

Question ID f5c3e3b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: f5c3e3b8

Which expression is equivalent to $(m^4q^4z^{-1})(mq^5z^3)$, where m , q , and z are positive?

- A. $m^4q^{20}z^{-3}$
- B. $m^5q^9z^2$
- C. $m^6q^8z^{-1}$
- D. $m^{20}q^{12}z^{-2}$

ID: f5c3e3b8 Answer

Correct Answer:

B

Rationale

Choice B is correct. Applying the commutative property of multiplication, the expression $(m^4q^4z^{-1})(mq^5z^3)$ can be rewritten as $(m^4m)(q^4q^5)(z^{-1}z^3)$. For positive values of x , $(x^a)(x^b) = x^{a+b}$. Therefore, the expression $(m^4m)(q^4q^5)(z^{-1}z^3)$ can be rewritten as $(m^{4+1})(q^{4+5})(z^{-1+3})$, or $m^5q^9z^2$.

Choice A is incorrect and may result from multiplying, not adding, the exponents.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 72ebc024

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 72ebc024

Which expression is equivalent to $16x^3y^2 + 14xy$?

- A. $2xy(8xy + 7)$
- B. $2xy(8x^2y + 7)$
- C. $14xy(2x^2y + 1)$
- D. $14xy(8x^2y + 1)$

ID: 72ebc024 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since $2xy$ is a common factor of each term in the given expression, the expression can be rewritten as $2xy(8x^2y + 7)$.

Choice A is incorrect. This expression is equivalent to $16x^2y^2 + 14xy$.

Choice C is incorrect. This expression is equivalent to $28x^3y^2 + 14xy$.

Choice D is incorrect. This expression is equivalent to $112x^3y^2 + 14xy$.

Question Difficulty:

Easy

Question ID dd4ab4c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dd4ab4c4

$$4a^2 + 20ab + 25b^2$$

Which of the following is a factor of the polynomial above?

- A. $a + b$
- B. $2a + 5b$
- C. $4a + 5b$
- D. $4a + 25b$

ID: dd4ab4c4 Answer

Correct Answer:

B

Rationale

Choice B is correct. The first and last terms of the polynomial are both squares such that $4a^2 = (2a)^2$ and $25b^2 = (5b)^2$. The second term is twice the product of the square root of the first and last terms: $20ab = 2(2a)(5b)$. Therefore, the polynomial is the square of a binomial such that $4a^2 + 20ab + 25b^2 = (2a + 5b)^2$, and $(2a + 5b)$ is a factor.

Choice A is incorrect and may be the result of incorrectly factoring the polynomial. Choice C is incorrect and may be the result of dividing the second and third terms of the polynomial by their greatest common factor. Choice D is incorrect and may be the result of not factoring the coefficients.

Question Difficulty:

Medium

Question ID b8caaf84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b8caaf84

If $p = 3x + 4$ and $v = x + 5$, which of the following is equivalent to $pv - 2p + v$?

- A. $3x^2 + 12x + 7$
- B. $3x^2 + 14x + 17$
- C. $3x^2 + 19x + 20$
- D. $3x^2 + 26x + 33$

ID: b8caaf84 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $p = 3x + 4$ and $v = x + 5$. Substituting the values for p and v into the expression $pv - 2p + v$ yields $(3x + 4)(x + 5) - 2(3x + 4) + x + 5$. Multiplying the terms $(3x + 4)(x + 5)$ yields $3x^2 + 4x + 15x + 20$. Using the distributive property to rewrite $-2(3x + 4)$ yields $-6x - 8$. Therefore, the entire expression can be represented as $3x^2 + 4x + 15x + 20 - 6x - 8 + x + 5$. Combining like terms yields $3x^2 + 14x + 17$.

Choice A is incorrect and may result from subtracting, instead of adding, the term $x + 5$. Choice C is incorrect. This is the result of multiplying the terms $(3x + 4)(x + 5)$. Choice D is incorrect and may result from distributing 2, instead of -2 , to the term $3x + 4$.

Question Difficulty:

Medium

Question ID e312081b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e312081b

$$(x + 5) + (2x - 3)$$

Which of the following is equivalent to the given expression?

- A. $3x - 2$
- B. $3x + 2$
- C. $3x - 8$
- D. $3x + 8$

ID: e312081b Answer

Correct Answer:

B

Rationale

Choice B is correct. Using the associative and commutative properties of addition, the given expression $(x + 5) + (2x - 3)$ can be rewritten as $(x + 2x) + (5 - 3)$. Adding these like terms results in $3x + 2$.

Choice A is incorrect and may result from adding $(x - 5) + (2x + 3)$. Choice C is incorrect and may result from adding $(x - 5) + (2x - 3)$. Choice D is incorrect and may result from adding $(x + 5) + (2x + 3)$.

Question Difficulty:

Easy

Question ID 52931bfa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 52931bfa

Which expression is equivalent to $\frac{8x(x-7)-3(x-7)}{2x-14}$, where $x > 7$?

- A. $\frac{x-7}{5}$
- B. $\frac{8x-3}{2}$
- C. $\frac{8x^2-3x-14}{2x-14}$
- D. $\frac{8x^2-3x-77}{2x-14}$

ID: 52931bfa Answer

Correct Answer:

B

Rationale

Choice B is correct. The given expression has a common factor of 2 in the denominator, so the expression can be rewritten as $\frac{8x(x-7)-3(x-7)}{2(x-7)}$. The three terms in this expression have a common factor of $(x - 7)$. Since it's given that $x > 7$, x can't be equal to 7, which means $(x - 7)$ can't be equal to 0. Therefore, each term in the expression, $\frac{8x(x-7)-3(x-7)}{2(x-7)}$, can be divided by $(x - 7)$, which gives $\frac{8x-3}{2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 075b29b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 075b29b0

Which expression is equivalent to $(9x^3 + 5x + 7) + (6x^3 + 5x^2 - 5)$?

- A. $15x^6 + 5x^2 - 5x - 35$
- B. $15x^3 + 10x^2 + 2$
- C. $15x^6 + 5x^2 + 5x + 2$
- D. $15x^3 + 5x^2 + 5x + 2$

ID: 075b29b0 Answer

Correct Answer:

D

Rationale

Choice D is correct. The given expression can be rewritten as $(9x^3 + 6x^3) + 5x^2 + 5x + (7 - 5)$. Combining like terms in this expression yields $15x^3 + 5x^2 + 5x + 2$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID ad2ec615

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: ad2ec615

Which of the following is equivalent to the expression $x^4 - x^2 - 6$?

- A. $(x^2 + 1)(x^2 - 6)$
- B. $(x^2 + 2)(x^2 - 3)$
- C. $(x^2 + 3)(x^2 - 2)$
- D. $(x^2 + 6)(x^2 - 1)$

ID: ad2ec615 Answer

Correct Answer:

B

Rationale

Choice B is correct. The term x^4 can be factored as $(x^2)(x^2)$. Factoring -6 as $(2)(-3)$ yields values that add to -1 , the coefficient of x^2 in the expression.

Choices A, C, and D are incorrect and may result from finding factors of -6 that don't add to the coefficient of x^2 in the original expression.

Question Difficulty:

Medium

Question ID 42c71eb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 42c71eb5

$$(2x + 5)^2 - (x - 2) + 2(x + 3)$$

Which of the following is equivalent to the expression above?

- A. $4x^2 + 21x + 33$
- B. $4x^2 + 21x + 29$
- C. $4x^2 + x + 29$
- D. $4x^2 + x + 33$

ID: 42c71eb5 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given expression can be rewritten as $(2x + 5)^2 + (-1)(x - 2) + 2(x + 3)$. Applying the distributive property, the expression $(-1)(x - 2) + 2(x + 3)$ can be rewritten as $-1(x) + (-1)(-2) + 2(x) + 2(3)$, or $-x + 2 + 2x + 6$. Adding like terms yields $x + 8$. Substituting $x + 8$ for $(-1)(x - 2) + 2(x + 3)$ in the given expression yields $(2x + 5)^2 + x + 8$. By the rules of exponents, the expression $(2x + 5)^2$ is equivalent to $(2x + 5)(2x + 5)$. Applying the distributive property, this expression can be rewritten as $2x(2x) + 2x(5) + 5(2x) + 5(5)$, or $4x^2 + 10x + 10x + 25$. Adding like terms gives $4x^2 + 20x + 25$. Substituting $4x^2 + 20x + 25$ for $(2x + 5)^2$ in the rewritten expression yields $4x^2 + 20x + 25 + x + 8$, and adding like terms yields $4x^2 + 21x + 33$.

Choices B, C, and D are incorrect. Choices C and D may result from rewriting the expression $(2x + 5)^2$ as $4x^2 + 25$, instead of as $4x^2 + 20x + 25$. Choices B and C may result from rewriting the expression $-(x - 2)$ as $-x - 2$, instead of $-x + 2$.

Question Difficulty:

Medium

Question ID 371cbf6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 371cbf6b

$$(ax + 3)(5x^2 - bx + 4) = 20x^3 - 9x^2 - 2x + 12$$

The equation above is true for all x , where a and b are constants. What is the value of ab ?

- A. 18
- B. 20
- C. 24
- D. 40

ID: 371cbf6b Answer

Correct Answer:

C

Rationale

Choice C is correct. If the equation is true for all x , then the expressions on both sides of the equation will be equivalent. Multiplying the polynomials on the left-hand side of the equation gives $5ax^3 - abx^2 + 4ax + 15x^2 - 3bx + 12$. On the right-hand side of the equation, the only x^2 -term is $-9x^2$. Since the expressions on both sides of the equation are equivalent, it follows that $-abx^2 + 15x^2 = -9x^2$, which can be rewritten as $(-ab + 15)x^2 = -9x^2$. Therefore, $-ab + 15 = -9$, which gives $ab = 24$.

Choice A is incorrect. If $ab = 18$, then the coefficient of x^2 on the left-hand side of the equation would be $-18 + 15 = -3$, which doesn't equal the coefficient of x^2 , -9 , on the right-hand side. Choice B is incorrect. If $ab = 20$, then the coefficient of x^2 on the left-hand side of the equation would be $-20 + 15 = -5$, which doesn't equal the coefficient of x^2 , -9 , on the right-hand side. Choice D is incorrect. If $ab = 40$, then the coefficient of x^2 on the left-hand side of the equation would be $-40 + 15 = -25$, which doesn't equal the coefficient of x^2 , -9 , on the right-hand side.

Question Difficulty:

Hard

Question ID a05bd3a4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: a05bd3a4

Which of the following expressions is equivalent to $x^2 - 5$?

A. $(x + \sqrt{5})^2$

B. $(x - \sqrt{5})^2$

C. $(x + \sqrt{5})(x - \sqrt{5})$

D. $(x + 5)(x - 1)$

ID: a05bd3a4 Answer

Correct Answer:

C

Rationale

Choice C is correct. The expression can be written as a difference of squares $x^2 - y^2$, which can be factored as $(x + y)(x - y)$. Here, $y^2 = 5$, so $y = \sqrt{5}$, and the expression therefore factors as $(x + \sqrt{5})(x - \sqrt{5})$.

Choices A and B are incorrect and may result from misunderstanding how to factor a difference of squares. Choice D is incorrect; $(x + 5)(x - 1)$ can be rewritten as $x^2 + 4x - 5$, which is not equivalent to the original expression.

Question Difficulty:

Medium

Question ID c3b116d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%;"><div style="display: inline-block; width: 100%; height: 10px; background-color: #005a9f;"></div></div>

ID: c3b116d7

Which of the following expressions is(are) a factor of $3x^2 + 20x - 63$?

- I. $x - 9$
- II. $3x - 7$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: c3b116d7 Answer

Correct Answer:

B

Rationale

Choice B is correct. The given expression can be factored by first finding two values whose sum is 20 and whose product is 3(-63), or -189. Those two values are 27 and -7. It follows that the given expression can be rewritten as $3x^2 + 27x - 7x - 63$. Since the first two terms of this expression have a common factor of $3x$ and the last two terms of this expression have a common factor of -7, this expression can be rewritten as $3x(x + 9) - 7(x + 9)$. Since the two terms of this expression have a common factor of $(x + 9)$, it can be rewritten as $(3x - 7)(x + 9)$. Therefore, expression II, $3x - 7$, is a factor of $3x^2 + 20x - 63$, but expression I, $x - 9$, is not a factor of $3x^2 + 20x - 63$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 40c09d66

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 40c09d66

If $\frac{\sqrt{x^5}}{3\sqrt[3]{x^4}} = x^{\frac{a}{b}}$ for all positive values of x ,

what is the value of $\frac{a}{b}$?

ID: 40c09d66 Answer

Rationale

The correct answer is $\frac{7}{6}$. The value of $\frac{a}{b}$ can be found by first rewriting the left-hand side of the given equation as $x^{\frac{5}{6} - \frac{4}{3}}$. Using the properties of exponents, this expression can be rewritten as $x^{\left(\frac{5}{2} - \frac{4}{3}\right)}$.

This expression can be rewritten by subtracting the fractions in the exponent, which yields $x^{\frac{7}{6}}$. Thus, $\frac{a}{b}$ is $\frac{7}{6}$. Note that 7/6, 1.166, and 1.167 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 3206b905

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 3206b905

Which of the following expressions is equivalent to $8x^{10} - 8x^9 + 88x$?

- A. $x(7x^{10} - 7x^9 + 87x)$
- B. $x(8^{10} - 8^9 + 88)$
- C. $8x(x^{10} - x^9 + 11x)$
- D. $8x(x^9 - x^8 + 11)$

ID: 3206b905 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since $8x$ is a common factor of each term in the given expression, the expression can be rewritten as $8x(x^9 - x^8 + 11)$.

Choice A is incorrect. This expression is equivalent to $7x^{11} - 7x^{10} + 87x^2$.

Choice B is incorrect. This expression is equivalent to $8^{10}x - 8^9x + 88x$.

Choice C is incorrect. This expression is equivalent to $8x^{11} - 8x^{10} + 88x^2$.

Question Difficulty:

Medium

Question ID b4a6ed81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b4a6ed81

The expression $90y^5 - 54y^4$ is equivalent to $ry^4(15y - 9)$, where r is a constant. What is the value of r ?

ID: b4a6ed81 Answer

Correct Answer:

6

Rationale

The correct answer is **6**. Applying the distributive property to the expression $ry^4(15y - 9)$ yields $15ry^5 - 9ry^4$. Since $90y^5 - 54y^4$ is equivalent to $ry^4(15y - 9)$, it follows that $90y^5 - 54y^4$ is also equivalent to $15ry^5 - 9ry^4$. Since these expressions are equivalent, it follows that corresponding coefficients are equivalent. Therefore, $90 = 15r$ and $-54 = -9r$. Solving either of these equations for r will yield the value of r . Dividing both sides of $90 = 15r$ by 15 yields $6 = r$. Therefore, the value of r is **6**.

Question Difficulty:

Medium

Question ID 34847f8a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 34847f8a

$$\frac{2}{x-2} + \frac{3}{x+5} = \frac{rx+t}{(x-2)(x+5)}$$

The equation above is true for all $x > 2$, where r and t are positive constants. What is the value of rt ?

- A. -20
- B. 15
- C. 20
- D. 60

ID: 34847f8a Answer

Correct Answer:

C

Rationale

Choice C is correct. To express the sum of the two rational expressions on the left-hand side of the equation as the single rational expression on the right-hand side of the equation, the expressions on the left-hand side must have the same denominator.

Multiplying the first expression by $\frac{x+5}{x-5}$ results in $\frac{2(x+5)}{(x-2)(x+5)}$, and multiplying the second expression by $\frac{x-2}{x-2}$ results in $\frac{3(x-2)}{(x-2)(x+5)}$, so the given equation can be rewritten as $\frac{2(x+5)}{(x-2)(x+5)} + \frac{3(x-2)}{(x-2)(x+5)} = \frac{rx+t}{(x-2)(x+5)}$, or $\frac{2x+10}{(x-2)(x+5)} + \frac{3x-6}{(x-2)(x+5)} = \frac{rx+t}{(x-2)(x+5)}$. Since the two rational expressions on the left-hand side of the equation have the same denominator as the rational expression on the right-hand side of the equation, it follows that $(2x+10) + (3x-6) = rx+t$. Combining like terms on the left-hand side yields $5x+4 = rx+t$, so it follows that $r=5$ and $t=4$. Therefore, the value of rt is $(5)(4)=20$.

Choice A is incorrect and may result from an error when determining the sign of either r or t . Choice B is incorrect and may result from not distributing the 2 and 3 to their respective terms in $\frac{2(x+5)}{(x-2)(x+5)} + \frac{3(x-2)}{(x-2)(x+5)} = \frac{rx+t}{(x-2)(x+5)}$. Choice D is incorrect and may result from a calculation error.

Question Difficulty:

Hard

Question ID cc776a04

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: cc776a04

Which of the following is an equivalent form of

$$(1.5x - 2.4)^2 - (5.2x^2 - 6.4) ?$$

- A. $-2.2x^2 + 1.6$
- B. $-2.2x^2 + 11.2$
- C. $-2.95x^2 - 7.2x + 12.16$
- D. $-2.95x^2 - 7.2x + 0.64$

ID: cc776a04 Answer

Correct Answer:

C

Rationale

Choice C is correct. The first expression $(1.5x - 2.4)^2$ can be rewritten as $(1.5x - 2.4)(1.5x - 2.4)$. Applying the distributive property to this product yields $(2.25x^2 - 3.6x - 3.6x + 5.76) - (5.2x^2 - 6.4)$. This difference can be rewritten as $(2.25x^2 - 3.6x - 3.6x + 5.76) + (-1)(5.2x^2 - 6.4)$. Distributing the factor of -1 through the second expression yields $2.25x^2 - 3.6x - 3.6x + 5.76 - 5.2x^2 + 6.4$. Regrouping like terms, the expression becomes $(2.25x^2 - 5.2x^2) + (-3.6x - 3.6x) + (5.76 + 6.4)$. Combining like terms yields $-2.95x^2 - 7.2x + 12.16$.

Choices A, B, and D are incorrect and likely result from errors made when applying the distributive property or combining the resulting like terms.

Question Difficulty:

Medium

Question ID 4ac59df6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4ac59df6

Which expression is equivalent to $(8yz)(y)(7z)$?

- A. $56y^2z^2$
- B. $56y^2z$
- C. $56yz$
- D. $16yz$

ID: 4ac59df6 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given expression can be rewritten as $(8 \cdot 7)(y \cdot y)(z \cdot z)$, which is equivalent to $(56)(y^2)(z^2)$, or $56y^2z^2$.

Choice B is incorrect. This expression is equivalent to $(8yz)(y)(7)$.

Choice C is incorrect. This expression is equivalent to $(8z)(y)(7)$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 137cc6fd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 137cc6fd

$$\sqrt[5]{70n} \left(\sqrt[6]{70n} \right)^2$$

For what value of x is the given expression equivalent to $(70n)^{30x}$, where $n > 1$?

ID: 137cc6fd Answer

Correct Answer:

.0177, .0178, 4/225

Rationale

The correct answer is $\frac{4}{225}$. An expression of the form $\sqrt[k]{a}$, where k is an integer greater than 1 and $a \geq 0$, is equivalent to $a^{\frac{1}{k}}$. Therefore, the given expression, where $n > 1$, is equivalent to $(70n)^{\frac{1}{5}} \left((70n)^{\frac{1}{6}} \right)^2$. Applying properties of exponents, this expression can be rewritten as $(70n)^{\frac{1}{5}} (70n)^{\frac{1}{6} \cdot 2}$, or $(70n)^{\frac{1}{5}} (70n)^{\frac{1}{3}}$, which can be rewritten as $(70n)^{\frac{1}{5} + \frac{1}{3}}$, or $(70n)^{\frac{8}{15}}$. It's given that the expression $\sqrt[5]{70n} \left(\sqrt[6]{70n} \right)^2$ is equivalent to $(70n)^{30x}$, where $n > 1$. It follows that $(70n)^{\frac{8}{15}}$ is equivalent to $(70n)^{30x}$. Therefore, $\frac{8}{15} = 30x$. Dividing both sides of this equation by 30 yields $\frac{8}{450} = x$, or $\frac{4}{225} = x$. Thus, the value of x for which the given expression is equivalent to $(70n)^{30x}$, where $n > 1$, is $\frac{4}{225}$. Note that 4/225, .0177, .0178, 0.017, and 0.018 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 70482e20

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 70482e20

Which expression is equivalent to $11x^3 - 5x^3$?

- A. $16x^3$
- B. $6x^3$
- C. $6x^6$
- D. $16x^6$

ID: 70482e20 Answer

Correct Answer:

B

Rationale

Choice B is correct. The given expression can be rewritten as $11x^3 + (-5)x^3$. Since the two terms of this expression are both constant multiples of x^3 , they are like terms and can, therefore, be combined through addition. Adding like terms in the expression $11x^3 + (-5)x^3$ yields $6x^3$.

Choice A is incorrect. This is equivalent to $11x^3 + 5x^3$, not $11x^3 - 5x^3$.

Choice C is incorrect. This is equivalent to $11x^6 - 5x^6$, not $11x^3 - 5x^3$.

Choice D is incorrect. This is equivalent to $11x^6 + 5x^6$, not $11x^3 - 5x^3$.

Question Difficulty:

Easy

Question ID 8452c42b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8452c42b

Which expression is equivalent to $50x^2 + 5x^2$?

- A. $250x^2$
- B. $10x^2$
- C. $45x^2$
- D. $55x^2$

ID: 8452c42b Answer

Correct Answer:

D

Rationale

Choice D is correct. The given expression shows addition of two like terms. Therefore, the given expression is equivalent to $(50 + 5)x^2$, or $55x^2$.

Choice A is incorrect. This expression is equivalent to $(50)(5)x^2$, not $(50 + 5)x^2$.

Choice B is incorrect. This expression is equivalent to $(\frac{50}{5})x^2$, not $(50 + 5)x^2$.

Choice C is incorrect. This expression is equivalent to $(50 - 5)x^2$, not $(50 + 5)x^2$.

Question Difficulty:

Easy

Question ID ea6d05bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ea6d05bb

The expression $(3x - 23)(19x + 6)$ is equivalent to the expression $ax^2 + bx + c$, where a , b , and c are constants. What is the value of b ?

ID: ea6d05bb Answer

Correct Answer:

-419

Rationale

The correct answer is **-419**. It's given that the expression $(3x - 23)(19x + 6)$ is equivalent to the expression $ax^2 + bx + c$, where a , b , and c are constants. Applying the distributive property to the given expression, $(3x - 23)(19x + 6)$, yields $(3x)(19x) + (3x)(6) - (23)(19x) - (23)(6)$, which can be rewritten as $57x^2 + 18x - 437x - 138$. Combining like terms yields $57x^2 - 419x - 138$. Since this expression is equivalent to $ax^2 + bx + c$, it follows that the value of b is **-419**.

Question Difficulty:

Hard

Question ID 0536ad4f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 0536ad4f

Which expression is equivalent to $20w - (4w + 3w)$?

- A. $10w$
- B. $13w$
- C. $19w$
- D. $21w$

ID: 0536ad4f Answer

Correct Answer:

B

Rationale

Choice B is correct. Combining like terms inside the parentheses of the given expression, $20w - (4w + 3w)$, yields $20w - (7w)$. Combining like terms in this resulting expression yields $13w$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 433184f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 433184f1

Which expression is equivalent to $\frac{4}{4x-5} - \frac{1}{x+1}$?

- A. $\frac{1}{(x+1)(4x-5)}$
- B. $\frac{3}{3x-6}$
- C. $-\frac{1}{(x+1)(4x-5)}$
- D. $\frac{9}{(x+1)(4x-5)}$

ID: 433184f1 Answer

Correct Answer:

D

Rationale

Choice D is correct. The expression $\frac{4}{4x-5} - \frac{1}{x+1}$ can be rewritten as $\frac{4}{4x-5} + \frac{(-1)}{x+1}$. To add the two terms of this expression, the terms can be rewritten with a common denominator. Since $\frac{x+1}{x+1} = 1$, the expression $\frac{4}{4x-5}$ can be rewritten as $\frac{(x+1)(4)}{(x+1)(4x-5)}$. Since $\frac{4x-5}{4x-5} = 1$, the expression $\frac{-1}{x+1}$ can be rewritten as $\frac{(4x-5)(-1)}{(4x-5)(x+1)}$. Therefore, the expression $\frac{4}{4x-5} + \frac{(-1)}{x+1}$ can be rewritten as $\frac{(x+1)(4)}{(x+1)(4x-5)} + \frac{(4x-5)(-1)}{(4x-5)(x+1)}$, which is equivalent to $\frac{(x+1)(4)+(4x-5)(-1)}{(x+1)(4x-5)}$. Applying the distributive property to each term of the numerator yields $\frac{(4x+4)+(-4x+5)}{(x+1)(4x-5)}$, or $\frac{(4x+(-4x))+(4+5)}{(x+1)(4x-5)}$. Adding like terms in the numerator yields $\frac{9}{(x+1)(4x-5)}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 1d3fee25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 1d3fee25

Which of the following is equivalent to $3(x + 5) - 6$?

- A. $3x - 3$
- B. $3x - 1$
- C. $3x + 9$
- D. $15x - 6$

ID: 1d3fee25 Answer

Correct Answer:

C

Rationale

Choice C is correct. Using the distributive property to multiply 3 and $(x + 5)$ gives $3x + 15 - 6$, which can be rewritten as $3x + 9$.

Choice A is incorrect and may result from rewriting the given expression as $3(x + 5 - 6)$. Choice B is incorrect and may result from incorrectly rewriting the expression as $(3x + 5) - 6$. Choice D is incorrect and may result from incorrectly rewriting the expression as $3(5x) - 6$.

Question Difficulty:

Easy

Question ID d8789a4c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d8789a4c

$$\frac{x^2 - c}{x - b}$$

In the expression above, b and c are positive integers. If the expression is equivalent to $x + b$ and $x \neq b$, which of the following could be the value of c ?

- A. 4
- B. 6
- C. 8
- D. 10

ID: d8789a4c Answer

Correct Answer:

A

Rationale

Choice A is correct. If the given expression is equivalent to $x + b$, then $\frac{x^2 - c}{x - b} = x + b$, where x isn't equal to b . Multiplying both sides of this equation by $x - b$ yields $x^2 - c = (x + b)(x - b)$. Since the right-hand side of this equation is in factored form for the difference of squares, the value of c must be a perfect square. Only choice A gives a perfect square for the value of c .

Choices B, C, and D are incorrect. None of these values of c produces a difference of squares. For example, when 6 is substituted

for c in the given expression, the result is $\frac{x^2 - 6}{x - b}$. The expression $x^2 - 6$ can't be factored with integer values, and therefore $\frac{x^2 - 6}{x - b}$ isn't equivalent to $x + b$.

Question Difficulty:

Hard

Question ID fde6f3bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: fde6f3bb

$$\begin{aligned}g(x) &= \frac{3}{5}x + \frac{7}{6} \\h(x) &= 6x - 5\end{aligned}$$

The functions g and h are defined by the equations shown. Which expression is equivalent to $g(x) \cdot h(x)$?

- A. $\frac{18x^2}{5} - \frac{35}{6}$
- B. $\frac{18x^2}{5} + \frac{27x}{11} - \frac{35}{6}$
- C. $\frac{18x^2}{5} - 4x - \frac{35}{6}$
- D. $\frac{18x^2}{5} + 4x - \frac{35}{6}$

ID: fde6f3bb Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that $g(x) = \frac{3}{5}x + \frac{7}{6}$ and $h(x) = 6x - 5$. Substituting $\frac{3}{5}x + \frac{7}{6}$ for $g(x)$ and $6x - 5$ for $h(x)$ in the expression $g(x) \cdot h(x)$ yields $(\frac{3}{5}x + \frac{7}{6})(6x - 5)$. This expression can be rewritten as $\frac{3}{5}x(6x - 5) + \frac{7}{6}(6x - 5)$, or $\frac{18x^2}{5} - 3x + 7x - \frac{35}{6}$, which is equivalent to $\frac{18x^2}{5} + 4x - \frac{35}{6}$.

Choice A is incorrect. This expression is equivalent to $\frac{3}{5}x(6x) + \frac{7}{6}(-5)$, not $(\frac{3}{5}x + \frac{7}{6})(6x - 5)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This expression is equivalent to $(\frac{3}{5}x - \frac{7}{6})(6x + 5)$, not $(\frac{3}{5}x + \frac{7}{6})(6x - 5)$.

Question Difficulty:

Medium

Question ID a520ba07

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: a520ba07

$$\sqrt[3]{x^3y^6}$$

Which of the following expressions is equivalent to the expression above?

- A. y^2
- B. xy^2
- C. y^3
- D. xy^3

ID: a520ba07 Answer

Correct Answer:

B

Rationale

Choice B is correct. One of the properties of radicals is $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$. Thus, the given expression can be rewritten as $\sqrt[3]{x^3} \cdot \sqrt[3]{y^6}$. Simplifying by taking the cube root of each part gives $x^1 \cdot y^2$, or xy^2 .

Choices A, C, and D are incorrect and may be the result of incorrect application of the properties of exponents and radicals.

Question Difficulty:

Medium

Question ID 5b6af6b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 5b6af6b1

Which expression is equivalent to $(d - 6)(8d^2 - 3)$?

- A. $8d^3 - 14d^2 - 3d + 18$
- B. $8d^3 - 17d^2 + 48$
- C. $8d^3 - 48d^2 - 3d + 18$
- D. $8d^3 - 51d^2 + 48$

ID: 5b6af6b1 Answer

Correct Answer:

C

Rationale

Choice C is correct. Applying the distributive property to the given expression yields $d(8d^2 - 3) - 6(8d^2 - 3)$. Applying the distributive property once again to this expression yields $(d)(8d^2) + (d)(-3) + (-6)(8d^2) + (-6)(-3)$, or $8d^3 + (-3d) + (-48d^2) + 18$. This expression can be rewritten as $8d^3 - 48d^2 - 3d + 18$. Thus, $(d - 6)(8d^2 - 3)$ is equivalent to $8d^3 - 48d^2 - 3d + 18$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID a255ae72

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a255ae72

If $x^2 = a + b$ and $y^2 = a + c$, which of the

following is equal to $(x^2 - y^2)^2$?

- A. $a^2 - 2ac + c^2$
- B. $b^2 - 2bc + c^2$
- C. $4a^2 - 4abc + c^2$
- D. $4a^2 - 2abc + b^2c^2$

ID: a255ae72 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $x^2 = a + b$ and $y^2 = a + c$. Using the distributive property, the expression $(x^2 - y^2)^2$ can be rewritten as $(x^2)^2 - 2x^2y^2 + (y^2)^2$. Substituting $a + b$ and $a + c$ for x^2 and y^2 , respectively, in this expression yields $(a + b)^2 - 2((a + b)(a + c)) + (a + c)^2$. Expanding this expression yields $(a^2 + 2ab + b^2) - (2a^2 + 2bc + 2ac + 2ab) + (a^2 + 2ac + c^2)$. Combining like terms, this expression can be rewritten as $b^2 - 2bc + c^2$.

Choices A, C, and D are incorrect and may result from an error in using the distributive property, substituting, or combining like terms.

Question Difficulty:

Medium

Question ID 84e5e36c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 84e5e36c

$$\begin{aligned}y &= 76 \\y &= x^2 - 5\end{aligned}$$

The graphs of the given equations in the xy -plane intersect at the point (x, y) . What is a possible value of x ?

- A. $-\frac{76}{5}$
- B. -9
- C. 5
- D. 76

ID: 84e5e36c Answer

Correct Answer:

B

Rationale

Choice B is correct. Since the point (x, y) is an intersection point of the graphs of the given equations in the xy -plane, the pair (x, y) should satisfy both equations, and thus is a solution of the given system. According to the first equation, $y = 76$.

Substituting 76 in place of y in the second equation yields $x^2 - 5 = 76$. Adding 5 to both sides of this equation yields $x^2 = 81$. Taking the square root of both sides of this equation yields two solutions: $x = 9$ and $x = -9$. Of these two solutions, only -9 is given as a choice.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the value of coordinate y , rather than x , of the intersection point (x, y) .

Question Difficulty:

Easy

Question ID ff2c1431

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: ff2c1431

$$7m = 5(n + p)$$

The given equation relates the positive numbers m , n , and p . Which equation correctly gives n in terms of m and p ?

- A. $n = \frac{5p}{7m}$
- B. $n = \frac{7m}{5} - p$
- C. $n = 5(7m) + p$
- D. $n = 7m - 5 - p$

ID: ff2c1431 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the equation $7m = 5(n + p)$ relates the positive numbers m , n , and p . Dividing both sides of the given equation by 5 yields $\frac{7m}{5} = n + p$. Subtracting p from both sides of this equation yields $\frac{7m}{5} - p = n$, or $n = \frac{7m}{5} - p$. It follows that the equation $n = \frac{7m}{5} - p$ correctly gives n in terms of m and p .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 6ce95fc8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6ce95fc8

$$2x^2 - 2 = 2x + 3$$

Which of the following is a solution to the equation above?

- A. 2
- B. $1 - \sqrt{11}$
- C. $\frac{1}{2} + \sqrt{11}$
- D. $\frac{1 + \sqrt{11}}{2}$

ID: 6ce95fc8 Answer

Correct Answer:

D

Rationale

Choice D is correct. A quadratic equation in the form $ax^2 + bx + c = 0$, where a, b, and c are constants, can be solved using the

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

quadratic formula: . Subtracting $2x + 3$ from both sides of the given equation yields $2x^2 - 2x - 5 = 0$.

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(2)(-5)}}{2(2)}$$

Applying the quadratic formula, where $a = 2$, $b = -2$, and $c = -5$, yields . This can be

rewritten as $x = \frac{2 \pm \sqrt{44}}{4}$. Since $\sqrt{44} = \sqrt{2^2(11)}$, or $2\sqrt{11}$, the equation can be rewritten as $x = \frac{2 \pm 2\sqrt{11}}{4}$. Dividing 2 from

$$\frac{1 + \sqrt{11}}{2} \text{ or } \frac{1 - \sqrt{11}}{2}$$

both the numerator and denominator yields . Of these two solutions, only $\frac{1 + \sqrt{11}}{2}$ is present among the choices. Thus, the correct choice is D.

Choice A is incorrect and may result from a computational or conceptual error. Choice B is incorrect and may result from using

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{a} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

instead of

as the quadratic formula. Choice C is incorrect and may result from

rewriting $\sqrt{44}$ as $4\sqrt{11}$ instead of $2\sqrt{11}$.

Question Difficulty:

Hard

Question ID 6bdcac03

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 6bdcac03

$$x^2 = -841$$

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 6bdcac03 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since the square of a real number is never negative, the given equation isn't true for any real value of x . Therefore, the given equation has zero distinct real solutions.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID f5aa5040

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f5aa5040

In the xy -plane, a line with equation $2y = c$ for some constant c intersects a parabola at exactly one point. If the parabola has equation $y = -2x^2 + 9x$, what is the value of c ?

ID: f5aa5040 Answer

Correct Answer:

20.25, 81/4

Rationale

The correct answer is $\frac{81}{4}$. The given linear equation is $2y = c$. Dividing both sides of this equation by 2 yields $y = \frac{c}{2}$. Substituting $\frac{c}{2}$ for y in the equation of the parabola yields $\frac{c}{2} = -2x^2 + 9x$. Adding $2x^2$ and $-9x$ to both sides of this equation yields $2x^2 - 9x + \frac{c}{2} = 0$. Since it's given that the line and the parabola intersect at exactly one point, the equation $2x^2 - 9x + \frac{c}{2} = 0$ must have exactly one solution. An equation of the form $Ax^2 + Bx + C = 0$, where A , B , and C are constants, has exactly one solution when the discriminant, $B^2 - 4AC$, is equal to 0. In the equation $2x^2 - 9x + \frac{c}{2} = 0$, where $A = 2$, $B = -9$, and $C = \frac{c}{2}$, the discriminant is $(-9)^2 - 4(2)(\frac{c}{2})$. Setting the discriminant equal to 0 yields $(-9)^2 - 4(2)(\frac{c}{2}) = 0$, or $81 - 4c = 0$. Adding $4c$ to both sides of this equation yields $81 = 4c$. Dividing both sides of this equation by 4 yields $c = \frac{81}{4}$. Note that 81/4 and 20.25 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 58443765

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 58443765

$$y = 5x + 4$$

$$y = 5x^2 + 4$$

Which ordered pair (x, y) is a solution to the given system of equations?

- A. $(0, 0)$
- B. $(0, 4)$
- C. $(8, 44)$
- D. $(8, 84)$

ID: 58443765 Answer

Correct Answer:

B

Rationale

Choice B is correct. The second equation in the given system is $y = 5x^2 + 4$. Substituting $5x^2 + 4$ for y in the first equation of the given system yields $5x^2 + 4 = 5x + 4$. Subtracting 4 from both sides of this equation yields $5x^2 = 5x$. Subtracting $5x$ from both sides of this equation yields $5x^2 - 5x = 0$. Factoring out a common factor of $5x$ from the left-hand side of this equation yields $5x(x - 1) = 0$. It follows that $5x = 0$ or $x - 1 = 0$. Dividing both sides of the equation $5x = 0$ by 5 yields $x = 0$. Substituting 0 for x in the equation $y = 5x + 4$ yields $y = 5(0) + 4$, or $y = 4$. Therefore, a solution to the given system of equations is the ordered pair $(0, 4)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 3d7d7534

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3d7d7534

$$(d - 30)(d + 30) - 7 = -7$$

What is a solution to the given equation?

ID: 3d7d7534 Answer

Correct Answer:

30, -30

Rationale

The correct answer is either **-30** or **30**. Adding **7** to each side of the given equation yields $(d - 30)(d + 30) = 0$. Since a product of two factors is equal to **0** if and only if at least one of the factors is **0**, either $d - 30 = 0$ or $d + 30 = 0$. Adding **30** to each side of the equation $d - 30 = 0$ yields $d = 30$. Subtracting **30** from each side of the equation $d + 30 = 0$ yields $d = -30$. Therefore, the solutions to the given equation are **-30** and **30**. Note that -30 and 30 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 722de804

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 722de804

$$(x - 47)^2 = 1$$

What is the sum of the solutions to the given equation?

ID: 722de804 Answer

Correct Answer:

94

Rationale

The correct answer is 94. Taking the square root of each side of the given equation yields $x - 47 = 1$ or $x - 47 = -1$. Adding 47 to both sides of the equation $x - 47 = 1$ yields $x = 48$. Adding 47 to both sides of the equation $x - 47 = -1$ yields $x = 46$. Therefore, the sum of the solutions to the given equation is $48 + 46$, or 94.

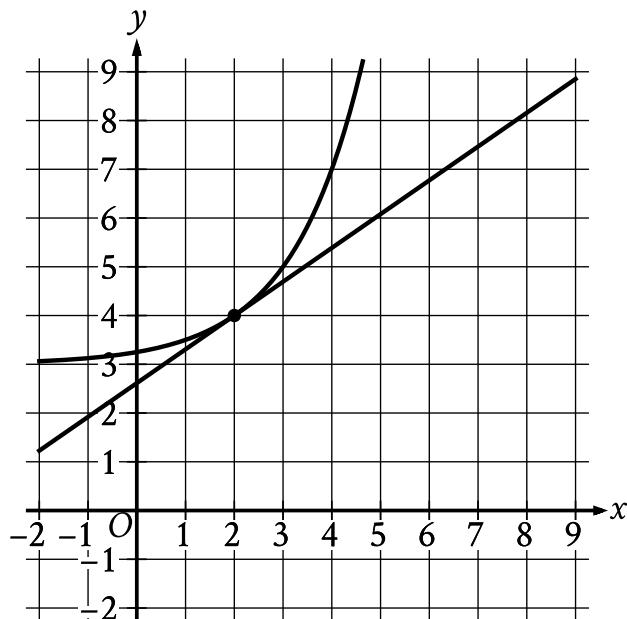
Question Difficulty:

Hard

Question ID 4ca30186

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 4ca30186



The graph of a system of a linear equation and a nonlinear equation is shown. What is the solution (x, y) to this system?

- A. $(0, 0)$
- B. $(0, 2)$
- C. $(2, 4)$
- D. $(4, 0)$

ID: 4ca30186 Answer

Correct Answer:

C

Rationale

Choice C is correct. The solution to the system of two equations corresponds to the point where the graphs of the equations intersect. The graphs of the linear equation and the nonlinear equation shown intersect at the point $(2, 4)$. Thus, the solution to the system is $(2, 4)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 911383f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 911383f2

$$(x - 4)(x + 2)(x - 1) = 0$$

What is the product of the solutions to the given equation?

- A. 8
- B. 3
- C. -3
- D. -8

ID: 911383f2 Answer

Correct Answer:

D

Rationale

Choice D is correct. By the zero-product property, if $(x - 4)(x + 2)(x - 1) = 0$, then $x - 4 = 0$, $x + 2 = 0$, or $x - 1 = 0$. Solving each of these equations for x yields $x = 4$, $x = -2$, or $x = 1$. The product of these solutions is $(4)(-2)(1) = -8$.

Choice A is incorrect and may result from sign errors made when solving the given equation. Choice B is incorrect and may result from finding the sum, not the product, of the solutions. Choice C is incorrect and may result from finding the sum, not the product, of the solutions in addition to making sign errors when solving the given equation.

Question Difficulty:

Medium

Question ID b80d10d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: b80d10d7

$$\frac{2(x+1)}{x+5} = 1 - \frac{1}{x+5}$$

What is the solution to the equation above?

- A. 0
- B. 2
- C. 3
- D. 5

ID: b80d10d7 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since $\frac{x+5}{x+5}$ is equivalent to 1, the right-hand side of the given equation can be rewritten as $\frac{x+5}{x+5} - \frac{1}{x+5}$, or $\frac{x+4}{x+5}$. Since the left- and right-hand sides of the equation $\frac{2(x+1)}{x+5} = \frac{x+4}{x+5}$ have the same denominator, it follows that $2(x+1) = x+4$. Applying the distributive property of multiplication to the expression $2(x+1)$ yields $2(x)+2(1)$, or $2x+2$. Therefore, $2x+2 = x+4$. Subtracting x and 2 from both sides of this equation yields $x = 2$.

Choices A, C, and D are incorrect. If $x = 0$, then $\frac{2(0+1)}{0+5} = 1 - \frac{1}{0+5}$. This can be rewritten as $\frac{2}{5} = \frac{4}{5}$, which is a false statement. Therefore, 0 isn't a solution to the given equation. Substituting 3 and 5 into the given equation yields similarly false statements.

Question Difficulty:

Medium

Question ID d0a53ef5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d0a53ef5

$$\sqrt{(x - 2)^2} = \sqrt{3x + 34}$$

What is the smallest solution to the given equation?

ID: d0a53ef5 Answer

Correct Answer:

-3

Rationale

The correct answer is **-3**. Squaring both sides of the given equation yields $(x - 2)^2 = 3x + 34$, which can be rewritten as $x^2 - 4x + 4 = 3x + 34$. Subtracting $3x$ and 34 from both sides of this equation yields $x^2 - 7x - 30 = 0$. This quadratic equation can be rewritten as $(x - 10)(x + 3) = 0$. According to the zero product property, $(x - 10)(x + 3)$ equals zero when either $x - 10 = 0$ or $x + 3 = 0$. Solving each of these equations for x yields $x = 10$ or $x = -3$. Therefore, the given equation has two solutions, **10** and **-3**. Of these two solutions, **-3** is the smallest solution to the given equation.

Question Difficulty:

Hard

Question ID fcdf87b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: fcdf87b7

$$y = x^2 - 4x + 4$$

$$y = 4 - x$$

If the ordered pair (x, y) satisfies the system of equations above,
what is one possible value of x ?

ID: fcdf87b7 Answer

Rationale

The correct answer is either 0 or 3. For an ordered pair to satisfy a system of equations, both the x - and y -values of the ordered pair must satisfy each equation in the system. Both expressions on the right-hand side of the given equations are equal to y , therefore it follows that both expressions on the right-hand side of the equations are equal to each other: $x^2 - 4x + 4 = 4 - x$.

This equation can be rewritten as $x^2 - 3x = 0$, and then through factoring, the equation becomes $x(x - 3) = 0$. Because the product of the two factors is equal to 0, it can be concluded that either $x = 0$ or $x - 3 = 0$, or rather, $x = 0$ or $x = 3$. Note that 0 and 3 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID 3148fe3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 3148fe3e

$$x^2 + y + 10 = 10$$

$$8x + 16 - y = 0$$

The solution to the given system of equations is (x, y) . What is the value of x ?

- A. -16
- B. -4
- C. 2
- D. 8

ID: 3148fe3e Answer

Correct Answer:

B

Rationale

Choice A is correct. Adding y to each side of the second equation in the given system of equations yields $8x + 16 = y$. Substituting $8x + 16$ for y in the first equation yields $x^2 + 8x + 16 + 10 = 10$. Subtracting 10 from each side of this equation yields $x^2 + 8x + 16 = 0$. This equation can be rewritten as $(x + 4)^2 = 0$. Taking the square root of each side of this equation yields $x + 4 = 0$. Subtracting 4 from each side of this equation yields $x = -4$. Therefore, the value of x is -4 .

Choice A is incorrect. This is the value of y , not x .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 652054da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 652054da

An oceanographer uses the equation $s = \frac{3}{2}p$ to model the speed s , in knots, of an ocean wave, where p represents the period of the wave, in seconds. Which of the following represents the period of the wave in terms of the speed of the wave?

- A. $p = \frac{2}{3}s$
- B. $p = \frac{3}{2}s$
- C. $p = \frac{2}{3} + s$
- D. $p = \frac{3}{2} + s$

ID: 652054da Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that p represents the period of the ocean wave, so the equation $s = \frac{3}{2}p$ can be solved for p to represent the period of the wave in terms of the speed of the wave. Multiplying both sides of the equation by the reciprocal of $\frac{3}{2}$

will isolate p . This yields $\frac{2}{3}s = \frac{2}{3}\left(\frac{3}{2}p\right)$, which simplifies to $\frac{2}{3}s = p$. Therefore, $p = \frac{2}{3}s$.

Choices B, C, and D are incorrect and may result from errors made when rearranging the equation to solve for p .

Question Difficulty:

Medium

Question ID 0380bbdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0380bbdc

If $4\sqrt{2x} = 16$, what is the value of $6x$?

- A. 24
- B. 48
- C. 72
- D. 96

ID: 0380bbdc Answer

Correct Answer:

B

Rationale

Choice B is correct. Dividing each side of the given equation by 4 yields $\sqrt{2x} = 4$. Squaring both sides of this equation yields $2x = 16$. Multiplying each side of this equation by 3 yields $6x = 48$. Therefore, the value of $6x$ is 48.

Choice A is incorrect. This is the value of $3x$, not $6x$.

Choice C is incorrect. This is the value of $9x$, not $6x$.

Choice D is incorrect. This is the value of $12x$, not $6x$.

Question Difficulty:

Medium

Question ID 3de7a7d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3de7a7d7

Which of the following is a solution to the equation $2x^2 - 4 = x^2$?

- A. 1
- B. 2
- C. 3
- D. 4

ID: 3de7a7d7 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting x^2 from both sides of the given equation yields $x^2 - 4 = 0$. Adding 4 to both sides of the equation gives $x^2 = 4$. Taking the square root of both sides of the equation gives $x = 2$ or $x = -2$. Therefore, $x = 2$ is one solution to the original equation.

Alternative approach: Subtracting x^2 from both sides of the given equation yields $x^2 - 4 = 0$. Factoring this equation gives $x^2 - 4 = (x + 2)(x - 2) = 0$, such that $x = 2$ or $x = -2$. Therefore, $x = 2$ is one solution to the original equation.

Choices A, C, and D are incorrect and may be the result of computation errors.

Question Difficulty:

Easy

Question ID 70f98ab4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 70f98ab4

$$q - 29r = s$$

The given equation relates the positive numbers q , r , and s . Which equation correctly expresses q in terms of r and s ?

- A. $q = s - 29r$
- B. $q = s + 29r$
- C. $q = 29rs$
- D. $q = -\frac{s}{29r}$

ID: 70f98ab4 Answer

Correct Answer:

B

Rationale

Choice B is correct. Adding $29r$ to each side of the given equation yields $q = s + 29r$. Therefore, the equation $q = s + 29r$ correctly expresses q in terms of r and s .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 2c05d312

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c05d312

$$57x^2 + (57b + a)x + ab = 0$$

In the given equation, a and b are positive constants. The product of the solutions to the given equation is kab , where k is a constant. What is the value of k ?

- A. $\frac{1}{57}$
- B. $\frac{1}{19}$
- C. 1
- D. 57

ID: 2c05d312 Answer

Correct Answer:

A

Rationale

Choice A is correct. The left-hand side of the given equation is the expression $57x^2 + (57b + a)x + ab$. Applying the distributive property to this expression yields $57x^2 + 57bx + ax + ab$. Since the first two terms of this expression have a common factor of $57x$ and the last two terms of this expression have a common factor of a , this expression can be rewritten as $57x(x + b) + a(x + b)$. Since the two terms of this expression have a common factor of $(x + b)$, it can be rewritten as $(x + b)(57x + a)$. Therefore, the given equation can be rewritten as $(x + b)(57x + a) = 0$. By the zero product property, it follows that $x + b = 0$ or $57x + a = 0$. Subtracting b from both sides of the equation $x + b = 0$ yields $x = -b$. Subtracting a from both sides of the equation $57x + a = 0$ yields $57x = -a$. Dividing both sides of this equation by 57 yields $x = \frac{-a}{57}$. Therefore, the solutions to the given equation are $-b$ and $\frac{-a}{57}$. It follows that the product of the solutions of the given equation is $(-b)\left(\frac{-a}{57}\right)$, or $\frac{ab}{57}$. It's given that the product of the solutions of the given equation is kab . It follows that $\frac{ab}{57} = kab$, which can also be written as $ab\left(\frac{1}{57}\right) = ab(k)$. It's given that a and b are positive constants. Therefore, dividing both sides of the equation $ab\left(\frac{1}{57}\right) = ab(k)$ by ab yields $\frac{1}{57} = k$. Thus, the value of k is $\frac{1}{57}$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 1fe32f7d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1fe32f7d

$$-x^2 + bx - 676 = 0$$

In the given equation, b is a positive integer. The equation has no real solution. What is the greatest possible value of b ?

ID: 1fe32f7d Answer

Correct Answer:

51

Rationale

The correct answer is 51. A quadratic equation of the form $ax^2 + bx + c = 0$, where a , b , and c are constants, has no real solution if and only if its discriminant, $-4ac + b^2$, is negative. In the given equation, $a = -1$ and $c = -676$. Substituting -1 for a and -676 for c in this expression yields a discriminant of $b^2 - 4(-1)(-676)$, or $b^2 - 2,704$. Since this value must be negative, $b^2 - 2,704 < 0$, or $b^2 < 2,704$. Taking the positive square root of each side of this inequality yields $b < 52$. Since b is a positive integer, and the greatest integer less than 52 is 51, the greatest possible value of b is 51.

Question Difficulty:

Hard

Question ID 95ed0b69

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 95ed0b69

$$p = \frac{k}{4j+9}$$

The given equation relates the distinct positive numbers p , k , and j . Which equation correctly expresses $4j + 9$ in terms of p and k ?

- A. $4j + 9 = \frac{k}{p}$
- B. $4j + 9 = kp$
- C. $4j + 9 = k - p$
- D. $4j + 9 = \frac{p}{k}$

ID: 95ed0b69 Answer

Correct Answer:

A

Rationale

Choice A is correct. To express $4j + 9$ in terms of p and k , the given equation must be solved for $4j + 9$. Since it's given that j is a positive number, $4j + 9$ is not equal to zero. Therefore, multiplying both sides of the given equation by $4j + 9$ yields the equivalent equation $p(4j + 9) = k$. Since it's given that p is a positive number, p is not equal to zero. Therefore, dividing each side of the equation $p(4j + 9) = k$ by p yields the equivalent equation $4j + 9 = \frac{k}{p}$.

Choice B is incorrect. This equation is equivalent to $p = \frac{4j+9}{k}$.

Choice C is incorrect. This equation is equivalent to $p = k - 4j - 9$.

Choice D is incorrect. This equation is equivalent to $p = k(4j + 9)$.

Question Difficulty:

Medium

Question ID c303ad23

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: c303ad23

If $3x^2 - 18x - 15 = 0$, what is the value of $x^2 - 6x$?

ID: c303ad23 Answer

Correct Answer:

5

Rationale

The correct answer is 5. Dividing each side of the given equation by 3 yields $x^2 - 6x - 5 = 0$. Adding 5 to each side of this equation yields $x^2 - 6x = 5$. Therefore, if $3x^2 - 18x - 15 = 0$, the value of $x^2 - 6x$ is 5.

Question Difficulty:

Hard

Question ID 6e02cd78

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0070C0; height: 10px;"></div> <div style="width: 50%; background-color: #D9D9D9; height: 10px;"></div>

ID: 6e02cd78

In the xy -plane, what is the y -coordinate of the point of intersection of the graphs of $y = (x - 1)^2$ and $y = 2x - 3$?

ID: 6e02cd78 Answer

Rationale

The correct answer is 1. The point of intersection of the graphs of the given equations is the solution to the system of the two equations. Since $y = (x - 1)^2$ and $y = 2x - 3$, it follows that $(x - 1)^2 = 2x - 3$, or $(x - 1)(x - 1) = 2x - 3$. Applying the distributive property to the left-hand side of this equation yields $x^2 - 2x + 1 = 2x - 3$. Subtracting $2x$ from and adding 3 to both sides of this equation yields $x^2 - 4x + 4 = 0$. Factoring the left-hand side of this equation yields $(x - 2)(x - 2) = 0$. By the zero product property, if $(x - 2)(x - 2) = 0$, it follows that $x - 2 = 0$. Adding 2 to both sides of $x - 2 = 0$ yields $x = 2$. Substituting 2 for x in either of the given equations yields $y = 1$. For example, substituting 2 for x in the second given equation yields $y = 2(2) - 3$, or $y = 1$. Therefore, the point of intersection of the graphs of the given equations is $(2, 1)$. The y -coordinate of this point is 1.

Question Difficulty:

Medium

Question ID 2cb17792

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2cb17792

$$\begin{aligned}y + k &= x + 26 \\y - k &= x^2 - 5x\end{aligned}$$

In the given system of equations, k is a constant. The system has exactly one distinct real solution. What is the value of k ?

ID: 2cb17792 Answer

Correct Answer:

17.5, 35/2

Rationale

The correct answer is $\frac{35}{2}$. Subtracting the second equation from the first equation yields $(y + k) - (y - k) = x + 26 - (x^2 - 5x)$, or $2k = -x^2 + 6x + 26$. This is equivalent to $x^2 - 6x + (2k - 26) = 0$. It's given that the system has exactly one distinct real solution; therefore, this equation has exactly one distinct real solution. An equation of the form $ax^2 + bx + c = 0$, where a , b , and c are constants, has exactly one distinct real solution when the discriminant, $b^2 - 4ac$, is equal to 0. The equation $x^2 - 6x + (2k - 26) = 0$ is of this form, where $a = 1$, $b = -6$, and $c = 2k - 26$. Substituting these values into the discriminant, $b^2 - 4ac$, yields $(-6)^2 - 4(1)(2k - 26)$. Setting the discriminant equal to 0 yields $(-6)^2 - 4(1)(2k - 26) = 0$, or $-8k + 140 = 0$. Subtracting 140 from both sides of this equation yields $-8k = -140$. Dividing both sides of this equation by -8 yields $k = \frac{35}{2}$. Note that $35/2$ and 17.5 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 74473be4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 74473be4

Which quadratic equation has no real solutions?

- A. $x^2 + 14x - 49 = 0$
- B. $x^2 - 14x + 49 = 0$
- C. $5x^2 - 14x - 49 = 0$
- D. $5x^2 - 14x + 49 = 0$

ID: 74473be4 Answer

Correct Answer:

D

Rationale

Choice D is correct. The number of solutions to a quadratic equation in the form $ax^2 + bx + c = 0$, where a , b , and c are constants, can be determined by the value of the discriminant, $b^2 - 4ac$. If the value of the discriminant is greater than zero, then the quadratic equation has two distinct real solutions. If the value of the discriminant is equal to zero, then the quadratic equation has exactly one real solution. If the value of the discriminant is less than zero, then the quadratic equation has no real solutions. For the quadratic equation in choice D, $5x^2 - 14x + 49 = 0$, $a = 5$, $b = -14$, and $c = 49$. Substituting 5 for a , -14 for b , and 49 for c in $b^2 - 4ac$ yields $(-14)^2 - 4(5)(49)$, or -784. Since -784 is less than zero, it follows that the quadratic equation $5x^2 - 14x + 49 = 0$ has no real solutions.

Choice A is incorrect. The value of the discriminant for this quadratic equation is 392. Since 392 is greater than zero, it follows that this quadratic equation has two real solutions.

Choice B is incorrect. The value of the discriminant for this quadratic equation is 0. Since zero is equal to zero, it follows that this quadratic equation has exactly one real solution.

Choice C is incorrect. The value of the discriminant for this quadratic equation is 1,176. Since 1,176 is greater than zero, it follows that this quadratic equation has two real solutions.

Question Difficulty:

Hard

Question ID 13e5a5d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 13e5a5d5

$$5|x| = 45$$

What is the positive solution to the given equation?

ID: 13e5a5d5 Answer

Correct Answer:

9

Rationale

The correct answer is 9. Dividing both sides of the given equation by 5 yields $|x| = 9$. By the definition of absolute value, if $|x| = 9$, then $x = 9$ or $x = -9$. Therefore, the two solutions to the equation $5|x| = 45$ are 9 and -9 . It follows that the positive solution to the given equation is 9.

Question Difficulty:

Easy

Question ID 7bd10ef3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7bd10ef3

$$2x^2 - 4x = t$$

In the equation above, t is a constant. If the equation has no real solutions, which of the following could be the value of t ?

- A. -3
- B. -1
- C. 1
- D. 3

ID: 7bd10ef3 Answer

Correct Answer:

A

Rationale

Choice A is correct. The number of solutions to any quadratic equation in the form $ax^2 + bx + c = 0$, where a , b , and c are constants, can be found by evaluating the expression $b^2 - 4ac$, which is called the discriminant. If the value of $b^2 - 4ac$ is a positive number, then there will be exactly two real solutions to the equation. If the value of $b^2 - 4ac$ is zero, then there will be exactly one real solution to the equation. Finally, if the value of $b^2 - 4ac$ is negative, then there will be no real solutions to the equation.

The given equation $2x^2 - 4x = t$ is a quadratic equation in one variable, where t is a constant. Subtracting t from both sides of the equation gives $2x^2 - 4x - t = 0$. In this form, $a = 2$, $b = -4$, and $c = -t$. The values of t for which the equation has no real solutions are the same values of t for which the discriminant of this equation is a negative value. The discriminant is equal to $(-4)^2 - 4(2)(-t)$; therefore, $(-4)^2 - 4(2)(-t) < 0$. Simplifying the left side of the inequality gives $16 + 8t < 0$. Subtracting 16 from both sides of the inequality and then dividing both sides by 8 gives $t < -2$. Of the values given in the options, -3 is the only value that is less than -2 . Therefore, choice A must be the correct answer.

Choices B, C, and D are incorrect and may result from a misconception about how to use the discriminant to determine the number of solutions of a quadratic equation in one variable.

Question Difficulty:
Hard

Question ID 11ccf3e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 11ccf3e1

$$14j + 5k = m$$

The given equation relates the numbers j , k , and m . Which equation correctly expresses k in terms of j and m ?

- A. $k = \frac{m-14j}{5}$
- B. $k = \frac{1}{5}m - 14j$
- C. $k = \frac{14j-m}{5}$
- D. $k = 5m - 14j$

ID: 11ccf3e1 Answer

Correct Answer:

A

Rationale

Choice A is correct. Subtracting $14j$ from each side of the given equation results in $5k = m - 14j$. Dividing each side of this equation by 5 results in $k = \frac{m-14j}{5}$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID e11294f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e11294f9

The solutions to $x^2 + 6x + 7 = 0$ are r and s , where $r < s$. The solutions to $x^2 + 8x + 8 = 0$ are t and u , where $t < u$. The solutions to $x^2 + 14x + c = 0$, where c is a constant, are $r + t$ and $s + u$. What is the value of c ?

ID: e11294f9 Answer

Correct Answer:

31

Rationale

The correct answer is 31. Subtracting 7 from both sides of the equation $x^2 + 6x + 7 = 0$ yields $x^2 + 6x = -7$. To complete the square, adding $(\frac{6}{2})^2$, or 3^2 , to both sides of this equation yields $x^2 + 6x + 3^2 = -7 + 3^2$, or $(x + 3)^2 = 2$. Taking the square root of both sides of this equation yields $x + 3 = \pm\sqrt{2}$. Subtracting 3 from both sides of this equation yields $x = -3 \pm \sqrt{2}$. Therefore, the solutions r and s to the equation $x^2 + 6x + 7 = 0$ are $-3 - \sqrt{2}$ and $-3 + \sqrt{2}$. Since $r < s$, it follows that $r = -3 - \sqrt{2}$ and $s = -3 + \sqrt{2}$. Subtracting 8 from both sides of the equation $x^2 + 8x + 8 = 0$ yields $x^2 + 8x = -8$. To complete the square, adding $(\frac{8}{2})^2$, or 4^2 , to both sides of this equation yields $x^2 + 8x + 4^2 = -8 + 4^2$, or $(x + 4)^2 = 8$. Taking the square root of both sides of this equation yields $x + 4 = \pm\sqrt{8}$, or $x + 4 = \pm 2\sqrt{2}$. Subtracting 4 from both sides of this equation yields $x = -4 \pm 2\sqrt{2}$. Therefore, the solutions t and u to the equation $x^2 + 8x + 8 = 0$ are $-4 - 2\sqrt{2}$ and $-4 + 2\sqrt{2}$. Since $t < u$, it follows that $t = -4 - 2\sqrt{2}$ and $u = -4 + 2\sqrt{2}$. It's given that the solutions to $x^2 + 14x + c = 0$, where c is a constant, are $r + t$ and $s + u$. It follows that this equation can be written as $(x - (r + t))(x - (s + u)) = 0$, which is equivalent to $x^2 - (r + t + s + u)x + (r + t)(s + u) = 0$. Therefore, the value of c is $(r + t)(s + u)$. Substituting $-3 - \sqrt{2}$ for r , $-4 - 2\sqrt{2}$ for t , $-3 + \sqrt{2}$ for s , and $-4 + 2\sqrt{2}$ for u in this equation yields $((-3 - \sqrt{2}) + (-4 - 2\sqrt{2}))((-3 + \sqrt{2}) + (-4 + 2\sqrt{2}))$, which is equivalent to $(-7 - 3\sqrt{2})(-7 + 3\sqrt{2})$, or $(-7)(-7) - (3\sqrt{2})(3\sqrt{2})$, which is equivalent to $49 - 18$, or 31. Therefore, the value of c is 31.

Question Difficulty:

Hard

Question ID 03ff48d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 03ff48d2

$$x(kx - 56) = -16$$

In the given equation, k is an integer constant. If the equation has no real solution, what is the least possible value of k ?

ID: 03ff48d2 Answer

Correct Answer:

50

Rationale

The correct answer is 50. An equation of the form $ax^2 + bx + c = 0$, where a , b , and c are constants, has no real solutions if and only if its discriminant, $b^2 - 4ac$, is negative. Applying the distributive property to the left-hand side of the equation

$x(kx - 56) = -16$ yields $kx^2 - 56x = -16$. Adding 16 to each side of this equation yields $kx^2 - 56x + 16 = 0$.

Substituting k for a , -56 for b , and 16 for c in $b^2 - 4ac$ yields a discriminant of $(-56)^2 - 4(k)(16)$, or $3,136 - 64k$. If the given equation has no real solution, it follows that the value of $3,136 - 64k$ must be negative. Therefore, $3,136 - 64k < 0$. Adding $64k$ to both sides of this inequality yields $3,136 < 64k$. Dividing both sides of this inequality by 64 yields $49 < k$, or $k > 49$. Since it's given that k is an integer, the least possible value of k is 50.

Question Difficulty:

Hard

Question ID b8f13a3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b8f13a3a

Function f is defined by $f(x) = -a^x + b$, where a and b are constants. In the xy -plane, the graph of $y = f(x) - 12$ has a y -intercept at $(0, -\frac{75}{7})$. The product of a and b is $\frac{320}{7}$. What is the value of a ?

ID: b8f13a3a Answer

Correct Answer:

20

Rationale

The correct answer is 20. It's given that $f(x) = -a^x + b$. Substituting $-a^x + b$ for $f(x)$ in the equation $y = f(x) - 12$ yields $y = -a^x + b - 12$. It's given that the y -intercept of the graph of $y = f(x) - 12$ is $(0, -\frac{75}{7})$. Substituting 0 for x and $-\frac{75}{7}$ for y in the equation $y = -a^x + b - 12$ yields $-\frac{75}{7} = -a^0 + b - 12$, which is equivalent to $-\frac{75}{7} = -1 + b - 12$, or $-\frac{75}{7} = b - 13$. Adding 13 to both sides of this equation yields $\frac{16}{7} = b$. It's given that the product of a and b is $\frac{320}{7}$, or $ab = \frac{320}{7}$. Substituting $\frac{16}{7}$ for b in this equation yields $(a)(\frac{16}{7}) = \frac{320}{7}$. Dividing both sides of this equation by $\frac{16}{7}$ yields $a = 20$.

Question Difficulty:

Hard

Question ID 8e1da169

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8e1da169

$$f(x) = (x - 44)(x - 46)$$

The function f is defined by the given equation. For what value of x does $f(x)$ reach its minimum?

A. 46

B. 45

C. 44

D. -1

ID: 8e1da169 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that $f(x) = (x - 44)(x - 46)$, which can be rewritten as $f(x) = x^2 - 90x + 2,024$. Since the coefficient of the x^2 -term is positive, the graph of $y = f(x)$ in the xy -plane opens upward and reaches its minimum value at its vertex. For an equation in the form $f(x) = ax^2 + bx + c$, where a , b , and c are constants, the x -coordinate of the vertex is $-\frac{b}{2a}$. For the equation $f(x) = x^2 - 90x + 2,024$, $a = 1$, $b = -90$, and $c = 2,024$. It follows that the x -coordinate of the vertex is $-\frac{(-90)}{2(1)}$, or 45. Therefore, $f(x)$ reaches its minimum when the value of x is 45.

Choice A is incorrect. This is one of the x -coordinates of the x -intercepts of the graph of $y = f(x)$ in the xy -plane.

Choice C is incorrect. This is one of the x -coordinates of the x -intercepts of the graph of $y = f(x)$ in the xy -plane.

Choice D is incorrect. This is the y -coordinate of the vertex of the graph of $y = f(x)$ in the xy -plane.

Question Difficulty:

Hard

Question ID 1d3c5c95

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1d3c5c95

$$f(x) = 4,000(0.75)^x$$

An entomologist recommended a program to reduce a certain invasive beetle population in an area. The given function estimates this beetle species' population x years after 2012, where $x \leq 7$. Which of the following is the best interpretation of 4,000 in this context?

- A. The estimated initial beetle population for this species and area in 2012
- B. The estimated beetle population for this species and area 7 years after 2012
- C. The estimated percent decrease in the beetle population for this species and area each year after 2012
- D. The estimated percent decrease in the beetle population for this species and area every 7 years after 2012

ID: 1d3c5c95 Answer

Correct Answer:

A

Rationale

Choice A is correct. For an exponential function in the form $f(x) = a(b)^x$, where a and b are positive constants and $b < 1$, the initial value of $f(x)$, or the value of $f(x)$ when $x = 0$, is a and the value of $f(x)$ decreases by $100(1 - b)\%$ each time x increases by 1. Therefore, the initial value of the function $f(x) = 4,000(0.75)^x$, or the value of $f(x)$ when $x = 0$, is 4,000. Therefore, the best interpretation of 4,000 in this context is the estimated initial beetle population for this species and area in 2012.

Choice B is incorrect. The estimated beetle population for this species and area 7 years after 2012 is $4,000(0.75)^7$, or approximately 534, not 4,000.

Choice C is incorrect. The estimated percent decrease in the beetle population for this species and area each year after 2012 is $100(1 - 0.75)$, or 25, not 4,000.

Choice D is incorrect. The estimated percent decrease in the beetle population for this species and area every 7 years after 2012 is $100(1 - 0.75^7)$, or approximately 87, not 4,000.

Question Difficulty:

Medium

Question ID ae05d37b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: ae05d37b

The function $f(t) = 40,000(2)^{\frac{t}{790}}$ gives the number of bacteria in a population t minutes after an initial observation. How much time, in minutes, does it take for the number of bacteria in the population to double?

- A. 2
- B. 790
- C. 1,580
- D. 40,000

ID: ae05d37b Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that t minutes after an initial observation, the number of bacteria in a population is $40,000(2)^{\frac{t}{790}}$. This expression consists of the initial number of bacteria, 40,000, multiplied by the expression $2^{\frac{t}{790}}$. The time, in minutes, it takes for the number of bacteria to double is the increase in the value of t that causes the expression $2^{\frac{t}{790}}$ to double. Since the base is 2, the expression $2^{\frac{t}{790}}$ will double when the exponent increases by 1. Since the exponent of this expression is $\frac{t}{790}$, the exponent will increase by 1 when t increases by 790. Therefore, the time, in minutes, it takes for the number of bacteria in the population to double is 790.

Choice A is incorrect. This is the base of the exponent, not the time it takes for the number of bacteria in the population to double.

Choice C is incorrect. This is the number of minutes it takes for the population to double twice.

Choice D is incorrect. This is the number of bacteria that are initially observed, not the time it takes for the number of bacteria in the population to double.

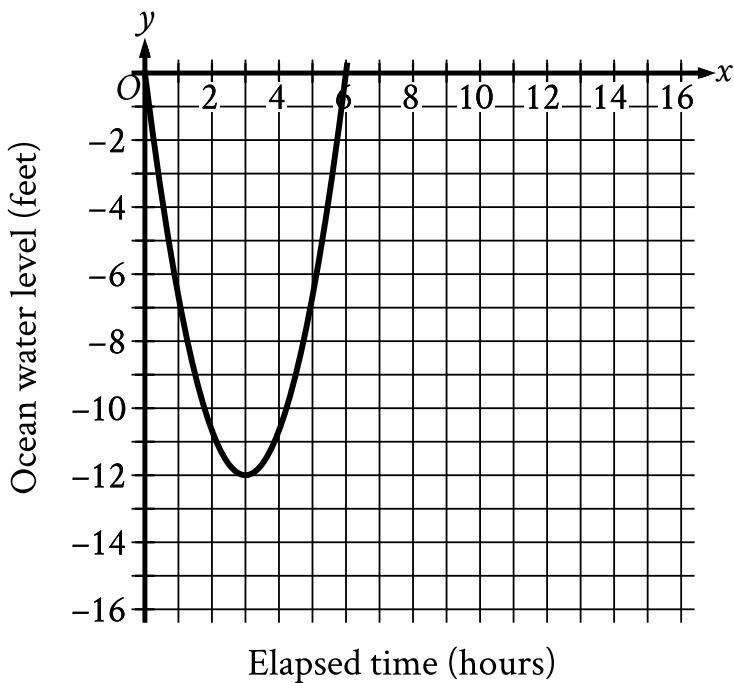
Question Difficulty:

Medium

Question ID 1ee962ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 1ee962ec



Scientists recorded data about the ocean water levels at a certain location over a period of 6 hours. The graph shown models the data, where $y = 0$ represents sea level. Which table gives values of x and their corresponding values of y based on the model?

A.

x	y
0	-12
0	3
3	6

B.

x	y
0	0
3	12
0	-6

C.

x	y
0	0
3	-12
6	0

D.	x	y
	0	0
	12	3
	-6	0

ID: 1ee962ec Answer

Correct Answer:

C

Rationale

Choice C is correct. Each point (x, y) on the graph represents an elapsed time x , in hours, and the corresponding ocean water level y , in feet, at a certain location based on the model. The graph shown passes through the points $(0, 0)$, $(3, -12)$, and $(6, 0)$. Thus, the table in choice C gives the values of x and their corresponding values of y based on the model.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 07bcecac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 07bcecac

$$P(t) = 24.8(1.036)^t$$

The function P gives the predicted population, in millions, of a certain country for the period from **1984** to **2018**, where t is the number of years after **1984**. According to the model, what is the best interpretation of the statement " $P(8)$ is approximately equal to **32.91**"?

- A. In **1984**, the predicted population of this country was approximately **8** million.
- B. In **1984**, the predicted population of this country was approximately **32.91** million.
- C. **8** years after **1984**, the predicted population of this country was approximately **32.91** million.
- D. **32.91** years after **1984**, the predicted population of this country was approximately **8** million.

ID: 07bcecac Answer

Correct Answer:

C

Rationale

Choice C is correct. The function P gives the predicted population, in millions, of a certain country for the period from **1984** to **2018**, where t is the number of years after **1984**. Since the value of $P(8)$ is the value of $P(t)$ when $t = 8$, it follows that " $P(8)$ is approximately equal to **32.91**" means that the value of $P(t)$ is approximately equal to **32.91** when $t = 8$. Therefore, the best interpretation of the statement " $P(8)$ is approximately equal to **32.91**" is that **8** years after **1984**, the predicted population of this country was approximately **32.91** million.

Choice A is incorrect. In **1984**, the predicted population of this country was **24.8** million, not approximately **8** million.

Choice B is incorrect. In **1984**, the predicted population of this country was **24.8** million, not approximately **32.91** million.

Choice D is incorrect. **32.91** years after **1984**, the predicted population of this country was $24.8(1.036)^{32.91}$ million, or approximately **79.42** million, not approximately **8** million.

Question Difficulty:

Easy

Question ID 02add2d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 02add2d2

A company has a newsletter. In January **2018**, there were **1,300** customers subscribed to the newsletter. For the next **24** months after January **2018**, the total number of customers subscribed to the newsletter each month was **7%** greater than the total number subscribed the previous month. Which equation gives the total number of customers, c , subscribed to the company's newsletter m months after January **2018**, where $m \leq 24$?

- A. $c = 1,300(0.07)^m$
- B. $c = 1,300(1.07)^m$
- C. $c = 1,300(1.7)^m$
- D. $c = 1,300(7)^m$

ID: 02add2d2 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that in January **2018**, there were **1,300** customers subscribed to a company's newsletter and for the next **24** months after January **2018**, the total number of customers subscribed to the newsletter each month was **7%** greater than the total number subscribed the previous month. It follows that this situation can be represented by the equation

$c = a(1 + \frac{r}{100})^m$, where c is the total number of customers subscribed to the company's newsletter m months after January **2018**, a is the number of customers subscribed to the newsletter in January **2018**, and the total number of customers subscribed to the newsletter each month was $r\%$ greater than the total number subscribed the previous month. Substituting **1,300** for a and **7** for r in this equation yields $c = 1,300(1 + \frac{7}{100})^m$, or $c = 1,300(1.07)^m$.

Choice A is incorrect. This equation represents a situation where the total number of customers subscribed each month was **93%** less, not **7%** greater, than the total number subscribed the previous month.

Choice C is incorrect. This equation represents a situation where the total number of customers subscribed each month was **70%**, not **7%**, greater than the total number subscribed the previous month.

Choice D is incorrect. This equation represents a situation where the total number of customers subscribed each month was **600%**, not **7%**, greater than the total number subscribed the previous month.

Question Difficulty:

Medium

Question ID 788bfd56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 788bfd56

The function f is defined by $f(x) = 4 + \sqrt{x}$. What is the value of $f(144)$?

- A. 0
- B. 16
- C. 40
- D. 76

ID: 788bfd56 Answer

Correct Answer:

B

Rationale

Choice B is correct. The value of $f(144)$ is the value of $f(x)$ when $x = 144$. It's given that the function f is defined by $f(x) = 4 + \sqrt{x}$. Substituting 144 for x in this equation yields $f(144) = 4 + \sqrt{144}$. Since the positive square root of 144 is 12, it follows that this equation can be rewritten as $f(144) = 4 + 12$, or $f(144) = 16$. Therefore, the value of $f(144)$ is 16.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the value of $f(1,296)$, not $f(144)$.

Choice D is incorrect. This is the value of $f(5,184)$, not $f(144)$.

Question Difficulty:

Easy

Question ID 40491607

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 40491607

$$f(x) = (x - 1)(x + 3)(x - 2)$$

In the xy -plane, when the graph of the function f , where $y = f(x)$, is shifted up 6 units, the resulting graph is defined by the function g . If the graph of $y = g(x)$ crosses through the point $(4, b)$, where b is a constant, what is the value of b ?

ID: 40491607 Answer

Correct Answer:

48

Rationale

The correct answer is 48. It's given that in the xy -plane, when the graph of the function f , where $y = f(x)$, is shifted up 6 units, the resulting graph is defined by the function g . Therefore, function g can be defined by the equation $g(x) = f(x) + 6$. It's given that $f(x) = (x - 1)(x + 3)(x - 2)$. Substituting $(x - 1)(x + 3)(x - 2)$ for $f(x)$ in the equation $g(x) = f(x) + 6$ yields $g(x) = (x - 1)(x + 3)(x - 2) + 6$. For the point $(4, b)$, the value of x is 4. Substituting 4 for x in the equation $g(x) = (x - 1)(x + 3)(x - 2) + 6$ yields $g(4) = (4 - 1)(4 + 3)(4 - 2) + 6$, or $g(4) = 48$. It follows that the graph of $y = g(x)$ crosses through the point $(4, 48)$. Therefore, the value of b is 48.

Question Difficulty:

Hard

Question ID 369b7bb7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 369b7bb7

The function g is defined by $g(x) = \sqrt{8x + 1}$. What is the value of $g(3)$?

- A. $\frac{5}{8}$
- B. $\frac{25}{8}$
- C. 5
- D. 25

ID: 369b7bb7 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the function g is defined by $g(x) = \sqrt{8x + 1}$. Substituting 3 for x in the given function yields $g(3) = \sqrt{8(3) + 1}$, which is equivalent to $g(3) = \sqrt{25}$, or $g(3) = 5$. Therefore, the value of $g(3)$ is 5.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the value of $8(3) + 1$, not $\sqrt{8(3) + 1}$.

Question Difficulty:

Easy

Question ID f89af023

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: f89af023

A rectangular volleyball court has an area of 162 square meters. If the length of the court is twice the width, what is the width of the court, in meters?

- A. 9
- B. 18
- C. 27
- D. 54

ID: f89af023 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the volleyball court is rectangular and has an area of 162 square meters. The formula for the area of a rectangle is $A = \ell \cdot w$, where A is the area, ℓ is the length, and w is the width of the rectangle. It's also given that the length of the volleyball court is twice the width, thus $\ell = 2w$. Substituting the given value into the formula for the area of a rectangle and using the relationship between length and width for this rectangle yields $162 = (2w)(w)$. This equation can be rewritten as $162 = 2w^2$. Dividing both sides of this equation by 2 yields $81 = w^2$. Taking the square root of both sides of this equation yields $\pm 9 = w$. Since the width of a rectangle is a positive number, the width of the volleyball court is 9 meters.

Choice B is incorrect because this is the length of the rectangle. Choice C is incorrect because this is the result of using 162 as the perimeter rather than the area. Choice D is incorrect because this is the result of calculating w in the equation $162 = 2w + w$ instead of $162 = (2w)(w)$.

Question Difficulty:

Medium

Question ID 7902bed0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 7902bed0

A machine launches a softball from ground level. The softball reaches a maximum height of **51.84** meters above the ground at **1.8** seconds and hits the ground at **3.6** seconds. Which equation represents the height above ground h , in meters, of the softball t seconds after it is launched?

- A. $h = -t^2 + 3.6$
- B. $h = -t^2 + 51.84$
- C. $h = -16(t - 1.8)^2 - 3.6$
- D. $h = -16(t - 1.8)^2 + 51.84$

ID: 7902bed0 Answer

Correct Answer:

D

Rationale

Choice D is correct. An equation representing the height above ground h , in meters, of a softball t seconds after it is launched by a machine from ground level can be written in the form $h = -a(t - b)^2 + c$, where a , b , and c are positive constants. In this equation, b represents the time, in seconds, at which the softball reaches its maximum height of c meters above the ground. It's given that this softball reaches a maximum height of **51.84** meters above the ground at **1.8** seconds; therefore, $b = 1.8$ and $c = 51.84$. Substituting **1.8** for b and **51.84** for c in the equation $h = -a(t - b)^2 + c$ yields $h = -a(t - 1.8)^2 + 51.84$. It's also given that this softball hits the ground at **3.6** seconds; therefore, $h = 0$ when $t = 3.6$. Substituting **0** for h and **3.6** for t in the equation $h = -a(t - 1.8)^2 + 51.84$ yields $0 = -a(3.6 - 1.8)^2 + 51.84$, which is equivalent to $0 = -a(1.8)^2 + 51.84$, or $0 = -3.24a + 51.84$. Adding **3.24a** to both sides of this equation yields $3.24a = 51.84$. Dividing both sides of this equation by **3.24** yields $a = 16$. Substituting **16** for a in the equation $h = -a(t - 1.8)^2 + 51.84$ yields $h = -16(t - 1.8)^2 + 51.84$. Therefore, $h = -16(t - 1.8)^2 + 51.84$ represents the height above ground h , in meters, of this softball t seconds after it is launched.

Choice A is incorrect. This equation represents a situation where the maximum height is **3.6** meters above the ground at **0** seconds, not **51.84** meters above the ground at **1.8** seconds.

Choice B is incorrect. This equation represents a situation where the maximum height is **51.84** meters above the ground at **0** seconds, not **1.8** seconds.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 4a0d0399

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4a0d0399

The function f is defined by $f(x) = a^x + b$, where a and b are constants. In the xy -plane, the graph of $y = f(x)$ has an x -intercept at $(2, 0)$ and a y -intercept at $(0, -323)$. What is the value of b ?

ID: 4a0d0399 Answer

Correct Answer:

-324

Rationale

The correct answer is **-324**. It's given that the function f is defined by $f(x) = a^x + b$, where a and b are constants. It's also given that the graph of $y = f(x)$ has a y -intercept at $(0, -323)$. It follows that $f(0) = -323$. Substituting 0 for x and -323 for $f(x)$ in $f(x) = a^x + b$ yields $-323 = a^0 + b$, or $-323 = 1 + b$. Subtracting 1 from each side of this equation yields $-324 = b$. Therefore, the value of b is **-324**.

Question Difficulty:

Hard

Question ID 768b60d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 768b60d2

For the exponential function f , the value of $f(0)$ is c , where c is a constant. Of the following equations that define the function f , which equation shows the value of c as the coefficient or the base?

- A. $f(x) = 22(1.5)^{x+1}$
- B. $f(x) = 33(1.5)^x$
- C. $f(x) = 49.5(1.5)^{x-1}$
- D. $f(x) = 74.25(1.5)^{x-2}$

ID: 768b60d2 Answer

Correct Answer:

B

Rationale

Choice B is correct. Each of the given choices is an equation of the form $f(x) = a(b)^{x-k}$, where a , b , and k are constants. For an equation of this form, the coefficient, a , is equal to the value of the function when the exponent is equal to 0, or when $x = k$. It follows that in the equation $f(x) = 33(1.5)^x$, the coefficient, 33, is equal to the value of $f(0)$. Substituting 0 for x in this equation yields $f(0) = 33(1.5)^0$, which is equivalent to $f(0) = 33(1)$, or $f(0) = 33$. Thus, the value of c is 33 and the equation $f(x) = 33(1.5)^x$ shows the value of c as the coefficient.

Choice A is incorrect. This equation shows the value of $f(-1)$, not $f(0)$, as the coefficient.

Choice C is incorrect. This equation shows the value of $f(1)$, not $f(0)$, as the coefficient.

Choice D is incorrect. This equation shows the value of $f(2)$, not $f(0)$, as the coefficient.

Question Difficulty:

Medium

Question ID e53add44

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: e53add44

$$S(n) = 38,000a^n$$

The function S above models the annual salary, in dollars, of an employee n years after starting a job, where a is a constant. If the employee's salary increases by 4% each year, what is the value of a ?

- A. 0.04
- B. 0.4
- C. 1.04
- D. 1.4

ID: e53add44 Answer

Correct Answer:

C

Rationale

Choice C is correct. A model for a quantity S that increases by a certain percentage per time period n is an exponential function in the form $S(n) = I\left(1 + \frac{r}{100}\right)^n$, where I is the initial value at time $n = 0$ for $r\%$ annual increase. It's given that the annual increase in an employee's salary is 4%, so $r = 4$. The initial value can be found by substituting 0 for n in the given function, which yields $S(0) = 38,000$. Therefore, $I = 38,000$. Substituting these values for r and I into the form of the exponential function $S(n) = I\left(1 + \frac{r}{100}\right)^n$ yields $S(n) = 38,000\left(1 + \frac{4}{100}\right)^n$, or $S(n) = 38,000(1.04)^n$. Therefore, the value of a in the given function is 1.04.

Choices A, B, and D are incorrect and may result from incorrectly representing the annual increase in the exponential function.

Question Difficulty:

Medium

Question ID 9654add7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9654add7

$$f(x) = -500x^2 + 25,000x$$

The revenue $f(x)$, in dollars, that a company receives from sales of a product is given by the function f above, where x is the unit price, in dollars, of the product. The graph of $y = f(x)$ in the xy -plane intersects the x -axis at 0 and a . What does a represent?

- A. The revenue, in dollars, when the unit price of the product is \$0
- B. The unit price, in dollars, of the product that will result in maximum revenue
- C. The unit price, in dollars, of the product that will result in a revenue of \$0
- D. The maximum revenue, in dollars, that the company can make

ID: 9654add7 Answer

Correct Answer:

C

Rationale

Choice C is correct. By definition, the y -value when a function intersects the x -axis is 0. It's given that the graph of the function intersects the x -axis at 0 and a , that x is the unit price, in dollars, of a product, and that $f(x)$, where $y = f(x)$, is the revenue, in dollars, that a company receives from the sales of the product. Since the value of a occurs when $y = 0$, a is the unit price, in dollars, of the product that will result in a revenue of \$0.

Choice A is incorrect. The revenue, in dollars, when the unit price of the product is \$0 is represented by $f(x)$, when $x = 0$. Choice B is incorrect. The unit price, in dollars, of the product that will result in maximum revenue is represented by the x -coordinate of the maximum of f . Choice D is incorrect. The maximum revenue, in dollars, that the company can make is represented by the y -coordinate of the maximum of f .

Question Difficulty:

Hard

Question ID 4618501a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 4618501a

$$f(x) = 3,000(0.75)^x$$

A conservation scientist implemented a program to reduce the population of a certain species in an area. The given function estimates this species' population x years after 2008, where $x \leq 8$. Which of the following is the best interpretation of 3,000 in this context?

- A. The estimated percent decrease in the population for this species and area every 8 years after 2008
- B. The estimated percent decrease in the population for this species and area each year after 2008
- C. The estimated population for this species and area 8 years after 2008
- D. The estimated initial population for this species and area in 2008

ID: 4618501a Answer

Correct Answer:

D

Rationale

Choice D is correct. Substituting 0 for x in the given equation yields $f(0) = 3,000(0.75)^0$, which is equivalent to $f(0) = 3,000(1)$, or $f(0) = 3,000$. It's given that the function estimates the species' population x years after 2008, so it follows that the estimated population of the species is 3,000 in 2008. Therefore, the best interpretation of 3,000 in this context is the estimated initial population for this species and area in 2008.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect. The estimated percent decrease in the population for this species and area each year after 2008 is 25%, not 3,000.

Choice C is incorrect. The estimated population for this species and area 8 years after 2008 is $3,000(0.75)^8$, or approximately 300, not 3,000.

Question Difficulty:

Medium

Question ID 263f9937

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 263f9937

Growth of a Culture of Bacteria

Day	Number of bacteria per milliliter at end of day
1	2.5×10^5
2	5.0×10^5
3	1.0×10^6

A culture of bacteria is growing at an exponential rate, as shown in the table above. At this rate, on which day would the number of bacteria per milliliter reach 5.12×10^8 ?

- A. Day 5
- B. Day 9
- C. Day 11
- D. Day 12

ID: 263f9937 Answer

Correct Answer:

D

Rationale

Choice D is correct. The number of bacteria per milliliter is doubling each day. For example, from day 1 to day 2, the number of bacteria increased from 2.5×10^5 to 5.0×10^5 . At the end of day 3 there are 10^6 bacteria per milliliter. At the end of day 4, there will be $10^6 \times 2$ bacteria per milliliter. At the end of day 5, there will be $(10^6 \times 2) \times 2$, or $10^6 \times (2^2)$ bacteria per milliliter, and so on. At the end of day d, the number of bacteria will be $10^6 \times (2^{d-3})$. If the number of bacteria per milliliter will reach 5.12×10^8 at the end of day d, then the equation $10^6 \times (2^{d-3}) = 5.12 \times 10^8$ must hold. Since 5.12×10^8 can be rewritten as 512×10^6 , the equation is equivalent to $2^{d-3} = 512$. Rewriting 512 as 2^9 gives $d - 3 = 9$, so $d = 12$. The number of bacteria per milliliter would reach 5.12×10^8 at the end of day 12.

Choices A, B, and C are incorrect. Given the growth rate of the bacteria, the number of bacteria will not reach 5.12×10^8 per milliliter by the end of any of these days.

Question Difficulty:

Hard

Question ID 926c246b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 926c246b

$$D = 5,640(1.9)^t$$

The equation above estimates the global data traffic D , in terabytes, for the year that is t years after 2010. What is the best interpretation of the number 5,640 in this context?

- A. The estimated amount of increase of data traffic, in terabytes, each year
- B. The estimated percent increase in the data traffic, in terabytes, each year
- C. The estimated data traffic, in terabytes, for the year that is t years after 2010
- D. The estimated data traffic, in terabytes, in 2010

ID: 926c246b Answer

Correct Answer:

D

Rationale

Choice D is correct. Since t represents the number of years after 2010, the estimated data traffic, in terabytes, in 2010 can be calculated using the given equation when $t = 0$. Substituting 0 for t in the given equation yields $D = 5,640(1.9)^0$, or $5,640(1) = 5,640$. Thus, 5,640 represents the estimated data traffic, in terabytes, in 2010.

Choice A is incorrect. Since the equation is exponential, the amount of increase of data traffic each year isn't constant. Choice B is incorrect. According to the equation, the percent increase in data traffic each year is 90%. Choice C is incorrect. The estimated data traffic, in terabytes, for the year that is t years after 2010 is represented by D, not the number 5,640.

Question Difficulty:

Medium

Question ID 4dd4efcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 4dd4efcf

$$f(x) = ax^2 + 4x + c$$

In the given quadratic function, a and c are constants. The graph of $y = f(x)$ in the xy -plane is a parabola that opens upward and has a vertex at the point (h, k) , where h and k are constants. If $k < 0$ and $f(-9) = f(3)$, which of the following must be true?

- I. $c < 0$
- II. $a \geq 1$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: 4dd4efcf Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the graph of $y = f(x)$ in the xy -plane is a parabola with vertex (h, k) . If $f(-9) = f(3)$, then for the graph of $y = f(x)$, the point with an x -coordinate of -9 and the point with an x -coordinate of 3 have the same y -coordinate. In the xy -plane, a parabola is a symmetric graph such that when two points have the same y -coordinate, these points are equidistant from the vertex, and the x -coordinate of the vertex is halfway between the x -coordinates of these two points.

Therefore, for the graph of $y = f(x)$, the points with x -coordinates -9 and 3 are equidistant from the vertex, (h, k) , and h is halfway between -9 and 3 . The value that is halfway between -9 and 3 is $\frac{-9+3}{2}$, or -3 . Therefore, $h = -3$. The equation defining f can also be written in vertex form, $f(x) = a(x - h)^2 + k$. Substituting -3 for h in this equation yields

$f(x) = a(x - (-3))^2 + k$, or $f(x) = a(x + 3)^2 + k$. This equation is equivalent to $f(x) = a(x^2 + 6x + 9) + k$, or $f(x) = ax^2 + 6ax + 9a + k$. Since $f(x) = ax^2 + 4x + c$, it follows that $6a = 4$ and $9a + k = c$. Dividing both sides of the equation $6a = 4$ by 6 yields $a = \frac{4}{6}$, or $a = \frac{2}{3}$. Since $\frac{2}{3} < 1$, it's not true that $a \geq 1$. Therefore, statement II isn't true.

Substituting $\frac{2}{3}$ for a in the equation $9a + k = c$ yields $9(\frac{2}{3}) + k = c$, or $6 + k = c$. Subtracting 6 from both sides of this equation yields $k = c - 6$. If $k < 0$, then $c - 6 < 0$, or $c < 6$. Since c could be any value less than 6 , it's not necessarily true that $c < 0$. Therefore, statement I isn't necessarily true. Thus, neither I nor II must be true.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

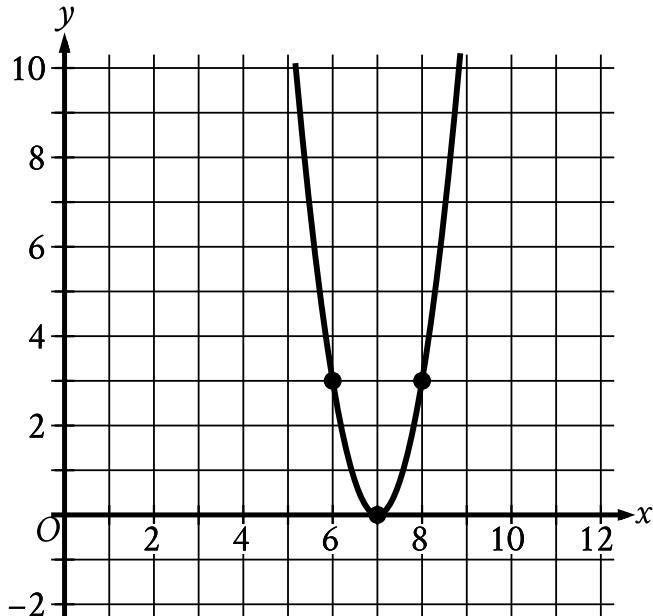
Question Difficulty:

Hard

Question ID cc2601cb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: cc2601cb



The x -intercept of the graph shown is $(x, 0)$. What is the value of x ?

ID: cc2601cb Answer

Correct Answer:

7

Rationale

The correct answer is 7. It's given that the x -intercept of the graph shown is $(x, 0)$. The graph passes through the point $(7, 0)$. Therefore, the value of x is 7.

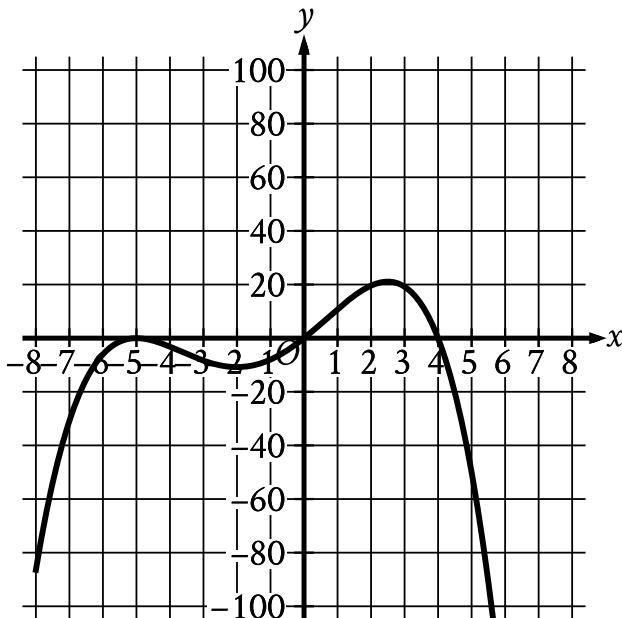
Question Difficulty:

Easy

Question ID 252a3b3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 252a3b3a



Which of the following could be the equation of the graph shown in the xy -plane?

- A. $y = -\frac{1}{10}x(x - 4)(x + 5)$
- B. $y = -\frac{1}{10}x(x - 4)(x + 5)^2$
- C. $y = -\frac{1}{10}x(x - 5)(x + 4)$
- D. $y = -\frac{1}{10}x(x - 5)^2(x + 4)$

ID: 252a3b3a Answer

Correct Answer:

B

Rationale

Choice B is correct. Each of the given choices is an equation of the form $y = -\frac{1}{10}x(x - a)^m(x + b)^n$, where a , b , m , and n are positive constants. In the xy -plane, the graph of an equation of this form has x -intercepts at $x = 0$, $x = a$, and $x = -b$. The graph shown has x -intercepts at $x = 0$, $x = 4$, and $x = -5$. Therefore, $a = 4$ and $b = 5$. Of the given choices, only choices A and B have $a = 4$ and $b = 5$. For an equation in the form $y = -\frac{1}{10}x(x - a)^m(x + b)^n$, if all values of x that are less than $-b$ or greater than a correspond to negative y -values, then the sum of all the exponents of the factors on the right-hand side of the equation is even. In the graph shown, all values of x less than -5 or greater than 4 correspond to negative y -values. Therefore, the sum of all the exponents of the factors on the right-hand side of the equation $y = -\frac{1}{10}x(x - 4)^m(x + 5)^n$ must be even. For choice A, the sum of these exponents is $1 + 1 + 1$, or 3 , which is odd. For choice B, the sum of these exponents is $1 + 1 + 2$, or 4 , which is even. Therefore, $y = -\frac{1}{10}x(x - 4)(x + 5)^2$ could be the equation of the graph shown.

Choice A is incorrect. For the graph of this equation, all values of x less than -5 correspond to positive, not negative, y -values.

Choice C is incorrect. The graph of this equation has x -intercepts at $x = -4$, $x = 0$, and $x = 5$, rather than x -intercepts at $x = -5$, $x = 0$, and $x = 4$.

Choice D is incorrect. The graph of this equation has x -intercepts at $x = -4$, $x = 0$, and $x = 5$, rather than x -intercepts at $x = -5$, $x = 0$, and $x = 4$.

Question Difficulty:

Medium

Question ID 2992ac30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2992ac30

$$P(t) = 260(1.04)^{(\frac{6}{4})t}$$

The function P models the population, in thousands, of a certain city t years after 2003. According to the model, the population is predicted to increase by 4% every n months. What is the value of n ?

- A. 8
- B. 12
- C. 18
- D. 72

ID: 2992ac30 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function P models the population, in thousands, of a certain city t years after 2003. The value of the base of the given exponential function, 1.04, corresponds to an increase of 4% for every increase of 1 in the exponent, $(\frac{6}{4})t$. If the exponent is equal to 0, then $(\frac{6}{4})t = 0$. Multiplying both sides of this equation by $(\frac{4}{6})$ yields $t = 0$. If the exponent is equal to 1, then $(\frac{6}{4})t = 1$. Multiplying both sides of this equation by $(\frac{4}{6})$ yields $t = \frac{4}{6}$, or $t = \frac{2}{3}$. Therefore, the population is predicted to increase by 4% every $\frac{2}{3}$ of a year. It's given that the population is predicted to increase by 4% every n months. Since there are 12 months in a year, $\frac{2}{3}$ of a year is equivalent to $(\frac{2}{3})(12)$, or 8, months. Therefore, the value of n is 8.

Choice B is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model $P(t) = 260(1.04)^t$, not $P(t) = 260(1.04)^{(\frac{6}{4})t}$.

Choice C is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model $P(t) = 260(1.04)^{(\frac{4}{6})t}$, not $P(t) = 260(1.04)^{(\frac{6}{4})t}$.

Choice D is incorrect. This is the number of months in which the population is predicted to increase by 4% according to the model $P(t) = 260(1.04)^{(\frac{1}{6})t}$, not $P(t) = 260(1.04)^{(\frac{6}{4})t}$.

Question Difficulty:

Hard

Question ID 841ef26c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 841ef26c

$$f(x) = 4x^2 + 64x + 262$$

The function g is defined by $g(x) = f(x + 5)$. For what value of x does $g(x)$ reach its minimum?

- A. -13
- B. -8
- C. -5
- D. -3

ID: 841ef26c Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that $g(x) = f(x + 5)$. Since $f(x) = 4x^2 + 64x + 262$, it follows that $f(x + 5) = 4(x + 5)^2 + 64(x + 5) + 262$. Expanding the quantity $(x + 5)^2$ in this equation yields $f(x + 5) = 4(x^2 + 10x + 25) + 64(x + 5) + 262$. Distributing the 4 and the 64 yields $f(x + 5) = 4x^2 + 40x + 100 + 64x + 320 + 262$. Combining like terms yields $f(x + 5) = 4x^2 + 104x + 682$. Therefore, $g(x) = 4x^2 + 104x + 682$. For a quadratic function defined by an equation of the form $g(x) = a(x - h)^2 + k$, where a , h , and k are constants and a is positive, $g(x)$ reaches its minimum, k , when the value of x is h . The equation $g(x) = 4x^2 + 104x + 682$ can be rewritten in this form by completing the square. This equation is equivalent to $g(x) = 4(x^2 + 26) + 682$, or $g(x) = 4(x^2 + 26x + 169 - 169) + 682$. This equation can be rewritten as $g(x) = 4((x + 13)^2 - 169) + 682$, or $g(x) = 4(x + 13)^2 - 4(169) + 682$, which is equivalent to $g(x) = 4(x + 13)^2 + 6$. This equation is in the form $g(x) = a(x - h)^2 + k$, where $a = 4$, $h = -13$, and $k = 6$. Therefore, $g(x)$ reaches its minimum when the value of x is -13 .

Choice B is incorrect. This is the value of x for which $f(x)$, rather than $g(x)$, reaches its minimum.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the value of x for which $f(x - 5)$, rather than $f(x + 5)$, reaches its minimum.

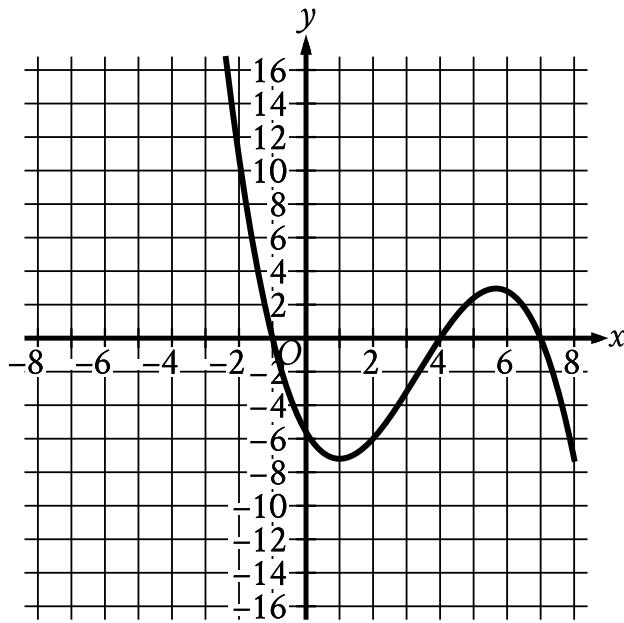
Question Difficulty:

Hard

Question ID cc6ccd71

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: cc6ccd71



The graph of $y = f(x)$ is shown, where the function f is defined by $f(x) = ax^3 + bx^2 + cx + d$ and a, b, c , and d are constants. For how many values of x does $f(x) = 0$?

- A. One
- B. Two
- C. Three
- D. Four

ID: cc6ccd71 Answer

Correct Answer:

C

Rationale

Choice C is correct. If a value of x satisfies $f(x) = 0$, the graph of $y = f(x)$ will contain a point $(x, 0)$ and thus touch the x-axis. Since there are 3 points at which this graph touches the x-axis, there are 3 values of x for which $f(x) = 0$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID b39d74a0

Assessment

Test

Domain

Skill

Difficulty

SAT

Math

Advanced Math

Nonlinear functions

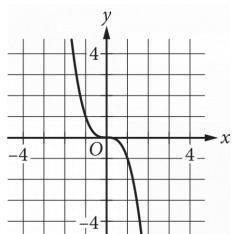


ID: b39d74a0

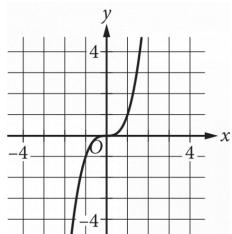
x	y
0	0
1	1
2	8
3	27

The table shown includes some values of x and their corresponding values of y . Which of the following graphs in the xy -plane could represent the relationship between x and y ?

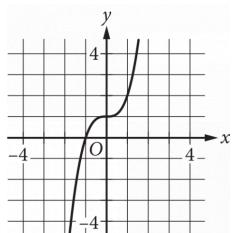
A.



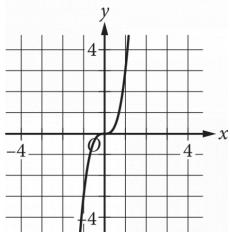
B.



C.



D.



ID: b39d74a0 Answer

Correct Answer:

B

Rationale

Choice B is correct. Each pair of values shown in the table gives the ordered pair of coordinates for a point that lies on the graph that represents the relationship between x and y in the xy -plane: $(0,0)$, $(1,1)$, $(2,8)$, and $(3,27)$. Only the graph in choice B passes through the points listed in the table that are visible in the given choices.

Choices A, C, and D are incorrect. None of these graphs passes through the point $(1,1)$.

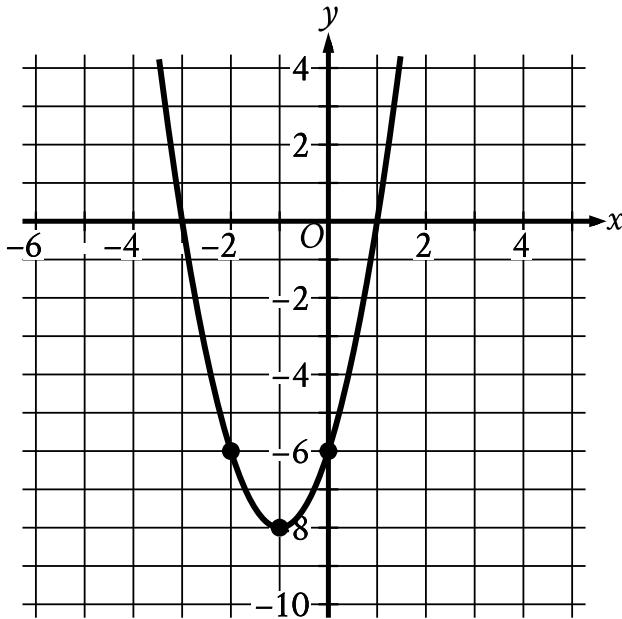
Question Difficulty:

Easy

Question ID 09d21d79

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 09d21d79



The graph of $y = 2x^2 + bx + c$ is shown, where b and c are constants. What is the value of bc ?

ID: 09d21d79 Answer

Correct Answer:

-24

Rationale

The correct answer is -24 . Since the graph passes through the point $(0, -6)$, it follows that when the value of x is 0 , the value of y is -6 . Substituting 0 for x and -6 for y in the given equation yields $-6 = 2(0)^2 + b(0) + c$, or $-6 = c$. Therefore, the value of c is -6 . Substituting -6 for c in the given equation yields $y = 2x^2 + bx - 6$. Since the graph passes through the point $(-1, -8)$, it follows that when the value of x is -1 , the value of y is -8 . Substituting -1 for x and -8 for y in the equation $y = 2x^2 + bx - 6$ yields $-8 = 2(-1)^2 + b(-1) - 6$, or $-8 = 2 - b - 6$, which is equivalent to $-8 = -4 - b$. Adding 4 to each side of this equation yields $-4 = -b$. Dividing each side of this equation by -1 yields $4 = b$. Since the value of b is 4 and the value of c is -6 , it follows that the value of bc is $(4)(-6)$, or -24 .

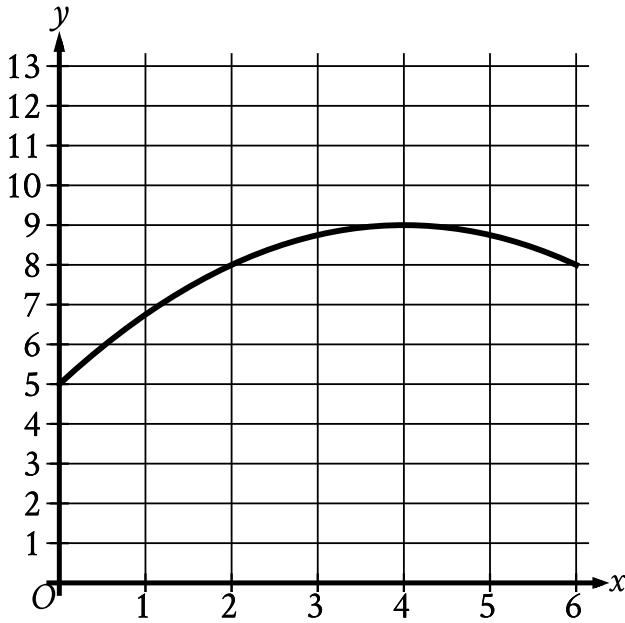
Alternate approach: The given equation represents a parabola in the xy -plane with a vertex at $(-1, -8)$. Therefore, the given equation, $y = 2x^2 + bx + c$, which is written in standard form, can be written in vertex form, $y = a(x - h)^2 + k$, where (h, k) is the vertex of the parabola and a is the value of the coefficient on the x^2 term when the equation is written in standard form. It follows that $a = 2$. Substituting 2 for a , -1 for h , and -8 for k in this equation yields $y = 2(x - (-1))^2 + (-8)$, or $y = 2(x + 1)^2 - 8$. Squaring the binomial on the right-hand side of this equation yields $y = 2(x^2 + 2x + 1) - 8$. Multiplying each term inside the parentheses on the right-hand side of this equation by 2 yields $y = 2x^2 + 4x + 2 - 8$, which is equivalent to $y = 2x^2 + 4x - 6$. From the given equation $y = 2x^2 + bx + c$, it follows that the value of b is 4 and the value of c is -6 . Therefore, the value of bc is $(4)(-6)$, or -24 .

Question Difficulty:
Hard

Question ID 95d1c344

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: 95d1c344



The graph models the number of active projects a company was working on x months after the end of November 2012, where $0 \leq x \leq 6$. According to the model, what is the predicted number of active projects the company was working on at the end of November 2012?

- A. 0
- B. 5
- C. 8
- D. 9

ID: 95d1c344 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the graph models the number of active projects a company was working on x months after the end of November 2012. Therefore, the value of x that corresponds to the end of November 2012 is 0. The point at which $x = 0$ is the y-intercept of the graph. It follows that the y-intercept of the graph shown is the point $(0, 5)$. Therefore, according to the model, the predicted number of active projects the company was working on at the end of November 2012 is 5.

Choice A is incorrect. This is the value of x that corresponds to the end of November 2012, not the predicted number of active projects the company was working on at the end of November 2012.

Choice C is incorrect. This is the predicted number of active projects the company was working on **2** months after the end of November **2012**.

Choice D is incorrect. This is the predicted number of active projects the company was working on **4** months after the end of November **2012**.

Question Difficulty:

Medium

Question ID d135f4bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d135f4bf

The function f is defined by $f(x) = (x - 6)(x - 2)(x + 6)$. In the xy -plane, the graph of $y = g(x)$ is the result of translating the graph of $y = f(x)$ up 4 units. What is the value of $g(0)$?

ID: d135f4bf Answer

Correct Answer:

76

Rationale

The correct answer is 76. It's given that the graph of $y = g(x)$ is the result of translating the graph of $y = f(x)$ up 4 units in the xy -plane. It follows that the graph of $y = g(x)$ is the same as the graph of $y = f(x) + 4$. Substituting $g(x)$ for y in the equation $y = f(x) + 4$ yields $g(x) = f(x) + 4$. It's given that $f(x) = (x - 6)(x - 2)(x + 6)$. Substituting $(x - 6)(x - 2)(x + 6)$ for $f(x)$ in the equation $g(x) = f(x) + 4$ yields $g(x) = (x - 6)(x - 2)(x + 6) + 4$. Substituting 0 for x in this equation yields $g(0) = (0 - 6)(0 - 2)(0 + 6) + 4$, or $g(0) = 76$. Thus, the value of $g(0)$ is 76.

Question Difficulty:

Hard

Question ID d4950429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d4950429

A rectangle has a length of x units and a width of $(x - 15)$ units. If the rectangle has an area of 76 square units, what is the value of x ?

- A. 4
- B. 19
- C. 23
- D. 76

ID: d4950429 Answer

Correct Answer:

B

Rationale

Choice B is correct. The area of a rectangle is equal to its length multiplied by its width. Multiplying the given length, x units, by the given width, $(x - 15)$ units, yields $x(x - 15)$ square units. If the rectangle has an area of 76 square units, it follows that $x(x - 15) = 76$, or $x^2 - 15x = 76$. Subtracting 76 from both sides of this equation yields $x^2 - 15x - 76 = 0$. Factoring the left-hand side of this equation yields $(x - 19)(x + 4) = 0$. Applying the zero product property to this equation yields two solutions: $x = 19$ and $x = -4$. Since x is the rectangle's length, in units, which must be positive, the value of x is 19.

Choice A is incorrect. This is the width, in units, of the rectangle, not the value of x .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the area, in square units, of the rectangle, not the value of x .

Question Difficulty:

Medium

Question ID 0adbe034

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 0adbe034

If $4x - 28 = -24$, what is the value of $x - 7$?

- A. -24
- B. -22
- C. -6
- D. -1

ID: 0adbe034 Answer

Correct Answer:

C

Rationale

Choice C is correct. Dividing all terms in the given equation by 4 yields $\frac{4x}{4} - \frac{28}{4} = -\frac{24}{4}$, or $x - 7 = -6$. Therefore, the value of $x - 7$ is -6 .

Choice A is incorrect. This is the value of $4x - 28$, not $x - 7$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID baca4a4c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: baca4a4c

$$7(2x - 3) = 63$$

Which equation has the same solution as the given equation?

- A. $2x - 3 = 9$
- B. $2x - 3 = 56$
- C. $2x - 21 = 63$
- D. $2x - 21 = 70$

ID: baca4a4c Answer

Correct Answer:

A

Rationale

Choice A is correct. Dividing each side of the given equation by 7 yields $\frac{7(2x-3)}{7} = \frac{63}{7}$, or $2x - 3 = 9$. Therefore, the equation $2x - 3 = 9$ is equivalent to the given equation and has the same solution.

Choice B is incorrect. This equation is equivalent to $7(2x - 3) = 392$, not $7(2x - 3) = 63$.

Choice C is incorrect. Distributing 7 on the left-hand side of the given equation yields $14x - 21 = 63$, not $2x - 21 = 63$.

Choice D is incorrect. Distributing 7 on the left-hand side of the given equation yields $14x - 21 = 63$, not $2x - 21 = 70$.

Question Difficulty:

Easy

Question ID 097e10f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 30%; background-color: #cccccc; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 097e10f5

What value of p satisfies the equation $5p + 180 = 250$?

- A. 14
- B. 65
- C. 86
- D. 250

ID: 097e10f5 Answer

Correct Answer:

A

Rationale

Choice A is correct. Subtracting 180 from both sides of the given equation yields $5p = 70$. Dividing both sides of this equation by 5 yields $p = 14$. Therefore, the value of p that satisfies the equation $5p + 180 = 250$ is 14.

Choice B is incorrect. This value of p satisfies the equation $5p + 180 = 505$.

Choice C is incorrect. This value of p satisfies the equation $5p + 180 = 610$.

Choice D is incorrect. This value of p satisfies the equation $5p + 180 = 1,430$.

Question Difficulty:

Easy

Question ID 9b886541

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 9b886541

If $3x - 8 = 7$, what is the value of $3x + 8$?

- A. -1
- B. 5
- C. 13
- D. 23

ID: 9b886541 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that $3x - 8 = 7$. Adding 8 to both sides of this equation yields $3x = 15$. Adding 8 to both sides of this equation yields $3x + 8 = 23$. Therefore, the value of $3x + 8$ is 23 .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of x , not $3x + 8$.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 590f2187

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 0%; background-color: #cccccc; height: 10px;"></div>

ID: 590f2187

If $3x - 27 = 24$, what is the value of $x - 9$?

- A. 1
- B. 8
- C. 24
- D. 35

ID: 590f2187 Answer

Correct Answer:

B

Rationale

Choice B is correct. Dividing each side of the given equation by 3 yields $x - 9 = 8$. Therefore, the value of $x - 9$ is 8.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the value of $3x - 27$, not $x - 9$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID f2b63f49

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: f2b63f49

$$8x - 7x + 130 = 260$$

What value of x is the solution to the given equation?

ID: f2b63f49 Answer

Correct Answer:

130

Rationale

The correct answer is 130. It's given that $8x - 7x + 130 = 260$. Combining like terms on the left-hand side of this equation yields $x + 130 = 260$. Subtracting 130 from each side of this equation yields $x = 130$. Therefore, the value of x that's the solution to the given equation is 130.

Question Difficulty:

Easy

Question ID 05417146

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 05417146

$$w + 7 = 357$$

What value of w is the solution to the given equation?

- A. 51
- B. 350
- C. 364
- D. 3,577

ID: 05417146 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting 7 from each side of the given equation yields $w = 350$. Therefore, the value of w that is the solution to the given equation is 350.

Choice A is incorrect. This is the value of w that is the solution to the equation $7w = 357$, not $w + 7 = 357$.

Choice C is incorrect. This is the value of w that is the solution to the equation $w - 7 = 357$, not $w + 7 = 357$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 51aab93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 51aab93

$$(p + 3) + 8 = 10$$

What value of p is the solution to the given equation?

- A. -1
- B. 5
- C. 15
- D. 21

ID: 51aab93 Answer

Correct Answer:

A

Rationale

Choice A is correct. Subtracting 8 from both sides of the given equation yields $p + 3 = 2$. Subtracting 3 from both sides of this equation yields $p = -1$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID f14484a5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: f14484a5

A manufacturing plant makes **10**-inch, **9**-inch, and **7**-inch frying pans. During a certain day, the number of **10**-inch frying pans that the manufacturing plant makes is **4** times the number **n** of **9**-inch frying pans it makes, and the number of **7**-inch frying pans it makes is **10**. During this day, the manufacturing plant makes **100** frying pans total. Which equation represents this situation?

- A. $10(4n) + 9n + 7(10) = 100$
- B. $10n + 9n + 7n = 100$
- C. $4n + 10 = 100$
- D. $5n + 10 = 100$

ID: f14484a5 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that during a certain day, the number of **9**-inch frying pans the manufacturing plant makes is **n** and the number of **7**-inch frying pans it makes is **10**. It's also given that during this day the number of **10**-inch frying pans that the manufacturing plant makes is **4** times the number of **9**-inch frying pans, or **$4n$** . Therefore, the total number of **7**-inch, **9**-inch, and **10**-inch frying pans the manufacturing plant makes is **$n + 10 + 4n$** , or **$5n + 10$** . It's given that during this day the manufacturing plant makes **100** frying pans total. Thus, the equation **$5n + 10 = 100$** represents this situation.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 349a5bc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 349a5bc1

$$4x + 5 = 165$$

What is the solution to the given equation?

ID: 349a5bc1 Answer

Correct Answer:

40

Rationale

The correct answer is 40. Subtracting 5 from both sides of the given equation yields $4x = 160$. Dividing both sides of this equation by 4 yields $x = 40$. Therefore, the solution to the given equation is 40.

Question Difficulty:

Easy

Question ID 6105234d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 6105234d

John paid a total of \$165 for a microscope by making a down payment of \$37 plus p monthly payments of \$16 each. Which of the following equations represents this situation?

- A. $16p - 37 = 165$
- B. $37p - 16 = 165$
- C. $16p + 37 = 165$
- D. $37p + 16 = 165$

ID: 6105234d Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that John made a \$16 payment each month for p months. The total amount of these payments can be represented by the expression $16p$. The down payment can be added to that amount to find the total amount John paid, yielding the expression $16p + 37$. It's given that John paid a total of \$165. Therefore, the expression for the total amount John paid can be set equal to that amount, yielding the equation $16p + 37 = 165$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID f305b5ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: f305b5ca

Lorenzo purchased a box of cereal and some strawberries at the grocery store. Lorenzo paid \$2 for the box of cereal and \$1.90 per pound for the strawberries. If Lorenzo paid a total of \$9.60 for the box of cereal and the strawberries, which of the following equations can be used to find p , the number of pounds of strawberries Lorenzo purchased? (Assume there is no sales tax.)

- A. $1.90p + 2 = 9.60$
- B. $1.90p - 2 = 9.60$
- C. $1.90 + 2p = 9.60$
- D. $1.90 - 2p = 9.60$

ID: f305b5ca Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that p represents the number of pounds of strawberries Lorenzo purchased and Lorenzo paid \$1.90 per pound for the strawberries. It follows that the total amount, in dollars, Lorenzo paid for strawberries can be represented by $1.90p$. It's given that Lorenzo paid \$2 for the box of cereal. If Lorenzo paid a total of \$9.60 for the box of cereal and strawberries, it follows that the equation $1.90p + 2 = 9.60$ can be used to find p .

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 9d4270fe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9d4270fe

A company that creates and sells tape dispensers calculates its monthly profit, in dollars, by subtracting its fixed monthly costs, in dollars, from its monthly sales revenue, in dollars. The equation $15,000 = 2.00x - 4,500$ represents this situation for a month where x tape dispensers are created and sold. Which statement is the best interpretation of $2.00x$ in this context?

- A. The monthly sales revenue, in dollars, from selling x tape dispensers
- B. The monthly sales revenue, in dollars, from each tape dispenser sold
- C. The monthly cost, in dollars, of creating each tape dispenser
- D. The monthly cost, in dollars, of creating x tape dispensers

ID: 9d4270fe Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the equation $15,000 = 2.00x - 4,500$ represents this situation for a month where x tape dispensers are created and sold. It's also given that the company calculates its monthly profit, in dollars, by subtracting its fixed monthly costs, in dollars, from its monthly sales revenue, in dollars. It follows that $2.00x$ represents the monthly sales revenue, in dollars. Therefore, the best interpretation of $2.00x$ in this context is the monthly sales revenue from selling x tape dispensers.

Choice B is incorrect. This is the best interpretation of 2.00 , not $2.00x$.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect. This is the best interpretation of $4,500$, not $2.00x$.

Question Difficulty:

Medium

Question ID 5c94e6fa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 5c94e6fa

$$3x + 21 = 3x + k$$

In the given equation, k is a constant. The equation has infinitely many solutions. What is the value of k ?

ID: 5c94e6fa Answer

Correct Answer:

21

Rationale

The correct answer is **21**. It's given that the equation $3x + 21 = 3x + k$ has infinitely many solutions. If an equation in one variable has infinitely many solutions, then the equation is true for any value of the variable. Subtracting $3x$ from both sides of the given equation yields $k = 21$. Since this equation must be true for any value of x , the value of k is **21**.

Question Difficulty:

Easy

Question ID 7a5a74a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7a5a74a6

$$3(2x - 6) - 11 = 4(x - 3) + 6$$

If x is the solution to the equation above, what is the value of $x - 3$?

A. $\frac{23}{2}$

B. $\frac{17}{2}$

C. $\frac{15}{2}$

D. $-\frac{15}{2}$

ID: 7a5a74a6 Answer

Correct Answer:

B

Rationale

Choice B is correct. Because 2 is a factor of both $2x$ and 6, the expression $2x - 6$ can be rewritten as $2(x - 3)$. Substituting $2(x - 3)$ for $(2x - 6)$ on the left-hand side of the given equation yields $3(2)(x - 3) - 11 = 4(x - 3) + 6$, or $6(x - 3) - 11 = 4(x - 3) + 6$. Subtracting $4(x - 3)$ from both sides of this equation yields $2(x - 3) - 11 = 6$. Adding 11 to both sides of this equation yields $2(x - 3) = 17$. Dividing both sides of this equation by 2 yields $x - 3 = \frac{17}{2}$.

Alternate approach: Distributing 3 to the quantity $(2x - 6)$ on the left-hand side of the given equation and distributing 4 to the quantity $(x - 3)$ on the right-hand side yields $6x - 18 - 11 = 4x - 12 + 6$, or $6x - 29 = 4x - 6$. Subtracting $4x$ from both sides of this equation yields $2x - 29 = -6$. Adding 29 to both sides of this equation yields $2x = 23$. Dividing both sides of this equation by 2 yields $x = \frac{23}{2}$. Therefore, the value of $x - 3$ is $\frac{23}{2} - 3$, or $\frac{17}{2}$.

Choice A is incorrect. This is the value of x , not $x - 3$. Choices C and D are incorrect. If the value of $x - 3$ is $\frac{15}{2}$ or $-\frac{15}{2}$, it follows that the value of x is $\frac{21}{2}$ or $-\frac{9}{2}$, respectively. However, solving the given equation for x yields $x = \frac{23}{2}$. Therefore, the

value of $x - 3$ can't be $\frac{15}{2}$ or $-\frac{15}{2}$.

Question Difficulty:

Medium

Question ID 38bf4e04

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 38bf4e04

A factory makes **9**-inch, **7**-inch, and **4**-inch concrete screws. During a certain day, the number of **9**-inch concrete screws that the factory makes is **5** times the number n of **7**-inch concrete screws, and the number of **4**-inch concrete screws is **22**. During this day, the factory makes **100** concrete screws total. Which equation represents this situation?

- A. $9(5n) + 7n + 4(22) = 100$
- B. $9n + 7n + 4n = 100$
- C. $5n + 22 = 100$
- D. $6n + 22 = 100$

ID: 38bf4e04 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that during a certain day at a factory, the number of **7**-inch concrete screws the factory makes is n and the number of **4**-inch concrete screws the factory makes is **22**. It's also given that during this day the number of **9**-inch concrete screws the factory makes is **5** times the number of **7**-inch concrete screws, or $5n$. Therefore, the total number of **7**-inch, **9**-inch, and **4**-inch concrete screws is $n + 5n + 22$, or $6n + 22$. It's given that during this day, the factory makes **100** concrete screws total. Thus, the equation $6n + 22 = 100$ represents this situation.

Choice A is incorrect. This equation represents a situation where the total length, in inches, of all the concrete screws, rather than the total number of concrete screws, is **100**.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This equation represents a situation where the total number of **9**-inch concrete screws and **4**-inch concrete screws, not including the **7**-inch concrete screws, is **100**.

Question Difficulty:

Hard

Question ID b7e6394d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b7e6394d

Alan drives an average of 100 miles each week. His car can travel an average of 25 miles per gallon of gasoline. Alan would like to reduce his weekly expenditure on gasoline by \$5. Assuming gasoline costs \$4 per gallon, which equation can Alan use to determine how many fewer average miles, m , he should drive each week?

A. $\frac{25}{4}m = 95$

B. $\frac{25}{4}m = 5$

C. $\frac{4}{25}m = 95$

D. $\frac{4}{25}m = 5$

ID: b7e6394d Answer

Correct Answer:

D

Rationale

Choice D is correct. Since gasoline costs \$4 per gallon, and since Alan's car travels an average of 25 miles per gallon, the expression $\frac{4}{25}$ gives the cost, in dollars per mile, to drive the car. Multiplying $\frac{4}{25}$ by m gives the cost for Alan to drive m miles in his car. Alan wants to reduce his weekly spending by \$5, so setting $\frac{4}{25}m$ equal to 5 gives the number of miles, m , by which he must reduce his driving.

Choices A, B, and C are incorrect. Choices A and B transpose the numerator and the denominator in the fraction. The fraction $\frac{25}{4}$ would result in the unit miles per dollar, but the question requires a unit of dollars per mile. Choices A and C set the expression equal to 95 instead of 5, a mistake that may result from a misconception that Alan wants to reduce his driving by 5 miles each week; instead, the question says he wants to reduce his weekly expenditure by \$5.

Question Difficulty:

Hard

Question ID aa85b138

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: aa85b138

$$2n + 6 = 14$$

A tree had a height of 6 feet when it was planted. The equation above can be used to find how many years n it took the tree to reach a height of 14 feet. Which of the following is the best interpretation of the number 2 in this context?

- A. The number of years it took the tree to double its height
- B. The average number of feet that the tree grew per year
- C. The height, in feet, of the tree when the tree was 1 year old
- D. The average number of years it takes similar trees to grow 14 feet

ID: aa85b138 Answer

Correct Answer:

B

Rationale

Choice B is correct. The height of the tree at a given time is equal to its height when it was planted plus the number of feet that the tree grew. In the given equation, 14 represents the height of the tree at the given time, and 6 represents the height of the tree when it was planted. It follows that $2n$ represents the number of feet the tree grew from the time it was planted until the time it reached a height of 14 feet. Since n represents the number of years between the given time and the time the tree was planted, 2 must represent the average number of feet the tree grew each year.

Choice A is incorrect and may result from interpreting the coefficient 2 as doubling instead of as increasing by 2 each year. Choice C is incorrect. The height of the tree when it was 1 year old was $2(1) + 6 = 8$ feet, not 2 feet. Choice D is incorrect. No information is given to connect the growth of one particular tree to the growth of similar trees.

Question Difficulty:

Medium

Question ID 15daa8d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 15daa8d6

$$2x + 16 = a(x + 8)$$

In the given equation, a is a constant. If the equation has infinitely many solutions, what is the value of a ?

ID: 15daa8d6 Answer

Correct Answer:

2

Rationale

The correct answer is **2**. An equation with one variable, x , has infinitely many solutions only when both sides of the equation are equal for any defined value of x . It's given that $2x + 16 = a(x + 8)$, where a is a constant. This equation can be rewritten as $2(x + 8) = a(x + 8)$. If this equation has infinitely many solutions, then both sides of this equation are equal for any defined value of x . Both sides of this equation are equal for any defined value of x when $2 = a$. Therefore, if the equation has infinitely many solutions, the value of a is **2**.

Alternate approach: If the given equation, $2x + 16 = a(x + 8)$, has infinitely many solutions, then both sides of this equation are equal for any value of x . If $x = 0$, then substituting 0 for x in $2x + 16 = a(x + 8)$ yields $2(0) + 16 = a(0 + 8)$, or $16 = 8a$. Dividing both sides of this equation by 8 yields $2 = a$.

Question Difficulty:

Medium

Question ID 2f0a43b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2f0a43b2

If $\frac{x}{8} = 5$, what is the value of $\frac{8}{x}$?

ID: 2f0a43b2 Answer

Correct Answer:

.2, 1/5

Rationale

The correct answer is $\frac{1}{5}$. Since the number 5 can also be written as $\frac{5}{1}$, the given equation can also be written as $\frac{x}{8} = \frac{5}{1}$. This equation is equivalent to $\frac{8}{x} = \frac{1}{5}$. Therefore, the value of $\frac{8}{x}$ is $\frac{1}{5}$. Note that 1/5 and .2 are examples of ways to enter a correct answer.

Alternate approach: Multiplying both sides of the equation $\frac{x}{8} = 5$ by 8 yields $x = 40$. Substituting 40 for x into the expression $\frac{8}{x}$ yields $\frac{8}{40}$, or $\frac{1}{5}$.

Question Difficulty:

Easy

Question ID 997bec28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 997bec28

The perimeter of an isosceles triangle is **83** inches. Each of the two congruent sides of the triangle has a length of **24** inches. What is the length, in inches, of the third side?

ID: 997bec28 Answer

Correct Answer:

35

Rationale

The correct answer is **35**. It's given that the perimeter of an isosceles triangle is **83** inches and that each of the two congruent sides has a length of **24** inches. The perimeter of a triangle is the sum of the lengths of its three sides. The equation **$24 + 24 + x = 83$** can be used to represent this situation, where **x** is the length, in inches, of the third side. Combining like terms on the left-hand side of this equation yields **$48 + x = 83$** . Subtracting **48** from both sides of this equation yields **$x = 35$** . Therefore, the length, in inches, of the third side is **35**.

Question Difficulty:

Easy

Question ID 40ba6288

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 40ba6288

If $3x = 30$, what is the value of $3x - 12$?

- A. -2
- B. 18
- C. 22
- D. 42

ID: 40ba6288 Answer

Correct Answer:

B

Rationale

Choice B is correct. Subtracting 12 from each side of the given equation yields $3x - 12 = 30 - 12$, or $3x - 12 = 18$. Therefore, the value of $3x - 12$ is 18.

Choice A is incorrect. This is the value of $x - 12$, not $3x - 12$.

Choice C is incorrect. This is the value of $x + 12$, not $3x - 12$.

Choice D is incorrect. This is the value of $3x + 12$, not $3x - 12$.

Question Difficulty:

Easy

Question ID 12ee1edc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 12ee1edc

$$(b - 2)x = 8$$

In the given equation, b is a constant. If the equation has no solution, what is the value of b ?

- A. 2
- B. 4
- C. 6
- D. 10

ID: 12ee1edc Answer

Correct Answer:

A

Rationale

Choice A is correct. This equation has no solution when there is no value of x that produces a true statement. Solving the given equation for x by dividing both sides by $(b - 2)$ gives $x = \frac{8}{(b - 2)}$. When $(b - 2) = 0$, the right-hand side of this equation will be undefined, and the equation will have no solution. Therefore, when $b = 2$, there is no value of x that satisfies the given equation.

Choices B, C, and D are incorrect. Substituting 4, 6, and 10 for b in the given equation yields exactly one solution, rather than no solution, for x . For example, substituting 4 for b in the given equation yields $(4 - 2)x = 8$, or $2x = 8$. Dividing both sides of $2x = 8$ by 2 yields $x = 4$. Similarly, if $b = 6$ or $b = 10$, $x = 2$ and $x = 1$, respectively.

Question Difficulty:

Medium

Question ID 25e1cfed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 25e1cfed

How many solutions does the equation $10(15x - 9) = -15(6 - 10x)$ have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 25e1cfed Answer

Correct Answer:

C

Rationale

Choice C is correct. Applying the distributive property to each side of the given equation yields $150x - 90 = -90 + 150x$. Applying the commutative property of addition to the right-hand side of this equation yields $150x - 90 = 150x - 90$. Since the two sides of the equation are equivalent, this equation is true for any value of x . Therefore, the given equation has infinitely many solutions.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 6ac23de7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6ac23de7

$$\frac{4x}{5} = 20$$

In the equation above, what is the value of x ?

- A. 25
- B. 24
- C. 16
- D. 15

ID: 6ac23de7 Answer

Correct Answer:

A

Rationale

Choice A is correct. Multiplying both sides of the equation by 5 results in $4x = 100$. Dividing both sides of the resulting equation by 4 results in $x = 25$.

Choice B is incorrect and may result from adding 20 and 4. Choice C is incorrect and may result from dividing 20 by 5 and then multiplying the result by 4. Choice D is incorrect and may result from subtracting 5 from 20.

Question Difficulty:

Easy

Question ID e6cb2402

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: e6cb2402

$$3(kx + 13) = \frac{48}{17}x + 36$$

In the given equation, k is a constant. The equation has no solution. What is the value of k ?

ID: e6cb2402 Answer

Correct Answer:

.9411, .9412, 16/17

Rationale

The correct answer is $\frac{16}{17}$. It's given that the equation $3(kx + 13) = \frac{48}{17}x + 36$ has no solution. A linear equation in the form $ax + b = cx + d$, where a, b, c , and d are constants, has no solution only when the coefficients of x on each side of the equation are equal and the constant terms aren't equal. Dividing both sides of the given equation by 3 yields $kx + 13 = \frac{48}{51}x + \frac{36}{3}$, or $kx + 13 = \frac{16}{17}x + 12$. Since the coefficients of x on each side of the equation must be equal, it follows that the value of k is $\frac{16}{17}$. Note that 16/17, .9411, .9412, and 0.941 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 7392dfc1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7392dfc1

Which of the following is equivalent to $4x + 6 = 12$?

- A. $2x + 4 = 6$
- B. $x + 3 = 3$
- C. $3x + 2 = 4$
- D. $2x + 3 = 6$

ID: 7392dfc1 Answer

Correct Answer:

D

Rationale

Choice D is correct. Dividing each side of the original equation by 2 yields $\frac{4x + 6}{2} = \frac{12}{2}$, which simplifies to $2x + 3 = 6$.

Choice A is incorrect. Dividing each side of the original equation by 2 gives $2x + 3 = 6$, which is not equivalent to $2x + 4 = 6$.

Choice B is incorrect. Dividing each side of the original equation by 4 gives $x + \frac{3}{2} = 3$, which is not equivalent to $x + 3 = 3$.

Choice C is incorrect. Dividing each side of the original equation by 3 gives $\frac{4}{3}x + 2 = 4$, which is not equivalent to $3x + 2 = 4$.

Question Difficulty:

Easy

Question ID 93954cfa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 93954cfa

One pound of grapes costs \$2. At this rate, how many dollars will c pounds of grapes cost?

A. $2c$

B. $2+c$

C. $\frac{2}{c}$

D. $\frac{c}{2}$

ID: 93954cfa Answer

Correct Answer:

A

Rationale

Choice A is correct. If one pound of grapes costs \$2, two pounds of grapes will cost 2 times \$2, three pounds of grapes will cost 3 times \$2, and so on. Therefore, c pounds of grapes will cost c times \$2, which is $2c$ dollars.

Choice B is incorrect and may result from incorrectly adding instead of multiplying. Choice C is incorrect and may result from assuming that c pounds cost \$2, and then finding the cost per pound. Choice D is incorrect and could result from incorrectly assuming that 2 pounds cost \$ c , and then finding the cost per pound.

Question Difficulty:

Easy

Question ID 018a2704

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 018a2704

If $46 = 16 + 2(x - 8)$, what is the value of $2(x - 8)$?

- A. 16
- B. 23
- C. 30
- D. 38

ID: 018a2704 Answer

Correct Answer:

C

Rationale

Choice C is correct. Subtracting 16 from both sides of the given equation yields $30 = 2(x - 8)$. Therefore, the value of $2(x - 8)$ is 30.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 3d04de9c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3d04de9c

A principal used a total of **25** flags that were either blue or yellow for field day. The principal used **20** blue flags. How many yellow flags were used?

- A. **5**
- B. **20**
- C. **25**
- D. **30**

ID: 3d04de9c Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a principal used a total of **25** blue flags and yellow flags. It's also given that of the **25** flags used, **20** flags were blue. Subtracting the number of blue flags used from the total number of flags used results in the number of yellow flags used. It follows that the number of yellow flags used is **25 – 20**, or **5**.

Choice B is incorrect. This is the number of blue flags used.

Choice C is incorrect. This is the total number of flags used.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 06fc1726

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 06fc1726

If f is the function defined by $f(x) = \frac{2x-1}{3}$,

what is the value of $f(5)$?

A. $\frac{4}{3}$

B. $\frac{7}{3}$

C. 3

D. 9

ID: 06fc1726 Answer

Correct Answer:

C

Rationale

Choice C is correct. If $f(x) = \frac{2x-1}{3}$, then $f(5) = \frac{2(5)-1}{3} = \frac{10-1}{3} = \frac{9}{3} = 3$.

Choice A is incorrect and may result from not multiplying x by 2 in the numerator. Choice B is incorrect and may result from dividing $2x$ by 3 and then subtracting 1. Choice D is incorrect and may result from evaluating only the numerator $2x - 1$.

Question Difficulty:

Easy

Question ID e3cf671f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e3cf671f

The function f is defined by $f(x) = 4x + k(x - 1)$, where k is a constant, and $f(5) = 32$. What is the value of $f(10)$?

ID: e3cf671f Answer

Correct Answer:

67

Rationale

The correct answer is **67**. It's given that $f(5) = 32$. Therefore, for the given function f , when $x = 5$, $f(x) = 32$. Substituting 5 for x and 32 for $f(x)$ in the given function $f(x) = 4x + k(x - 1)$ yields $32 = 4(5) + k(5 - 1)$, or $32 = 20 + 4k$. Subtracting 20 from each side of this equation yields $12 = 4k$. Dividing each side of this equation by 4 yields $k = 3$. Substituting 3 for k in the given function $f(x) = 4x + k(x - 1)$ yields $f(x) = 4x + 3(x - 1)$, which is equivalent to $f(x) = 4x + 3x - 3$, or $f(x) = 7x - 3$. Substituting 10 for x into this equation yields $f(10) = 7(10) - 3$, or $f(10) = 67$. Therefore, the value of $f(10)$ is **67**.

Question Difficulty:

Medium

Question ID 6863c7ce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6863c7ce

$$d = 16t$$

The given equation represents the distance d , in inches, where t represents the number of seconds since an object started moving. Which of the following is the best interpretation of **16** in this context?

- A. The object moved a total of **16** inches.
- B. The object moved a total of $16t$ inches.
- C. The object is moving at a rate of **16** inches per second.
- D. The object is moving at a rate of $\frac{1}{16}$ inches per second.

ID: 6863c7ce Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that in the equation $d = 16t$, d represents the distance, in inches, and t represents the number of seconds since an object started moving. In this equation, t is being multiplied by **16**. This means that the object's distance increases by **16** inches each second. Therefore, the best interpretation of **16** in this context is that the object is moving at a rate of **16** inches per second.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect. This is the best interpretation of $16t$, rather than **16**, in this context.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID a5834ea4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: a5834ea4

$$f(x) = 39$$

For the given linear function f , which table gives three values of x and their corresponding values of $f(x)$?

A.

x	$f(x)$
0	0
1	0
2	0

B.

x	$f(x)$
0	39
1	39
2	39

C.

x	$f(x)$
0	0
1	39
2	78

D.

x	$f(x)$
0	39
1	0
2	-39

ID: a5834ea4 Answer

Correct Answer:

B

Rationale

Choice B is correct. For the given linear function f , $f(x)$ must equal 39 for all values of x . Of the given choices, only choice B gives three values of x and their corresponding values of $f(x)$ for the given linear function f .

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 0b332f00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: 0b332f00

The function g is defined by $g(x) = 6x$. For what value of x is $g(x) = 54$?

ID: 0b332f00 Answer

Correct Answer:

9

Rationale

The correct answer is 9. It's given that $g(x) = 6x$. Substituting 54 for $g(x)$ in the given function yields $54 = 6x$. Dividing both sides of this equation by 6 yields $x = 9$. Therefore, the value of x when $g(x) = 54$ is 9.

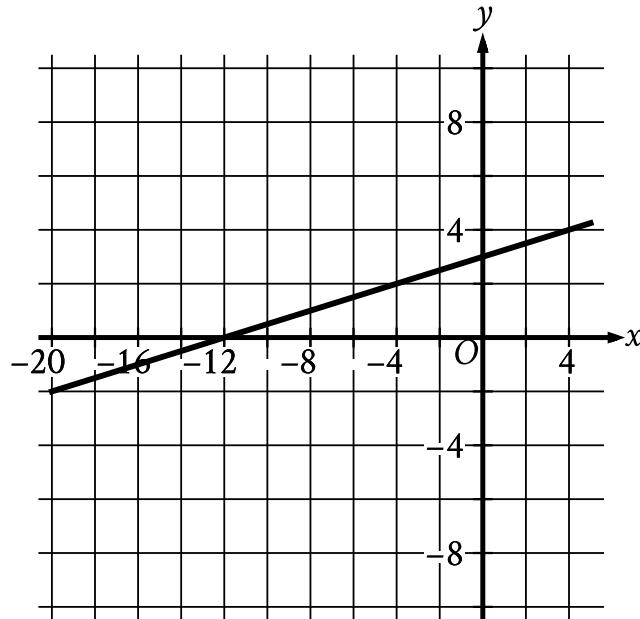
Question Difficulty:

Easy

Question ID c10ad793

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c10ad793



The graph of the linear function f is shown, where $y = f(x)$. What is the x -intercept of the graph of f ?

- A. $(-12, 0)$
- B. $(0, 0)$
- C. $(\frac{1}{4}, 0)$
- D. $(12, 0)$

ID: c10ad793 Answer

Correct Answer:

A

Rationale

Choice A is correct. The x -intercept of a graph is the point where the graph intersects the x -axis. The graph of function f , where $y = f(x)$, intersects the x -axis at $(-12, 0)$. Therefore, the x -intercept of the graph of f is $(-12, 0)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 7e3f8363

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7e3f8363

In the xy -plane, the graph of the linear function f contains the points $(0, 3)$ and $(7, 31)$. Which equation defines f , where $y = f(x)$?

- A. $f(x) = 28x + 34$
- B. $f(x) = 3x + 38$
- C. $f(x) = 4x + 3$
- D. $f(x) = 7x + 3$

ID: 7e3f8363 Answer

Correct Answer:

C

Rationale

Choice C is correct. In the xy -plane, an equation of the graph of a linear function can be written in the form $f(x) = mx + b$, where m represents the slope and $(0, b)$ represents the y -intercept of the graph of $y = f(x)$. It's given that the graph of the linear function f , where $y = f(x)$, in the xy -plane contains the point $(0, 3)$. Thus, $b = 3$. The slope of the graph of a line containing any two points (x_1, y_1) and (x_2, y_2) can be found using the slope formula, $m = \frac{y_2 - y_1}{x_2 - x_1}$. Since it's given that the graph of the linear function f contains the points $(0, 3)$ and $(7, 31)$, it follows that the slope of the graph of the line containing these points is $m = \frac{31 - 3}{7 - 0}$, or $m = 4$. Substituting 4 for m and 3 for b in $f(x) = mx + b$ yields $f(x) = 4x + 3$.

Choice A is incorrect. This function represents a graph with a slope of 28 and a y -intercept of $(0, 34)$.

Choice B is incorrect. This function represents a graph with a slope of 3 and a y -intercept of $(0, 38)$.

Choice D is incorrect. This function represents a graph with a slope of 7 and a y -intercept of $(0, 3)$.

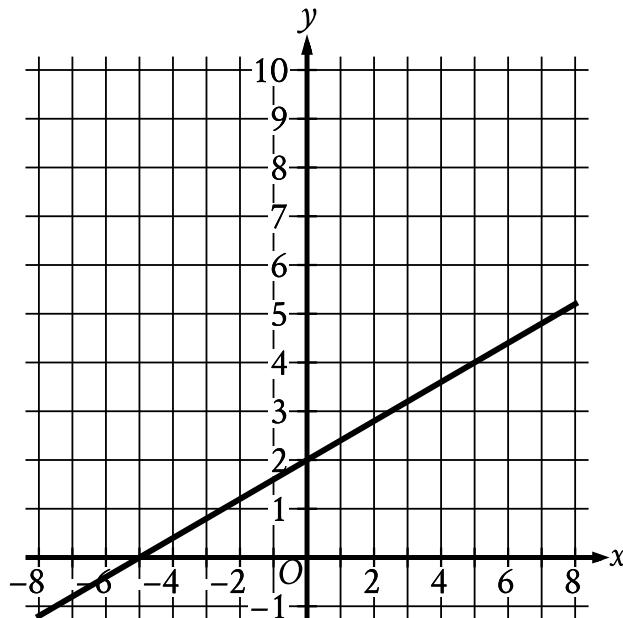
Question Difficulty:

Medium

Question ID d11910d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: d11910d6



The graph of the linear function f is shown. What is the y -intercept of the graph of $y = f(x)$?

- A. $(-5, 0)$
- B. $(2, 0)$
- C. $(0, 2)$
- D. $(0, -5)$

ID: d11910d6 Answer

Correct Answer:

C

Rationale

Choice C is correct. The y -intercept of a graph is the point where the graph intersects the y -axis. The graph of $y = f(x)$ shown intersects the y -axis at the point $(0, 2)$. Therefore, the y -intercept of the graph of $y = f(x)$ is $(0, 2)$.

Choice A is incorrect. This is the x -intercept, not the y -intercept, of the graph of $y = f(x)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 0eae6be1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 0eae6be1

The number y is 84 less than the number x . Which equation represents the relationship between x and y ?

- A. $y = x + 84$
- B. $y = \frac{1}{84}x$
- C. $y = 84x$
- D. $y = x - 84$

ID: 0eae6be1 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the number y is 84 less than the number x . A number that's 84 less than the number x is equivalent to 84 subtracted from the number x , or $x - 84$. Therefore, the equation $y = x - 84$ represents the relationship between x and y .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID 361f97c7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 361f97c7

The function f is defined by $f(x) = 4x - 3$. What is the value of $f(10)$?

- A. **-30**
- B. **37**
- C. 40
- D. 43

ID: 361f97c7 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the function f is defined by $f(x) = 4x - 3$. Substituting 10 for x in the given function yields $f(10) = 4(10) - 3$, which is equivalent to $f(10) = 40 - 3$, or $f(10) = 37$. Therefore, the value of $f(10)$ is 37.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the value of $f(10)$ for the function $f(x) = 4x$, not $f(x) = 4x - 3$.

Choice D is incorrect. This is the value of $f(10)$ for the function $f(x) = 4x + 3$, not $f(x) = 4x - 3$.

Question Difficulty:

Easy

Question ID 447fa970

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 447fa970

The function f is defined by the equation $f(x) = 7x + 2$. What is the value of $f(x)$ when $x = 4$?

ID: 447fa970 Answer

Correct Answer:

30

Rationale

The correct answer is **30**. The value of $f(x)$ when $x = 4$ can be found by substituting **4** for x in the given equation $f(x) = 7x + 2$. This yields $f(4) = 7(4) + 2$, or $f(4) = 30$. Therefore, when $x = 4$, the value of $f(x)$ is **30**.

Question Difficulty:

Easy

Question ID 27198699

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 27198699

As part of a science project on evaporation, Amaya measured the height of a liquid in a container over a period of time. The function $f(x) = 33 - 0.18x$ gives the estimated height, in centimeters (cm), of the liquid in the container x days after the start of the project. Which of the following is the best interpretation of 33 in this context?

- A. The estimated height, in cm, of the liquid at the start of the project
- B. The estimated height, in cm, of the liquid at the end of the project
- C. The estimated change in the height, in cm, of the liquid each day
- D. The estimated number of days for all of the liquid to evaporate

ID: 27198699 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function $f(x) = 33 - 0.18x$ gives the estimated height, in centimeters (cm), of the liquid in the container x days after the start of the project. For a linear function in the form $f(x) = a + bx$, where a and b are constants, a represents the value of $f(0)$ and b represents the rate of change of the function. It follows that in the given function, 33 represents the value of $f(0)$. Therefore, the best interpretation of 33 in this context is the estimated height, in cm, of the liquid at the start of the project.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. The estimated change in the height, in cm, of the liquid each day is 0.18, not 33.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID c1bd5301

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c1bd5301

A model predicts that a certain animal weighed **241** pounds when it was born and that the animal gained **3** pounds per day in its first year of life. This model is defined by an equation in the form $f(x) = a + bx$, where $f(x)$ is the predicted weight, in pounds, of the animal x days after it was born, and a and b are constants. What is the value of a ?

ID: c1bd5301 Answer

Correct Answer:

241

Rationale

The correct answer is **241**. For a certain animal, it's given that a model predicts the animal weighed **241** pounds when it was born and gained **3** pounds per day in its first year of life. It's also given that this model is defined by an equation in the form $f(x) = a + bx$, where $f(x)$ is the predicted weight, in pounds, of the animal x days after it was born, and a and b are constants. It follows that a represents the predicted weight, in pounds, of the animal when it was born and b represents the predicted rate of weight gain, in pounds per day, in its first year of life. Thus, the value of a is **241**.

Question Difficulty:

Medium

Question ID a130fcdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: a130fcdc

$$g(x) = 11x + 4$$

For the given linear function g , which table shows three values of x and their corresponding values of $g(x)$?

A.

x	$g(x)$
-1	7
0	11
1	15

B.

x	$g(x)$
-1	-4
0	0
1	4

C.

x	$g(x)$
-1	-7
0	4
1	15

D.

x	$g(x)$
-1	-11
0	0
1	11

ID: a130fcdc Answer

Correct Answer:

C

Rationale

Choice C is correct. Each of the tables shows the same three values of x : -1, 0, and 1. Substituting -1 for x in the given function yields $g(-1) = 11(-1) + 4$, or $g(-1) = -7$. Therefore, when $x = -1$, the corresponding value of $g(x)$ is -7. Substituting 0 for x in the given function yields $g(0) = 11(0) + 4$, or $g(0) = 4$. Therefore, when $x = 0$, the corresponding value of $g(x)$ is 4. Substituting 1 for x in the given function yields $g(1) = 11(1) + 4$, or $g(1) = 15$. Therefore, when $x = 1$, the corresponding value of $g(x)$ is 15. The table in choice C shows -7, 4, and 15 as the corresponding value of $g(x)$ for x -values of -1, 0, and 1, respectively. Therefore, the table in choice C shows three values of x and their corresponding values of $g(x)$.

Choice A is incorrect. This table shows three values of x and their corresponding values of $g(x)$ for the linear function $g(x) = 4x + 11$.

Choice B is incorrect. This table shows three values of x and their corresponding values of $g(x)$ for the linear function $g(x) = 4x$.

Choice D is incorrect. This table shows three values of x and their corresponding values of $g(x)$ for the linear function $g(x) = 11x$.

Question Difficulty:

Easy

Question ID bf36c815

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: bf36c815

The function g is defined by $g(x) = -x + 8$.

What is the value of $g(0)$?

- A. -8
- B. 0
- C. 4
- D. 8

ID: bf36c815 Answer

Correct Answer:

D

Rationale

Choice D is correct. The value of $g(0)$ is found by substituting 0 for x in the function g . This yields $g(0) = -0 + 8$, which can be rewritten as $g(0) = 8$.

Choice A is incorrect and may result from misinterpreting the equation as $g(x) = x + (-8)$ instead of $g(x) = -x + 8$. Choice B is incorrect. This is the value of x , not $g(x)$. Choice C is incorrect and may result from calculation errors.

Question Difficulty:

Easy

Question ID 0d391910

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 0d391910

The function f is defined by $f(x) = 4x$. For what value of x does $f(x) = 8$?

ID: 0d391910 Answer

Correct Answer:

2

Rationale

The correct answer is **2**. Substituting **8** for $f(x)$ in the given equation yields $8 = 4x$. Dividing the left- and right-hand sides of this equation by **4** yields $x = 2$. Therefore, the value of x is **2** when $f(x) = 8$.

Question Difficulty:

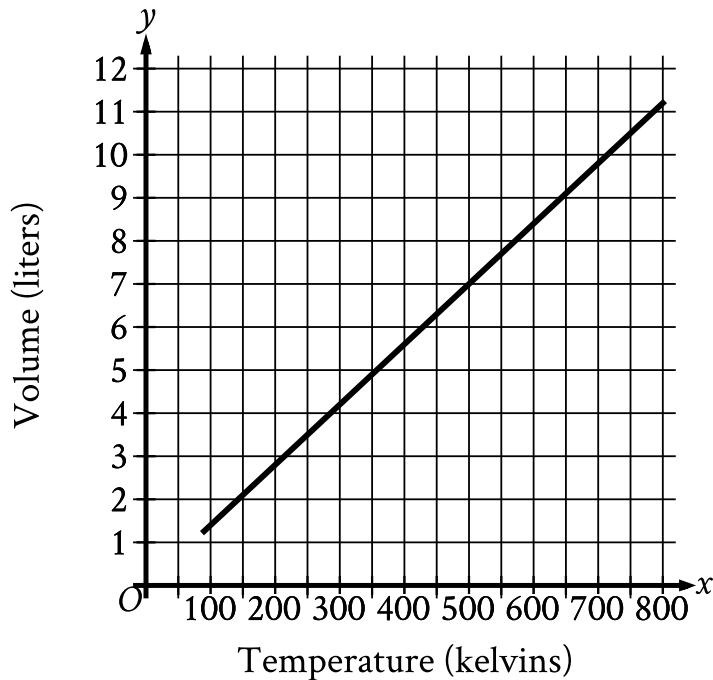
Easy

Question ID 930c2990

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 930c2990

Hydrogen is placed inside a container and kept at a constant pressure. The graph shows the estimated volume y , in liters, of the hydrogen when its temperature is x kelvins.



What is the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins?

- A. 0
- B. $\frac{7}{500}$
- C. 7
- D. $\frac{500}{7}$

ID: 930c2990 Answer

Correct Answer:

C

Rationale

Choice C is correct. For the graph shown, the x -axis represents temperature, in kelvins, and the y -axis represents volume, in liters. Therefore, the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins is represented by the y -coordinate of the point on the graph that has an x -coordinate of 500. The point on the graph with an x -coordinate of 500 has a y -coordinate of 7. Therefore, the estimated volume, in liters, of the hydrogen when its temperature is 500 kelvins is 7.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

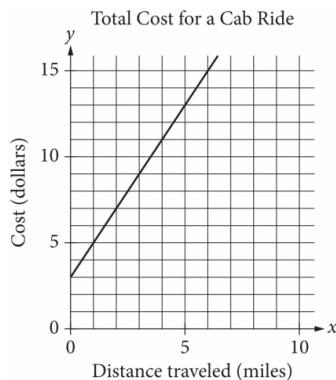
Easy

Question ID 3f5375d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3f5375d9

The line graphed in the xy -plane below models the total cost, in dollars, for a cab ride, y , in a certain city during nonpeak hours based on the number of miles traveled, x .



According to the graph, what is the cost for each additional mile traveled, in dollars, of a cab ride?

- A. \$2.00
- B. \$2.60
- C. \$3.00
- D. \$5.00

ID: 3f5375d9 Answer

Correct Answer:

A

Rationale

Choice A is correct. The cost of each additional mile traveled is represented by the slope of the given line. The slope of the line can be calculated by identifying two points on the line and then calculating the ratio of the change in y to the change in x between the two points. Using the points $(1, 5)$ and $(2, 7)$, the slope is equal to $\frac{7-5}{2-1}$, or 2. Therefore, the cost for each additional mile traveled of the cab ride is \$2.00.

Choice B is incorrect and may result from calculating the slope of the line that passes through the points $(5, 13)$ and $(0, 0)$. However, $(0, 0)$ does not lie on the line shown. Choice C is incorrect. This is the y -coordinate of the y -intercept of the graph and represents the flat fee for a cab ride before the charge for any miles traveled is added. Choice D is incorrect. This value represents the total cost of a 1-mile cab ride.

Question Difficulty:

Easy

Question ID 620fe971

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 620fe971

A team of workers has been moving cargo off of a ship. The equation below models the approximate number of tons of cargo, y , that remains to be moved x hours after the team started working.

$$y = 120 - 25x$$

The graph of this equation in the xy -plane is a line. What is the best interpretation of the x -intercept in this context?

- A. The team will have moved all the cargo in about 4.8 hours.
- B. The team has been moving about 4.8 tons of cargo per hour.
- C. The team has been moving about 25 tons of cargo per hour.
- D. The team started with 120 tons of cargo to move.

ID: 620fe971 Answer

Correct Answer:

A

Rationale

Choice A is correct. The x -intercept of the line with equation $y = 120 - 25x$ can be found by substituting 0 for y and finding the value of x . When $y = 0$, $x = 4.8$, so the x -intercept is at $(4.8, 0)$. Since y represents the number of tons of cargo remaining to be moved x hours after the team started working, it follows that the x -intercept refers to the team having no cargo remaining to be moved after 4.8 hours. In other words, the team will have moved all of the cargo after about 4.8 hours.

Choice B is incorrect and may result from incorrectly interpreting the value 4.8. Choices C and D are incorrect and may result from misunderstanding the x -intercept. These statements are accurate but not directly relevant to the x -intercept.

Question Difficulty:

Medium

Question ID 17d80dc3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 17d80dc3

In the xy -plane, line k has a slope of 5 and a y -intercept of $(0, -35)$. What is the x -coordinate of the x -intercept of line k ?

ID: 17d80dc3 Answer

Correct Answer:

7

Rationale

The correct answer is 7. An equation of a line in the xy -plane can be written in the form $y = mx + b$, where m is the slope of the line and $(0, b)$ is the y -intercept of the line. It's given that line k has a slope of 5 and a y -intercept of $(0, -35)$. Therefore, $m = 5$ and $b = -35$. Substituting 5 for m and -35 for b in the equation $y = mx + b$ yields $y = 5x - 35$. The x -intercept of a line in the xy -plane is the point where the line intersects the x -axis, which is a point with a y -coordinate of 0. Substituting 0 for y in the equation $y = 5x - 35$ yields $0 = 5x - 35$. Adding 35 to both sides of this equation yields $35 = 5x$. Dividing both sides of this equation by 5 yields $7 = x$. Therefore, the x -coordinate of the x -intercept of line k is 7.

Question Difficulty:

Medium

Question ID 1d18794b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1d18794b

A contract for a certain service requires a onetime activation cost of **\$35** and a monthly cost of **\$23**. Which equation represents this situation, where c is the total cost, in dollars, of this service contract for t months?

- A. $c = \frac{t}{23} + 35$
- B. $c = \frac{t}{35} + 23$
- C. $c = 23t + 35$
- D. $c = 35t + 23$

ID: 1d18794b Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that this service contract requires a monthly cost of **\$23**. A monthly cost of **\$23** for t months results in a cost of **\$23t**. It's also given that this service contract requires a onetime activation cost of **\$35**. Adding the onetime activation cost to the monthly cost of the service contract for t months yields the total cost c , in dollars, of this service contract for t months. Therefore, this situation can be represented by the equation $c = 23t + 35$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID b3abf40f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b3abf40f

$$F(x) = \frac{9}{5}(x - 273.15) + 32$$

The function F gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. If a temperature increased by 9.10 kelvins, by how much did the temperature increase, in degrees Fahrenheit?

- A. 16.38
- B. 48.38
- C. 475.29
- D. 507.29

ID: b3abf40f Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the function $F(x) = \frac{9}{5}(x - 273.15) + 32$ gives the temperature, in degrees Fahrenheit, that corresponds to a temperature of x kelvins. A temperature that increased by 9.10 kelvins means that the value of x increased by 9.10 kelvins. It follows that an increase in x by 9.10 increases $F(x)$ by $\frac{9}{5}(9.10)$, or 16.38. Therefore, if a temperature increased by 9.10 kelvins, the temperature increased by 16.38 degrees Fahrenheit.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 1c29bfd1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1c29bfd1

The pressure exerted on a scuba diver at sea level is **14.70 pounds per square inch (psi)**. For each foot the scuba diver descends below sea level, the pressure exerted on the scuba diver increases by **0.44 psi**. What is the total pressure, in **psi**, exerted on the scuba diver at **105** feet below sea level?

- A. **60.90**
- B. **31.50**
- C. **14.70**
- D. **0.44**

ID: 1c29bfd1 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the pressure exerted on a scuba diver at sea level is **14.70 pounds per square inch (psi)**. It's also given that for each foot the scuba diver descends below sea level, the pressure exerted on the scuba diver increases by **0.44 psi**. The total pressure, in **psi**, exerted on the scuba diver at x feet below sea level can be represented by the expression $0.44x + 14.70$. Substituting **105** for x in this expression yields $0.44(105) + 14.70$, or **60.90**. Therefore, the total pressure exerted on the scuba diver at **105** feet below sea level is **60.90 psi**.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the pressure, in **psi**, exerted on the scuba diver at sea level, not at **105** feet below sea level.

Choice D is incorrect. This is the rate by which the pressure, in **psi**, exerted on the scuba diver increases for each foot the scuba diver descends below sea level.

Question Difficulty:

Medium

Question ID e470e19d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #cccccc;"></div>

ID: e470e19d

The function f is defined by $f(x) = 7x - 84$. What is the x -intercept of the graph of $y = f(x)$ in the xy -plane?

- A. $(-12, 0)$
- B. $(-7, 0)$
- C. $(7, 0)$
- D. $(12, 0)$

ID: e470e19d Answer

Correct Answer:

D

Rationale

Choice D is correct. The given function f is a linear function. Therefore, the graph of $y = f(x)$ in the xy -plane has one x -intercept at the point $(k, 0)$, where k is a constant. Substituting 0 for $f(x)$ and k for x in the given function yields $0 = 7k - 84$. Adding 84 to both sides of this equation yields $84 = 7k$. Dividing both sides of this equation by 7 yields $12 = k$. Therefore, the x -intercept of the graph of $y = f(x)$ in the xy -plane is $(12, 0)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID af711d1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: af711d1b

Distance (kilometers)	Average time (minutes)
0.32	8
0.56	14
0.68	17

The table gives the average time t , in minutes, it takes Carly to travel a certain distance d , in kilometers. Which equation could represent this linear relationship?

- A. $t = 4d$
- B. $t = \frac{1}{25}d$
- C. $t = 25d$
- D. $t = \frac{1}{4}d$

ID: af711d1b Answer

Correct Answer:

C

Rationale

Choice C is correct. The average time t , in minutes, it takes Carly to travel a certain distance d , in kilometers, is given in the table. This linear relationship can be represented by an equation in the form $t = ad + b$, where a and b are constants. The table shows that it takes Carly an average time of 8 minutes to travel 0.32 kilometers. Substituting 8 for t and 0.32 for d in the equation $t = ad + b$ yields $8 = 0.32a + b$. Subtracting $0.32a$ from both sides of this equation yields $8 - 0.32a = b$. The table also shows that it takes Carly an average time of 14 minutes to travel 0.56 kilometers. Substituting 14 for t and 0.56 for d in the equation $t = ad + b$ yields $14 = 0.56a + b$. Subtracting $0.56a$ from both sides of this equation yields $14 - 0.56a = b$. Substituting $8 - 0.32a$ for b in this equation yields $14 - 0.56a = 8 - 0.32a$. Subtracting 8 from both sides of this equation yields $6 - 0.56a = -0.32a$. Adding $0.56a$ to both sides of this equation yields $6 = 0.24a$. Dividing both sides of this equation by 0.24 yields $25 = a$. Substituting 25 for a in the equation $8 = 0.32a + b$ yields $8 = 0.32(25) + b$, or $8 = 8 + b$. Subtracting 8 from both sides of this equation yields $0 = b$. Substituting 25 for a and 0 for b in the equation $t = ad + b$ yields $t = 25d + 0$, or $t = 25d$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID f7e39fe9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: f7e39fe9

x	10	15	20	25
$f(x)$	82	137	192	247

The table shows four values of x and their corresponding values of $f(x)$. There is a linear relationship between x and $f(x)$ that is defined by the equation $f(x) = mx - 28$, where m is a constant. What is the value of m ?

ID: f7e39fe9 Answer

Correct Answer:

11

Rationale

The correct answer is 11. It's given that $f(x)$ is defined by the equation $f(x) = mx - 28$, where m is a constant. It's also given in the table that when $x = 10$, $f(x) = 82$. Substituting 10 for x and 82 for $f(x)$ in the equation $f(x) = mx - 28$ yields, $82 = m(10) - 28$. Adding 28 to both sides of this equation yields $110 = 10m$. Dividing both sides of this equation by 10 yields $11 = m$. Therefore, the value of m is 11.

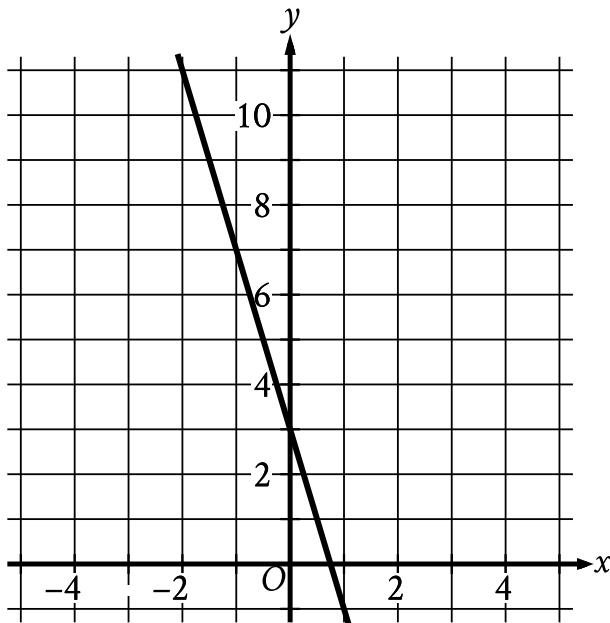
Question Difficulty:

Medium

Question ID 415ab1d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 415ab1d2



The graph of the linear function $y = f(x) + 19$ is shown. If c and d are positive constants, which equation could define f ?

- A. $f(x) = -d - cx$
- B. $f(x) = d - cx$
- C. $f(x) = -d + cx$
- D. $f(x) = d + cx$

ID: 415ab1d2 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the graph of the linear function $y = f(x) + 19$ is shown. This means that the graph of $y = f(x) + 19$ can be translated down 19 units to create the graph of $y = f(x)$ and the y -coordinate of every point on the graph of $y = f(x) + 19$ can be decreased by 19 to find the resulting point on the graph of $y = f(x)$. The y -intercept of the graph of $y = f(x) + 19$ is $(0, 3)$. Translating the graph of $y = f(x) + 19$ down 19 units results in a y -intercept of the graph of $y = f(x)$ at the point $(0, 3 - 19)$, or $(0, -16)$. The graph of $y = f(x) + 19$ slants down from left to right, so the slope of the graph is negative. The translation of a linear graph changes its position, but does not change its slope. It follows that the slope of the graph of $y = f(x)$ is also negative. The equation of a linear function f can be written in the form $f(x) = b + mx$, where b is the y -coordinate of the y -intercept and m is the slope of the graph of $y = f(x)$. It's given that c and d are positive constants. Since the y -coordinate of the y -intercept and the slope of the graph of $y = f(x)$ are both negative, it follows that $f(x) = -d - cx$ could define f .

Choice B is incorrect. This could define a linear function where its graph has a positive, not negative, y -intercept.

Choice C is incorrect. This could define a linear function where its graph has a positive, not negative, slope.

Choice D is incorrect. This could define a linear function where its graph has a positive, not negative, y -intercept and a positive, not negative, slope.

Question Difficulty:

Hard

Question ID e9908930

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e9908930

x	$f(x)$
-4	0
$-\frac{19}{5}$	1
$-\frac{18}{5}$	2

For the linear function f , the table shows three values of x and their corresponding values of $f(x)$. If $h(x) = f(x) - 13$, which equation defines h ?

- A. $h(x) = 5x - 4$
- B. $h(x) = 5x + 7$
- C. $h(x) = 5x + 9$
- D. $h(x) = 5x + 20$

ID: e9908930 Answer

Correct Answer:

B

Rationale

Choice B is correct. An equation that defines a linear function f can be written in the form $f(x) = mx + b$, where m and b are constants. It's given in the table that when $x = -4$, $f(x) = 0$. Substituting -4 for x and 0 for $f(x)$ in the equation $f(x) = mx + b$ yields $0 = m(-4) + b$, or $0 = -4m + b$. Adding $4m$ to both sides of this equation yields $4m = b$.

Substituting $4m$ for b in the equation $f(x) = mx + b$ yields $f(x) = mx + 4m$. It's also given in the table that when $x = -\frac{19}{5}$,

$f(x) = 1$. Substituting $-\frac{19}{5}$ for x and 1 for $f(x)$ in the equation $f(x) = mx + 4m$ yields $1 = m(-\frac{19}{5}) + 4m$, or $1 = \frac{1}{5}m$.

Multiplying both sides of this equation by 5 yields $m = 5$. Substituting 5 for m in the equation $f(x) = mx + 4m$ yields

$f(x) = 5x + 4(5)$, or $f(x) = 5x + 20$. If $h(x) = f(x) - 13$, substituting $5x + 20$ for $f(x)$ in this equation yields

$h(x) = (5x + 20) - 13$, or $h(x) = 5x + 7$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is an equation that defines the linear function f , not h .

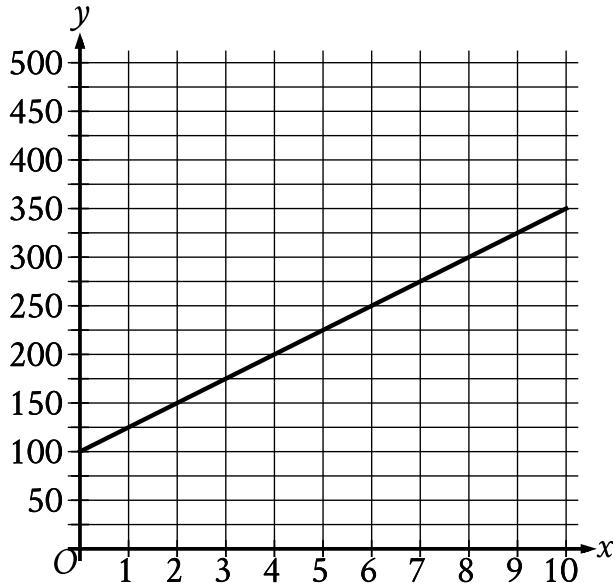
Question Difficulty:

Hard

Question ID 5cf1bbc9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5cf1bbc9



The graph of the function f , where $y = f(x)$, gives the total cost y , in dollars, for a certain video game system and x games. What is the best interpretation of the slope of the graph in this context?

- A. Each game costs \$25.
- B. The video game system costs \$100.
- C. The video game system costs \$25.
- D. Each game costs \$100.

ID: 5cf1bbc9 Answer

Correct Answer:

A

Rationale

Choice A is correct. The given graph is a line, and the slope of a line is defined as the change in the value of y for each increase in the value of x by 1. It's given that y represents the total cost, in dollars, and that x represents the number of games. Therefore, the change in the value of y for each increase in the value of x by 1 represents the change in total cost, in dollars, for each increase in the number of games by 1. In other words, the slope represents the cost, in dollars, per game. The graph shows that when the value of x increases from 0 to 1, the value of y increases from 100 to 125. It follows that the slope is 25, or the cost per game is \$25. Thus, the best interpretation of the slope of the graph is that each game costs \$25.

Choice B is incorrect. This is an interpretation of the y -intercept of the graph rather than the slope of the graph.

Choice C is incorrect. The slope of the graph is the cost per game, not the cost of the video game system.

Choice D is incorrect. Each game costs **\$25**, not **\$100**.

Question Difficulty:

Medium

Question ID b51c173d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b51c173d

For the linear function f , the graph of $y = f(x)$ in the xy -plane has a slope of **2** and has a y -intercept at $(0, -5)$. Which equation defines f ?

- A. $f(x) = \frac{1}{2}x - 5$
- B. $f(x) = -\frac{1}{2}x - 5$
- C. $f(x) = -2x - 5$
- D. $f(x) = 2x - 5$

ID: b51c173d Answer

Correct Answer:

D

Rationale

Choice D is correct. An equation defining the linear function f can be written in the form $f(x) = mx + b$, where m is the slope and $(0, b)$ is the y -intercept of the graph of $y = f(x)$ in the xy -plane. It's given that the graph of $y = f(x)$ has a slope of **2**. Therefore, $m = 2$. It's also given that the graph of $y = f(x)$ has a y -intercept at $(0, -5)$. Therefore, $b = -5$. Substituting **2** for m and **-5** for b in the equation $f(x) = mx + b$ yields $f(x) = 2x - 5$. Thus, the equation that defines f is $f(x) = 2x - 5$.

Choice A is incorrect. For this function, the graph of $y = f(x)$ in the xy -plane has a slope of $\frac{1}{2}$, not **2**.

Choice B is incorrect. For this function, the graph of $y = f(x)$ in the xy -plane has a slope of $-\frac{1}{2}$, not **2**.

Choice C is incorrect. For this function, the graph of $y = f(x)$ in the xy -plane has a slope of **-2**, not **2**.

Question Difficulty:

Easy

Question ID 541bef2f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 541bef2f

$$\begin{aligned}y &\leq x + 7 \\y &\geq -2x - 1\end{aligned}$$

Which point (x, y) is a solution to the given system of inequalities in the xy -plane?

- A. $(-14, 0)$
- B. $(0, -14)$
- C. $(0, 14)$
- D. $(14, 0)$

ID: 541bef2f Answer

Correct Answer:

D

Rationale

Choice D is correct. A point (x, y) is a solution to a system of inequalities in the xy -plane if substituting the x -coordinate and the y -coordinate of the point for x and y , respectively, in each inequality makes both of the inequalities true. Substituting the x -coordinate and the y -coordinate of choice D, 14 and 0, for x and y , respectively, in the first inequality in the given system, $y \leq x + 7$, yields $0 \leq 14 + 7$, or $0 \leq 21$, which is true. Substituting 14 for x and 0 for y in the second inequality in the given system, $y \geq -2x - 1$, yields $0 \geq -2(14) - 1$, or $0 \geq -29$, which is true. Therefore, the point $(14, 0)$ is a solution to the given system of inequalities in the xy -plane.

Choice A is incorrect. Substituting -14 for x and 0 for y in the inequality $y \leq x + 7$ yields $0 \leq -14 + 7$, or $0 \leq -7$, which is not true.

Choice B is incorrect. Substituting 0 for x and -14 for y in the inequality $y \geq -2x - 1$ yields $-14 \geq -2(0) - 1$, or $-14 \geq -1$, which is not true.

Choice C is incorrect. Substituting 0 for x and 14 for y in the inequality $y \leq x + 7$ yields $14 \leq 0 + 7$, or $14 \leq 7$, which is not true.

Question Difficulty:

Hard

Question ID dd875c97

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dd875c97

A truck can haul a maximum weight of **5,630** pounds. During one trip, the truck will be used to haul a **190**-pound piece of equipment as well as several crates. Some of these crates weigh **25** pounds each and the others weigh **62** pounds each. Which inequality represents the possible combinations of the number of **25**-pound crates, x , and the number of **62**-pound crates, y , the truck can haul during one trip if only the piece of equipment and the crates are being hauled?

- A. $25x + 62y \leq 5,440$
- B. $25x + 62y \geq 5,440$
- C. $62x + 25y \leq 5,630$
- D. $62x + 25y \geq 5,630$

ID: dd875c97 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a truck can haul a maximum of **5,630** pounds. It's also given that during one trip, the truck will be used to haul a **190**-pound piece of equipment as well as several crates. It follows that the truck can haul at most **5,630 – 190**, or **5,440**, pounds of crates. Since x represents the number of **25**-pound crates, the expression $25x$ represents the weight of the **25**-pound crates. Since y represents the number of **62**-pound crates, $62y$ represents the weight of the **62**-pound crates. Therefore, $25x + 62y$ represents the total weight of the crates the truck can haul. Since the truck can haul at most **5,440** pounds of crates, the total weight of the crates must be less than or equal to **5,440** pounds, or $25x + 62y \leq 5,440$.

Choice B is incorrect. This represents the possible combinations of the number of **25**-pound crates, x , and the number of **62**-pound crates, y , the truck can haul during one trip if it can haul a minimum, not a maximum, of **5,630** pounds.

Choice C is incorrect. This represents the possible combinations of the number of **62**-pound crates, x , and the number of **25**-pound crates, y , the truck can haul during one trip if only crates are being hauled.

Choice D is incorrect. This represents the possible combinations of the number of **62**-pound crates, x , and the number of **25**-pound crates, y , the truck can haul during one trip if it can haul a minimum, not a maximum, weight of **5,630** pounds and only crates are being hauled.

Question Difficulty:

Medium

Question ID 4a090a46

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 4a090a46

Julissa needs at least **100** hours of flight time to get her private pilot certification. If Julissa already has **86** hours of flight time, what is the minimum number of additional hours of flight time Julissa needs to get her private pilot certification?

- A. **14**
- B. **76**
- C. **86**
- D. **186**

ID: 4a090a46 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that Julissa already has **86** hours of flight time. Let x represent the number of additional hours of flight time Julissa needs to get her private pilot certification. After completing x hours of flight time, Julissa will have completed a total of $86 + x$ hours of flight time. It's given that Julissa needs at least **100** hours of flight time to get her private pilot certification. Therefore, $86 + x \geq 100$. Subtracting **86** from both sides of this inequality yields $x \geq 14$. Thus, **14** is the minimum number of additional hours of flight time Julissa needs to get her private pilot certification.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the number of hours of flight time Julissa already has, rather than the minimum number of additional hours of flight time Julissa needs.

Choice D is incorrect. This is the number of hours of flight time Julissa will have if she completes **100** more hours of flight time, rather than the minimum number of additional hours of flight time Julissa needs.

Question Difficulty:

Easy

Question ID 6c71f3ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 6c71f3ec

A salesperson's total earnings consist of a base salary of x dollars per year, plus commission earnings of 11% of the total sales the salesperson makes during the year. This year, the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary. Which of the following inequalities represents all possible values of total sales s , in dollars, the salesperson can make this year in order to meet that goal?

- A. $2x \leq s \leq 3x$
- B. $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$
- C. $3x \leq s \leq 4x$
- D. $\frac{3}{0.11}x \leq s \leq \frac{4}{0.11}x$

ID: 6c71f3ec Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a salesperson's total earnings consist of a base salary of x dollars per year plus commission earnings of 11% of the total sales the salesperson makes during the year. If the salesperson makes s dollars in total sales this year, the salesperson's total earnings can be represented by the expression $x + 0.11s$. It's also given that the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary, which can be represented by the expressions $3x$ and $4x$, respectively. Therefore, this situation can be represented by the inequality $3x \leq x + 0.11s \leq 4x$. Subtracting x from each part of this inequality yields $2x \leq 0.11s \leq 3x$. Dividing each part of this inequality by 0.11 yields $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$. Therefore, the inequality $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$ represents all possible values of total sales s , in dollars, the salesperson can make this year in order to meet their goal.

Choice A is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 2 times and at most 3 times, rather than at least 3 times and at most 4 times, the base salary.

Choice C is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 3 times and at most 4 times the base salary.

Choice D is incorrect. This inequality represents a situation in which the total earnings are at least 4 times and at most 5 times, rather than at least 3 times and at most 4 times, the base salary.

Question Difficulty:

Hard

Question ID 68f2cbaf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 68f2cbaf

Ty set a goal to walk at least **24** kilometers every day to prepare for a multiday hike. On a certain day, Ty plans to walk at an average speed of **4** kilometers per hour. What is the minimum number of hours Ty must walk on that day to fulfill the daily goal?

- A. **4**
- B. **6**
- C. **20**
- D. **24**

ID: 68f2cbaf Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that Ty plans to walk at an average speed of **4** kilometers per hour. The number of kilometers Ty will walk is determined by the expression $4s$, where s is the number of hours Ty walks. The given goal of at least **24** kilometers means that the inequality $4s \geq 24$ represents the situation. Dividing both sides of this inequality by **4** gives $s \geq 6$, which corresponds to a minimum of **6** hours Ty must walk.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 1a621af4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 1a621af4

A number x is at most 2 less than 3 times the value of y . If the value of y is -4 , what is the greatest possible value of x ?

ID: 1a621af4 Answer

Correct Answer:

-14

Rationale

The correct answer is -14 . It's given that a number x is at most 2 less than 3 times the value of y . Therefore, x is less than or equal to 2 less than 3 times the value of y . The expression $3y$ represents 3 times the value of y . The expression $3y - 2$ represents 2 less than 3 times the value of y . Therefore, x is less than or equal to $3y - 2$. This can be shown by the inequality $x \leq 3y - 2$. Substituting -4 for y in this inequality yields $x \leq 3(-4) - 2$ or, $x \leq -14$. Therefore, if the value of y is -4 , the greatest possible value of x is -14 .

Question Difficulty:

Hard

Question ID df32b09c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: df32b09c

Tom scored 85, 78, and 98 on his first three exams in history class. Solving which inequality gives the score, G , on Tom's fourth exam that will result in a mean score on all four exams of at least 90?

A. $90 - (85 + 78 + 98) \leq 4G$

B. $4G + 85 + 78 + 98 \geq 360$

C. $\frac{(G + 85 + 78 + 98)}{4} \geq 90$

D. $\frac{(85 + 78 + 98)}{4} \geq 90 - 4G$

ID: df32b09c Answer

Correct Answer:

C

Rationale

Choice C is correct. The mean of the four scores (G , 85, 78, and 98) can be expressed as $\frac{G + 85 + 78 + 98}{4}$. The inequality that expresses the condition that the mean score is at least 90 can therefore be written as $\frac{G + 85 + 78 + 98}{4} \geq 90$.

Choice A is incorrect. The sum of the scores (G , 85, 78, and 98) isn't divided by 4 to express the mean. Choice B is incorrect and may be the result of an algebraic error when multiplying both sides of the inequality by 4. Choice D is incorrect because it doesn't include G in the mean with the other three scores.

Question Difficulty:

Easy

Question ID 86f7483f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 86f7483f

During spring migration, a dragonfly traveled a minimum of **1,510** miles and a maximum of **4,130** miles between stopover locations. Which inequality represents this situation, where d is a possible distance, in miles, this dragonfly traveled between stopover locations during spring migration?

- A. $d \leq 1,510$
- B. $1,510 \leq d \leq 4,130$
- C. $d \geq 4,130$
- D. $4,130 \leq d \leq 5,640$

ID: 86f7483f Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that during spring migration, a dragonfly traveled a minimum of **1,510** miles and a maximum of **4,130** miles between stopover locations. It's also given that d represents a possible distance, in miles, this dragonfly traveled between stopover locations. It follows that the inequality $1,510 \leq d \leq 4,130$ represents this situation.

Choice A is incorrect. This inequality represents a situation in which a dragonfly traveled a maximum of **1,510** miles between stopover locations.

Choice C is incorrect. This inequality represents a situation in which a dragonfly traveled a minimum of **4,130** miles between stopover locations.

Choice D is incorrect. This inequality represents a situation in which a dragonfly traveled a minimum of **4,310** miles and a maximum of **5,640** miles between stopover locations.

Question Difficulty:

Easy

Question ID bf5f80c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: bf5f80c6

$$y < -4x + 4$$

Which point (x, y) is a solution to the given inequality in the xy -plane?

- A. $(-4, 0)$
- B. $(0, 5)$
- C. $(2, 1)$
- D. $(2, -1)$

ID: bf5f80c6 Answer

Correct Answer:

A

Rationale

Choice D is correct. For a point (x, y) to be a solution to the given inequality in the xy -plane, the value of the point's y -coordinate must be less than the value of $-4x + 4$, where x is the value of the x -coordinate of the point. This is true of the point $(-4, 0)$ because $0 < -4(-4) + 4$, or $0 < 20$. Therefore, the point $(-4, 0)$ is a solution to the given inequality.

Choices A, B, and C are incorrect. None of these points are a solution to the given inequality because each point's y -coordinate is greater than the value of $-4x + 4$ for the point's x -coordinate.

Question Difficulty:

Medium

Question ID 80da233d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 80da233d

A certain elephant weighs 200 pounds at birth and gains more than 2 but less than 3 pounds per day during its first year. Which of the following inequalities represents all possible weights w , in pounds, for the elephant 365 days after birth?

- A. $400 < w < 600$
- B. $565 < w < 930$
- C. $730 < w < 1,095$
- D. $930 < w < 1,295$

ID: 80da233d Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the elephant weighs 200 pounds at birth and gains more than 2 pounds but less than 3 pounds per day during its first year. The inequality $200 + 2d < w < 200 + 3d$ represents this situation, where d is the number of days after birth. Substituting 365 for d in the inequality gives $200 + 2(365) < w < 200 + 3(365)$, or $930 < w < 1,295$.

Choice A is incorrect and may result from solving the inequality $200(2) < w < 200(3)$. Choice B is incorrect and may result from solving the inequality for a weight range of more than 1 pound but less than 2 pounds: $200 + 1(365) < w < 200 + 2(365)$. Choice C is incorrect and may result from calculating the possible weight gained by the elephant during the first year without adding the 200 pounds the elephant weighed at birth.

Question Difficulty:

Medium

Question ID b78cd5df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b78cd5df

An event planner is planning a party. It costs the event planner a onetime fee of **\$35** to rent the venue and **\$10.25** per attendee. The event planner has a budget of **\$300**. What is the greatest number of attendees possible without exceeding the budget?

ID: b78cd5df Answer

Correct Answer:

25

Rationale

The correct answer is **25**. The total cost of the party is found by adding the onetime fee of the venue to the cost per attendee times the number of attendees. Let x be the number of attendees. The expression $35 + 10.25x$ thus represents the total cost of the party. It's given that the budget is **\$300**, so this situation can be represented by the inequality $35 + 10.25x \leq 300$. Subtracting **35** from both sides of this inequality gives $10.25x \leq 265$. Dividing both sides of this inequality by **10.25** results in approximately $x \leq 25.854$. Since the question is stated in terms of attendees, rounding **25.854** down to the greatest whole number gives the greatest number of attendees possible, which is **25**.

Question Difficulty:

Medium

Question ID 72a5fd28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 72a5fd28

For a party, **50** dinner rolls are needed. Dinner rolls are sold in packages of **12**. What is the minimum number of packages that should be bought for the party?

ID: 72a5fd28 Answer

Correct Answer:

5

Rationale

The correct answer is **5**. Let p represent the number of packages of dinner rolls that should be bought for the party. It's given that dinner rolls are sold in packages of **12**. Therefore, $12p$ represents the number of dinner rolls that should be bought for the party. It's also given that **50** dinner rolls are needed; therefore, $12p \geq 50$. Dividing both sides of this inequality by **12** yields $p \geq \frac{50}{12}$, or approximately $p \geq 4.17$. Since the number of packages of dinner rolls must be a whole number, the minimum number of packages that should be bought for the party is **5**.

Question Difficulty:

Easy

Question ID b31c3117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b31c3117

$$H = 120p + 60$$

The Karvonen formula above shows the relationship between Alice's target heart rate H , in beats per minute (bpm), and the intensity level p of different activities. When $p = 0$, Alice has a resting heart rate. When $p = 1$, Alice has her maximum heart rate. It is recommended that p be between 0.5 and 0.85 for Alice when she trains. Which of the following inequalities describes Alice's target training heart rate?

- A. $120 \leq H \leq 162$
- B. $102 \leq H \leq 120$
- C. $60 \leq H \leq 162$
- D. $60 \leq H \leq 102$

ID: b31c3117 Answer

Correct Answer:

A

Rationale

Choice A is correct. When Alice trains, it's recommended that p be between 0.5 and 0.85. Therefore, her target training heart rate is represented by the values of H corresponding to $0.5 \leq p \leq 0.85$. When $p = 0.5$, $H = 120(0.5) + 60$, or $H = 120$. When $p = 0.85$, $H = 120(0.85) + 60$, or $H = 162$. Therefore, the inequality that describes Alice's target training heart rate is $120 \leq H \leq 162$.

Choice B is incorrect. This inequality describes Alice's target heart rate for $0.35 \leq p \leq 0.5$. Choice C is incorrect. This inequality describes her target heart rate for $0 \leq p \leq 0.85$. Choice D is incorrect. This inequality describes her target heart rate for $0 \leq p \leq 0.35$.

Question Difficulty:

Medium

Question ID ee7b1de1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ee7b1de1

A small business owner budgets **\$2,200** to purchase candles. The owner must purchase a minimum of **200** candles to maintain the discounted pricing. If the owner pays **\$4.90** per candle to purchase small candles and **\$11.60** per candle to purchase large candles, what is the maximum number of large candles the owner can purchase to stay within the budget and maintain the discounted pricing?

ID: ee7b1de1 Answer

Correct Answer:

182

Rationale

The correct answer is **182**. Let s represent the number of small candles the owner can purchase, and let ℓ represent the number of large candles the owner can purchase. It's given that the owner pays **\$4.90** per candle to purchase small candles and **\$11.60** per candle to purchase large candles. Therefore, the owner pays **4.90s** dollars for s small candles and **11.60 ℓ** dollars for ℓ large candles, which means the owner pays a total of **4.90s + 11.60 ℓ** dollars to purchase candles. It's given that the owner budgets **\$2,200** to purchase candles. Therefore, $4.90s + 11.60\ell \leq 2,200$. It's also given that the owner must purchase a minimum of **200** candles. Therefore, $s + \ell \geq 200$. The inequalities $4.90s + 11.60\ell \leq 2,200$ and $s + \ell \geq 200$ can be combined into one compound inequality by rewriting the second inequality so that its left-hand side is equivalent to the left-hand side of the first inequality. Subtracting ℓ from both sides of the inequality $s + \ell \geq 200$ yields $s \geq 200 - \ell$. Multiplying both sides of this inequality by **4.90** yields $4.90s \geq 4.90(200 - \ell)$, or $4.90s \geq 980 - 4.90\ell$. Adding **11.60 ℓ** to both sides of this inequality yields $4.90s + 11.60\ell \geq 980 - 4.90\ell + 11.60\ell$, or $4.90s + 11.60\ell \geq 980 + 6.70\ell$. This inequality can be combined with the inequality $4.90s + 11.60\ell \leq 2,200$, which yields the compound inequality $980 + 6.70\ell \leq 4.90s + 11.60\ell \leq 2,200$. It follows that $980 + 6.70\ell \leq 2,200$. Subtracting **980** from both sides of this inequality yields $6.70\ell \leq 2,200$. Dividing both sides of this inequality by **6.70** yields approximately $\ell \leq 182.09$. Since the number of large candles the owner purchases must be a whole number, the maximum number of large candles the owner can purchase is the largest whole number less than **182.09**, which is **182**.

Question Difficulty:

Hard

Question ID c17d9ba9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c17d9ba9

A number x is at most 17 less than 5 times the value of y . If the value of y is 3, what is the greatest possible value of x ?

ID: c17d9ba9 Answer

Correct Answer:

-2

Rationale

The correct answer is -2. It's given that a number x is at most 17 less than 5 times the value of y , or $x \leq 5y - 17$. Substituting 3 for y in this inequality yields $x \leq 5(3) - 17$, or $x \leq -2$. Thus, if the value of y is 3, the greatest possible value of x is -2.

Question Difficulty:

Medium

Question ID ecca0603

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: ecca0603

$$\begin{aligned}y &< x \\x &< 22\end{aligned}$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given system of inequalities?

A.

x	y
19	18
20	19
21	20

B.

x	y
19	20
20	21
21	22

C.

x	y
23	22
24	23
25	24

D.

x	y
23	24
24	25
25	26

ID: ecca0603 Answer

Correct Answer:

A

Rationale

Choice A is correct. The inequality $y < x$ indicates that for any solution to the given system of inequalities, the value of x must be greater than the corresponding value of y . The inequality $x < 22$ indicates that for any solution to the given system of inequalities,

the value of x must be less than **22**. Of the given choices, only choice A contains values of x that are each greater than the corresponding value of y and less than **22**. Therefore, for choice A, all the values of x and their corresponding values of y are solutions to the given system of inequalities.

Choice B is incorrect. The values in this table aren't solutions to the inequality $y < x$.

Choice C is incorrect. The values in this table aren't solutions to the inequality $x < 22$.

Choice D is incorrect. The values in this table aren't solutions to the inequality $y < x$ or the inequality $x < 22$.

Question Difficulty:

Medium

Question ID 6cb9bf45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6cb9bf45

$$y > 7x - 4$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	13
5	27
8	48

B.

x	y
3	17
5	31
8	52

C.

x	y
3	21
5	27
8	52

D.

x	y
3	21
5	35
8	56

ID: 6cb9bf45 Answer

Correct Answer:

D

Rationale

Choice D is correct. A solution (x, y) to the given inequality is a value of x and the corresponding value of y such that the value of y is greater than the value of $7x - 4$. All the tables in the choices have the same three values of x , so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y > 7(3) - 4$, or $y > 17$. Substituting 5 for x in the given inequality yields $y > 7(5) - 4$, or $y > 31$.

. Substituting 8 for x in the given inequality yields $y > 7(8) - 4$, or $y > 52$. Therefore, when $x = 3$, $x = 5$, and $x = 8$, the corresponding values of y must be greater than 17 , greater than 31 , and greater than 52 , respectively. In the table in choice D, when $x = 3$, the corresponding value of y is 21 , which is greater than 17 ; when $x = 5$, the corresponding value of y is 35 , which is greater than 31 ; when $x = 8$, the corresponding value of y is 56 , which is greater than 52 . Of the given choices, only choice D gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

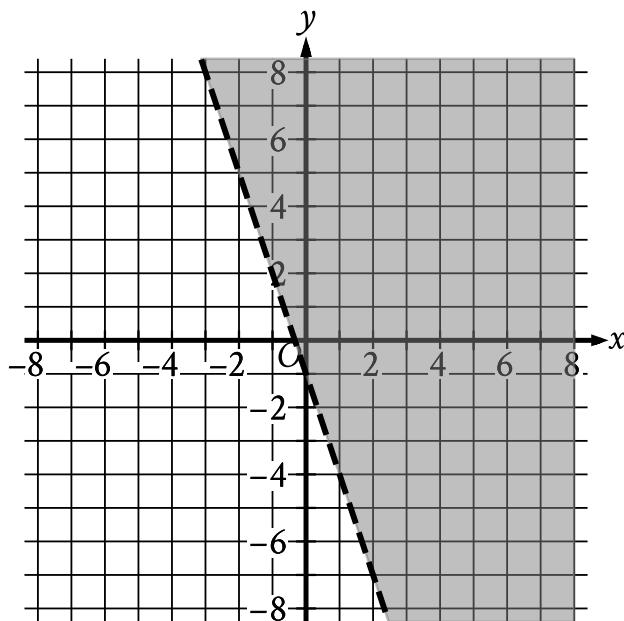
Question Difficulty:

Medium

Question ID c41e5688

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c41e5688



The shaded region shown represents the solutions to which inequality?

- A. $y < -1 + 3x$
- B. $y < -1 - 3x$
- C. $y > -1 + 3x$
- D. $y > -1 - 3x$

ID: c41e5688 Answer

Correct Answer:

D

Rationale

Choice D is correct. The equation for the line representing the boundary of the shaded region can be written in slope-intercept form $y = b + mx$, where m is the slope and $(0, b)$ is the y-intercept of the line. For the graph shown, the boundary line passes through the points $(0, -1)$ and $(1, -4)$. Given two points on a line, (x_1, y_1) and (x_2, y_2) , the slope of the line can be calculated using the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $(0, -1)$ and $(1, -4)$ for (x_1, y_1) and (x_2, y_2) in this equation yields $m = \frac{-4 - (-1)}{1 - 0} = \frac{-3}{1} = -3$, which is equivalent to $m = -3$. Since the point $(0, -1)$ represents the y-intercept, it follows that $b = -1$. Substituting -3 for m and -1 for b in the equation $y = b + mx$ yields $y = -1 - 3x$ as the equation of the boundary line. Since the shaded region represents all the points above this boundary line, it follows that the shaded region shown represents the solutions to the inequality $y > -1 - 3x$.

Choice A is incorrect. This inequality represents a region below, not above, a boundary line with a slope of **3**, not **-3**.

Choice B is incorrect. This inequality represents a region below, not above, the boundary line shown.

Choice C is incorrect. This inequality represents a region whose boundary line has a slope of **3**, not **-3**.

Question Difficulty:

Medium

Question ID 55ea82f3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 55ea82f3

A team hosting an event to raise money for new uniforms plans to sell at least **140** tickets before this event and at least **220** tickets during this event to raise a total of at least **\$5,820** from all tickets sold. The price of a ticket during this event is **\$3** less than the price of a ticket before this event. Which inequality represents this situation, where x is the price, in dollars, of a ticket sold during this event?

- A. $140(x + 3) + 220x \leq 5,820$
- B. $140(x + 3) + 220x \geq 5,820$
- C. $140(x - 3) + 220x \leq 5,820$
- D. $140(x - 3) + 220x \geq 5,820$

ID: 55ea82f3 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a team plans to sell at least **140** tickets before an event and at least **220** tickets during the event to raise a total of at least **\$5,820** from all tickets sold. It's also given that the price of a ticket during the event is **\$3** less than the price of a ticket before the event and that x represents the price, in dollars, of a ticket sold during the event. It follows that $x + 3$ represents the price, in dollars, of a ticket sold before the event. The expression $140(x + 3)$ represents the planned revenue, in dollars, from the tickets sold before the event, and the expression $220x$ represents the planned revenue, in dollars, from the tickets sold during the event. Thus, the expression $140(x + 3) + 220x$ represents the planned revenue, in dollars, from all tickets sold. Since the team plans to raise a total of at least **\$5,820** from all tickets sold, the total revenue must be at least **\$5,820**. Therefore, the inequality $140(x + 3) + 220x \geq 5,820$ represents this situation.

Choice A is incorrect. This inequality represents a situation in which the team raises a total of at most **\$5,820** from all tickets sold.

Choice C is incorrect. This inequality represents a situation in which the price of a ticket before the event is **\$3** less, rather than **\$3** more, than the price of a ticket during the event and the team raises a total of at most **\$5,820** from all tickets sold.

Choice D is incorrect. This inequality represents a situation in which the price of a ticket before the event is **\$3** less, rather than **\$3** more, than the price of a ticket during the event.

Question Difficulty:

Hard

Question ID a049f400

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a049f400

$$y < 5x + 6$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	17
5	27
7	37

B.

x	y
3	17
5	35
7	37

C.

x	y
3	25
5	35
7	45

D.

x	y
3	21
5	31
7	41

ID: a049f400 Answer

Correct Answer:

A

Rationale

Choice A is correct. Substituting 3 for x in the given inequality yields $y < 5(3) + 6$, or $y < 21$. Therefore, when $x = 3$, the corresponding value of y is less than 21. Substituting 5 for x in the given inequality yields $y < 5(5) + 6$, or $y < 31$. Therefore, when $x = 5$, the corresponding value of y is less than 31. Substituting 7 for x in the given inequality yields $y < 5(7) + 6$, or $y < 41$. Therefore, when $x = 7$, the corresponding value of y is less than 41. For the table in choice A, when $x = 3$, the

corresponding value of y is **17**, which is less than **21**; when $x = 5$, the corresponding value of y is **27**, which is less than **31**; and when $x = 7$, the corresponding value of y is **37**, which is less than **41**. Therefore, the table in choice A gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID e006209c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e006209c

A geologist needs to collect at least **67** samples of lava from a volcano. If the geologist has already collected **63** samples from the volcano, what is the minimum number of additional samples the geologist needs to collect?

- A. **130**
- B. **63**
- C. **4**
- D. **0**

ID: e006209c Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the geologist has already collected **63** samples from the volcano. Let x represent the number of additional samples the geologist needs to collect. After collecting x additional samples, the geologist will have collected a total of $63 + x$ samples. It's given that the geologist needs to collect at least **67** samples. Therefore, $63 + x \geq 67$. Subtracting **63** from each side of this inequality yields the inequality $x \geq 4$. Thus, the geologist needs to collect a minimum of **4** additional samples.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the number of samples the geologist has already collected, rather than the minimum number of additional samples the geologist needs to collect.

Choice D is incorrect. If the geologist collects **0** additional samples, the geologist will have collected a total of **63** samples, which is less than **67** samples.

Question Difficulty:

Easy

Question ID 5bf5136d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%;"><div style="display: inline-block; width: 100%; height: 10px; background-color: #005a9f;"></div></div>

ID: 5bf5136d

The triangle inequality theorem states that the sum of any two sides of a triangle must be greater than the length of the third side. If a triangle has side lengths of **6** and **12**, which inequality represents the possible lengths, x , of the third side of the triangle?

- A. $x < 18$
- B. $x > 18$
- C. $6 < x < 18$
- D. $x < 6$ or $x > 18$

ID: 5bf5136d Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that a triangle has side lengths of **6** and **12**, and x represents the length of the third side of the triangle. It's also given that the triangle inequality theorem states that the sum of any two sides of a triangle must be greater than the length of the third side. Therefore, the inequalities $6 + x > 12$, $6 + 12 > x$, and $12 + x > 6$ represent all possible values of x . Subtracting **6** from both sides of the inequality $6 + x > 12$ yields $x > 12 - 6$, or $x > 6$. Adding **6** and **12** in the inequality $6 + 12 > x$ yields $18 > x$, or $x < 18$. Subtracting **12** from both sides of the inequality $12 + x > 6$ yields $x > 6 - 12$, or $x > -6$. Since all x -values that satisfy the inequality $x > 6$ also satisfy the inequality $x > -6$, it follows that the inequalities $x > 6$ and $x < 18$ represent the possible values of x . Therefore, the inequality $6 < x < 18$ represents the possible lengths, x , of the third side of the triangle.

Choice A is incorrect. This inequality gives the upper bound for x but does not include its lower bound.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID d9733ed9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: d9733ed9

$$y > 4x + 8$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
2	19
4	30
6	41

B.

x	y
2	8
4	16
6	24

C.

x	y
2	13
4	18
6	23

D.

x	y
2	13
4	21
6	29

ID: d9733ed9 Answer

Correct Answer:

A

Rationale

Choice A is correct. In each choice, the values of x are 2, 4, and 6. Substituting the first value of x , 2, for x in the given inequality yields $y > 4(2) + 8$, or $y > 16$. Therefore, when $x = 2$, the corresponding value of y must be greater than 16. Of the given choices, only choice A is a table where the value of y corresponding to $x = 2$ is greater than 16. To confirm that the other values of x in this table and their corresponding values of y are also solutions to the given inequality, the values of x and y in the table

can be substituted for x and y in the given inequality. Substituting **4** for x and **30** for y in the given inequality yields **$30 > 4(4) + 8$** , or **$30 > 24$** , which is true. Substituting **6** for x and **41** for y in the given inequality yields **$41 > 4(6) + 8$** , or **$41 > 32$** , which is true. It follows that for choice A, all the values of x and their corresponding values of y are solutions to the given inequality.

Choice B is incorrect. Substituting **2** for x and **8** for y in the given inequality yields **$8 > 4(2) + 8$** , or **$8 > 16$** , which is false.

Choice C is incorrect. Substituting **2** for x and **13** for y in the given inequality yields **$13 > 4(2) + 8$** , or **$13 > 16$** , which is false.

Choice D is incorrect. Substituting **2** for x and **13** for y in the given inequality yields **$13 > 4(2) + 8$** , or **$13 > 16$** , which is false.

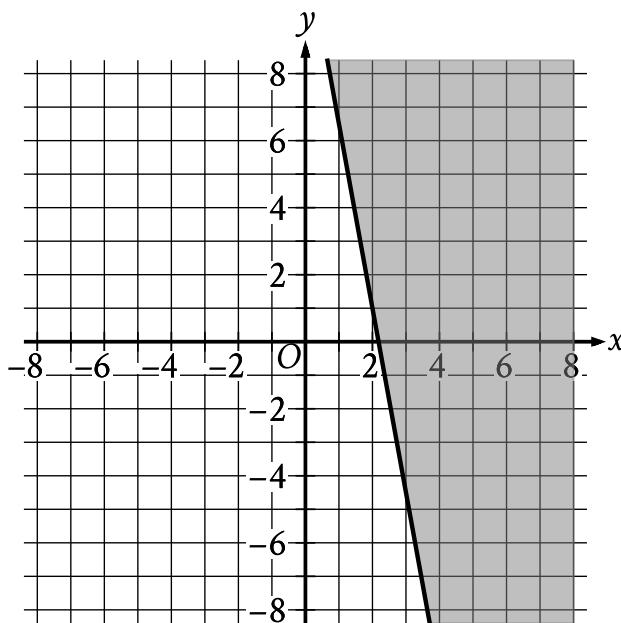
Question Difficulty:

Medium

Question ID 59a49431

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 59a49431



The shaded region shown represents solutions to an inequality. Which ordered pair (x, y) is a solution to this inequality?

- A. $(0, -4)$
- B. $(0, 4)$
- C. $(-4, 0)$
- D. $(4, 0)$

ID: 59a49431 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since the shaded region shown represents solutions to an inequality, an ordered pair (x, y) is a solution to the inequality if it's represented by a point in the shaded region. Of the given choices, only $(4, 0)$ is represented by a point in the shaded region. Therefore, $(4, 0)$ is a solution to the inequality.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:
Easy

Question ID f2bbd43d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: f2bbd43d

$$\begin{aligned}y &> 14 \\4x + y &< 18\end{aligned}$$

The point $(x, 53)$ is a solution to the system of inequalities in the xy -plane. Which of the following could be the value of x ?

- A. -9
- B. -5
- C. 5
- D. 9

ID: f2bbd43d Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the point $(x, 53)$ is a solution to the given system of inequalities in the xy -plane. This means that the coordinates of the point, when substituted for the variables x and y , make both of the inequalities in the system true. Substituting 53 for y in the inequality $y > 14$ yields $53 > 14$, which is true. Substituting 53 for y in the inequality $4x + y < 18$ yields $4x + 53 < 18$. Subtracting 53 from both sides of this inequality yields $4x < -35$. Dividing both sides of this inequality by 4 yields $x < -8.75$. Therefore, x must be a value less than -8.75 . Of the given choices, only -9 is less than -8.75 .

Choice B is incorrect. Substituting -5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(-5) + 53 < 18$, or $33 < 18$, which is not true.

Choice C is incorrect. Substituting 5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(5) + 53 < 18$, or $73 < 18$, which is not true.

Choice D is incorrect. Substituting 9 for x and 53 for y in the inequality $4x + y < 18$ yields $4(9) + 53 < 18$, or $89 < 18$, which is not true.

Question Difficulty:

Medium

Question ID e8f9e117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e8f9e117

$$I = \frac{V}{R}$$

The formula above is Ohm's law for an electric circuit with current I , in amperes, potential difference V , in volts, and resistance R , in ohms. A circuit has a resistance of 500 ohms, and its potential difference will be generated by n six-volt batteries that produce a total potential difference of $6n$ volts. If the circuit is to have a current of no more than 0.25 ampere, what is the greatest number, n , of six-volt batteries that can be used?

ID: e8f9e117 Answer

Rationale

The correct answer is 20. For the given circuit, the resistance R is 500 ohms, and the total potential difference V generated by n batteries is $6n$ volts. It's also given that the circuit is to have a current of no more than 0.25 ampere, which can be expressed as

$I < 0.25$. Since Ohm's law says that $I = \frac{V}{R}$, the given values for V and R can be substituted for I in this inequality, which yields $\frac{6n}{500} < 0.25$. Multiplying both sides of this inequality by 500 yields $6n < 125$, and dividing both sides of this inequality by 6 yields $n < 20.833$. Since the number of batteries must be a whole number less than 20.833, the greatest number of batteries that can be used in this circuit is 20.

Question Difficulty:

Hard

Question ID d8539e09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d8539e09

$$y < 6x + 2$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	20
5	32
7	44

B.

x	y
3	16
5	36
7	40

C.

x	y
3	16
5	28
7	40

D.

x	y
3	24
5	36
7	48

ID: d8539e09 Answer

Correct Answer:

C

Rationale

Choice C is correct. All the tables in the choices have the same three values of x , so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y < 6(3) + 2$, or $y < 20$. Therefore, when $x = 3$, the corresponding value of y is less than 20. Substituting 5 for x in the given inequality yields $y < 6(5) + 2$, or $y < 32$. Therefore, when $x = 5$, the corresponding value of y is less than 32.

Substituting 7 for x in the given inequality yields $y < 6(7) + 2$, or $y < 44$. Therefore, when $x = 7$, the corresponding value of y is less than 44 . For the table in choice C, when $x = 3$, the corresponding value of y is 16 , which is less than 20 ; when $x = 5$, the corresponding value of y is 28 , which is less than 32 ; when $x = 7$, the corresponding value of y is 40 , which is less than 44 .

Therefore, the table in choice C gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is 20 , which is not less than 20 ; when $x = 5$, the corresponding value of y is 32 , which is not less than 32 ; when $x = 7$, the corresponding value of y is 44 , which is not less than 44 .

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is 36 , which is not less than 32 .

Choice D is incorrect. In the table for choice D, when $x = 3$, the corresponding value of y is 24 , which is not less than 20 ; when $x = 5$, the corresponding value of y is 36 , which is not less than 32 ; when $x = 7$, the corresponding value of y is 48 , which is not less than 44 .

Question Difficulty:

Hard

Question ID 48fb34c8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 48fb34c8

$$y > 13x - 18$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	21
5	47
8	86

B.

x	y
3	26
5	42
8	86

C.

x	y
3	16
5	42
8	81

D.

x	y
3	26
5	52
8	91

ID: 48fb34c8 Answer

Correct Answer:

D

Rationale

Choice D is correct. All the tables in the choices have the same three values of x , so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y > 13(3) - 18$, or $y > 21$. Therefore, when $x = 3$, the corresponding value of y is greater than 21. Substituting 5 for x in the given inequality yields $y > 13(5) - 18$, or $y > 47$. Therefore, when $x = 5$, the corresponding value of y is greater

than **47**. Substituting **8** for x in the given inequality yields $y > 13(8) - 18$, or $y > 86$. Therefore, when $x = 8$, the corresponding value of y is greater than **86**. For the table in choice D, when $x = 3$, the corresponding value of y is **26**, which is greater than **21**; when $x = 5$, the corresponding value of y is **52**, which is greater than **47**; when $x = 8$, the corresponding value of y is **91**, which is greater than **86**. Therefore, the table in choice D gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is **21**, which is not greater than **21**; when $x = 5$, the corresponding value of y is **47**, which is not greater than **47**; when $x = 8$, the corresponding value of y is **86**, which is not greater than **86**.

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is **42**, which is not greater than **47**; when $x = 8$, the corresponding value of y is **86**, which is not greater than **86**.

Choice C is incorrect. In the table for choice C, when $x = 3$, the corresponding value of y is **16**, which is not greater than **21**; when $x = 5$, the corresponding value of y is **42**, which is not greater than **47**; when $x = 8$, the corresponding value of y is **81**, which is not greater than **86**.

Question Difficulty:

Hard

Question ID 915463e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 915463e0

Normal body temperature for an adult is between 97.8°F and 99°F , inclusive. If Kevin, an adult male, has a body temperature that is considered to be normal, which of the following could be his body temperature?

- A. 96.7°F
- B. 97.6°F
- C. 97.9°F
- D. 99.7°F

ID: 915463e0 Answer

Correct Answer:

C

Rationale

Choice C is correct. Normal body temperature must be greater than or equal to 97.8°F but less than or equal to 99°F . Of the given choices, 97.9°F is the only temperature that fits these restrictions.

Choices A and B are incorrect. These temperatures are less than 97.8°F , so they don't fit the given restrictions. Choice D is incorrect. This temperature is greater than 99°F , so it doesn't fit the given restrictions.

Question Difficulty:

Easy

Question ID 89541f9b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 89541f9b

Which of the following ordered pairs (x, y) satisfies the inequality $5x - 3y < 4$?

1. $(1, 1)$
2. $(2, 5)$
3. $(3, 2)$

- A. I only
- B. II only
- C. I and II only
- D. I and III only

ID: 89541f9b Answer

Correct Answer:

C

Rationale

Choice C is correct. Substituting $(1, 1)$ into the inequality gives $5(1) - 3(1) < 4$, or $2 < 4$, which is a true statement. Substituting $(2, 5)$ into the inequality gives $5(2) - 3(5) < 4$, or $-5 < 4$, which is a true statement. Substituting $(3, 2)$ into the inequality gives $5(3) - 3(2) < 4$, or $9 < 4$, which is not a true statement. Therefore, $(1, 1)$ and $(2, 5)$ are the only ordered pairs shown that satisfy the given inequality.

Choice A is incorrect because the ordered pair $(2, 5)$ also satisfies the inequality. Choice B is incorrect because the ordered pair $(1, 1)$ also satisfies the inequality. Choice D is incorrect because the ordered pair $(3, 2)$ does not satisfy the inequality.

Question Difficulty:

Easy

Question ID cb8f449f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: cb8f449f

$$\begin{array}{l} \frac{1}{2}y = 4 \\ x - \frac{1}{2}y = 2 \end{array}$$

The system of equations above has solution (x, y) . What is the value of x ?

A. 3

B. $\frac{7}{2}$

C. 4

D. 6

ID: cb8f449f Answer

Correct Answer:

D

Rationale

Choice D is correct. Adding the corresponding sides of the two equations eliminates y and yields $x = 6$, as shown.

$$\begin{array}{r} \frac{1}{2}y = 4 \\ x - \frac{1}{2}y = 2 \\ \hline x + 0 = 6 \end{array}$$

If (x, y) is a solution to the system, then (x, y) satisfies both equations in the system and any equation derived from them. Therefore, $x = 6$.

Choices A, B, and C are incorrect and may be the result of errors when solving the system.

Question Difficulty:

Medium

Question ID ff501705

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ff501705

$$\begin{aligned}\frac{3}{2}y - \frac{1}{4}x &= \frac{2}{3} - \frac{3}{2}y \\ \frac{1}{2}x + \frac{3}{2} &= py + \frac{9}{2}\end{aligned}$$

In the given system of equations, p is a constant. If the system has no solution, what is the value of p ?

ID: ff501705 Answer

Correct Answer:

6

Rationale

The correct answer is 6. A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are parallel and distinct. Lines represented by equations in standard form, $Ax + By = C$ and

$Dx + Ey = F$, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation, meaning $\frac{D}{A} = \frac{E}{B}$; and the lines are distinct if the constants are not proportional, meaning $\frac{F}{C}$ is not equal to $\frac{D}{A}$ or $\frac{E}{B}$. The first equation in the given system is $\frac{3}{2}y - \frac{1}{4}x = \frac{2}{3} - \frac{3}{2}y$. Multiplying each side of this equation by 12 yields

$18y - 3x = 8 - 18y$. Adding $18y$ to each side of this equation yields $36y - 3x = 8$, or $-3x + 36y = 8$. The second equation in the given system is $\frac{1}{2}x + \frac{3}{2} = py + \frac{9}{2}$. Multiplying each side of this equation by 2 yields $x + 3 = 2py + 9$. Subtracting $2py$ from each side of this equation yields $x + 3 - 2py = 9$. Subtracting 3 from each side of this equation yields $x - 2py = 6$.

Therefore, the two equations in the given system, written in standard form, are $-3x + 36y = 8$ and $x - 2py = 6$. As previously stated, if this system has no solution, the lines represented by the equations in the xy -plane are parallel and distinct, meaning the proportion $\frac{1}{-3} = \frac{-2p}{36}$, or $\frac{1}{3} = \frac{p}{18}$, is true and the proportion $\frac{6}{8} = \frac{1}{-3}$ is not true. The proportion $\frac{6}{8} = \frac{1}{-3}$ is not true.

Multiplying each side of the true proportion, $\frac{1}{3} = \frac{p}{18}$, by -18 yields $6 = p$. Therefore, if the system has no solution, then the value of p is 6.

Question Difficulty:

Hard

Question ID b86123af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b86123af

Hiro and Sofia purchased shirts and pants from a store. The price of each shirt purchased was the same and the price of each pair of pants purchased was the same. Hiro purchased 4 shirts and 2 pairs of pants for \$86, and Sofia purchased 3 shirts and 5 pairs of pants for \$166. Which of the following systems of linear equations represents the situation, if x represents the price, in dollars, of each shirt and y represents the price, in dollars, of each pair of pants?

- A. $4x + 2y = 86$
 $3x + 5y = 166$
- B. $4x + 3y = 86$
 $2x + 5y = 166$
- C. $4x + 2y = 166$
 $3x + 5y = 86$
- D. $4x + 3y = 166$
 $2x + 5y = 86$

ID: b86123af Answer

Correct Answer:

A

Rationale

Choice A is correct. Hiro purchased 4 shirts and each shirt cost x dollars, so he spent a total of $4x$ dollars on shirts. Likewise, Hiro purchased 2 pairs of pants, and each pair of pants cost y dollars, so he spent a total of $2y$ dollars on pants. Therefore, the total amount that Hiro spent was $4x + 2y$. Since Hiro spent \$86 in total, this can be modeled by the equation $4x + 2y = 86$. Using the same reasoning, Sofia bought 3 shirts at x dollars each and 5 pairs of pants at y dollars each, so she spent a total of $3x + 5y$ dollars on shirts and pants. Since Sofia spent \$166 in total, this can be modeled by the equation $3x + 5y = 166$.

Choice B is incorrect and may be the result of switching the number of shirts Sofia purchased with the number of pairs of pants Hiro purchased. Choice C is incorrect and may be the result of switching the total price each person paid. Choice D is incorrect and may be the result of switching the total price each person paid as well as switching the number of shirts Sofia purchased with the number of pairs of pants Hiro purchased.

Question Difficulty:

Easy

Question ID 1b1deebe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1b1deebe

$$ax + by = 72$$

$$6x + 2by = 56$$

In the given system of equations, a and b are constants. The graphs of these equations in the xy -plane intersect at the point $(4, y)$. What is the value of a ?

- A. 3
- B. 4
- C. 6
- D. 14

ID: 1b1deebe Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the graphs of the given system of equations intersect at the point $(4, y)$. Therefore, $(4, y)$ is the solution to the given system. Multiplying the first equation in the given system by -2 yields $-2ax - 2by = -144$. Adding this equation to the second equation in the system yields $(-2a + 6)x + (-2b + 2b)y = (-144 + 56)$, or $(-2a + 6)x = -88$. Since $(4, y)$ is the solution to the system, the value of a can be found by substituting 4 for x in this equation, which yields $(-2a + 6)(4) = -88$. Dividing both sides of this equation by 4 yields $-2a + 6 = -22$. Subtracting 6 from both sides of this equation yields $-2a = -28$. Dividing both sides of this equation by -2 yields $a = 14$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 608eeb6e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 608eeb6e

$$\begin{aligned}5x &= 15 \\ -4x + y &= -2\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $x + y$?

- A. -17
- B. -13
- C. 13
- D. 17

ID: 608eeb6e Answer

Correct Answer:

C

Rationale

Choice C is correct. Adding the second equation of the given system to the first equation yields $5x + (-4x + y) = 15 + (-2)$, which is equivalent to $x + y = 13$. So the value of $x + y$ is 13.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of $-(x + y)$.

Choice D is incorrect and may result from conceptual or calculation errors.

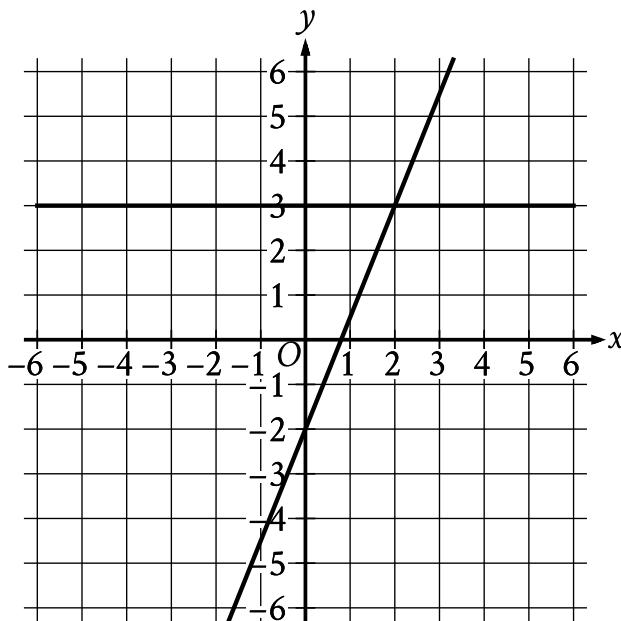
Question Difficulty:

Easy

Question ID b0fc3166

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: b0fc3166



The graph of a system of linear equations is shown. What is the solution (x, y) to the system?

- A. $(0, 3)$
- B. $(1, 3)$
- C. $(2, 3)$
- D. $(3, 3)$

ID: b0fc3166 Answer

Correct Answer:

C

Rationale

Choice C is correct. The solution to this system of linear equations is represented by the point that lies on both lines shown, or the point of intersection of the two lines. According to the graph, the point of intersection occurs when $x = 2$ and $y = 3$, or at the point $(2, 3)$. Therefore, the solution (x, y) to the system is $(2, 3)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Easy

Question ID 571174f3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 571174f3

$$\begin{aligned}\frac{2}{5}x + \frac{7}{5}y &= \frac{2}{7} \\ gx + ky &= \frac{5}{2}\end{aligned}$$

In the given system of equations, g and k are constants. The system has infinitely many solutions. What is the value of $\frac{g}{k}$?

ID: 571174f3 Answer

Correct Answer:

.2857, 2/7

Rationale

The correct answer is $\frac{2}{7}$. It's given that the system has infinitely many solutions. A system of two linear equations has infinitely many solutions if and only if the two linear equations are equivalent. Multiplying each side of the first equation in the system by $\frac{35}{4}$ yields $\frac{35}{4}(\frac{2}{5}x + \frac{7}{5}y) = \frac{35}{4}(\frac{2}{7})$, or $\frac{7}{2}x + \frac{49}{4}y = \frac{5}{2}$. Since this equation is equivalent to the second equation and has the same right side as the second equation, the coefficients of x and y , respectively, should also be the same. It follows that $g = \frac{7}{2}$ and $k = \frac{49}{4}$. Therefore, the value of $\frac{g}{k}$ is $\frac{\frac{7}{2}}{\frac{49}{4}}$, or $\frac{2}{7}$. Note that 2/7, .2857, 0.285, and 0.286 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 979c6ebc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 979c6ebc

$$\begin{aligned}7x + 6y &= 5 \\28x + 24y &= 20\end{aligned}$$

For each real number r , which of the following points lies on the graph of each equation in the xy -plane for the given system?

- A. $(r, -\frac{6r}{7} + \frac{5}{7})$
- B. $(r, \frac{7r}{6} + \frac{5}{6})$
- C. $(\frac{r}{4} + 5, -\frac{r}{4} + 20)$
- D. $(-\frac{6r}{7} + \frac{5}{7}, r)$

ID: 979c6ebc Answer

Correct Answer:

D

Rationale

Choice D is correct. Dividing each side of the second equation in the given system by 4 yields $7x + 6y = 5$. It follows that the two equations in the given system are equivalent and any point that lies on the graph of one equation will also lie on the graph of the other equation. Substituting r for y in the equation $7x + 6y = 5$ yields $7x + 6r = 5$. Subtracting $6r$ from each side of this equation yields $7x = -6r + 5$. Dividing each side of this equation by 7 yields $x = -\frac{6r}{7} + \frac{5}{7}$. Therefore, the point $(-\frac{6r}{7} + \frac{5}{7}, r)$ lies on the graph of each equation in the xy -plane for each real number r .

Choice A is incorrect. Substituting r for x in the equation $7x + 6y = 5$ yields $7r + 6y = 5$. Subtracting $7r$ from each side of this equation yields $6y = -7r + 5$. Dividing each side of this equation by 6 yields $y = -\frac{7r}{6} + \frac{5}{6}$. Therefore, the point $(r, -\frac{7r}{6} + \frac{5}{6})$, not the point $(r, -\frac{6r}{7} + \frac{5}{7})$, lies on the graph of each equation.

Choice B is incorrect. Substituting r for x in the equation $7x + 6y = 5$ yields $7r + 6y = 5$. Subtracting $7r$ from each side of this equation yields $6y = -7r + 5$. Dividing each side of this equation by 6 yields $y = -\frac{7r}{6} + \frac{5}{6}$. Therefore, the point $(r, -\frac{7r}{6} + \frac{5}{6})$, not the point $(r, \frac{7r}{6} + \frac{5}{6})$, lies on the graph of each equation.

Choice C is incorrect. Substituting $\frac{r}{4} + 5$ for x in the equation $7x + 6y = 5$ yields $7(\frac{r}{4} + 5) + 6y = 5$, or $(\frac{7r}{4} + 35) + 6y = 5$. Subtracting $(\frac{7r}{4} + 35)$ from each side of this equation yields $6y = -\frac{7r}{4} - 35 + 5$, or $6y = -\frac{7r}{4} - 30$. Dividing each side of this equation by 6 yields $y = -\frac{7r}{24} - 5$. Therefore, the point $(\frac{r}{4} + 5, -\frac{7r}{24} - 5)$, not the point $(\frac{r}{4} + 5, -\frac{r}{4} + 20)$, lies on the graph of each equation.

Question Difficulty:

Hard

Question ID bf4a8b6a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: bf4a8b6a

A company that provides whale-watching tours takes groups of **21** people at a time. The company's revenue is **80** dollars per adult and **60** dollars per child. If the company's revenue for one group consisting of adults and children was **1,440** dollars, how many people in the group were children?

- A. **3**
- B. **9**
- C. **12**
- D. **18**

ID: bf4a8b6a Answer

Correct Answer:

C

Rationale

Choice C is correct. Let x represent the number of children in a whale-watching tour group. Let y represent the number of adults in this group. Because it's given that **21** people are in a group and the group consists of adults and children, it must be true that $x + y = 21$. Since the company's revenue is **60** dollars per child, the total revenue from x children in this group was **60x** dollars. Since the company's revenue is **80** dollars per adult, the total revenue from y adults in this group was **80y** dollars. Because it's given that the total revenue for this group was **1,440** dollars, it must be true that $60x + 80y = 1,440$. The equations $x + y = 21$ and $60x + 80y = 1,440$ form a linear system of equations that can be solved to find the value of x , which represents the number of children in the group, using the elimination method. Multiplying both sides of the equation $x + y = 21$ by **80** yields $80x + 80y = 1,680$. Subtracting $60x + 80y = 1,440$ from $80x + 80y = 1,680$ yields $(80x + 80y) - (60x + 80y) = 1,680 - 1,440$, which is equivalent to $80x - 60x + 80y - 80y = 240$, or $20x = 240$. Dividing both sides of this equation by **20** yields $x = 12$. Therefore, **12** people in the group were children.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the number of adults in the group, not the number of children in the group.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 797a81fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 797a81fb

$$-12x + 14y = 36$$

$$-6x + 7y = -18$$

How many solutions does the given system of equations have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

ID: 797a81fb Answer

Correct Answer:

D

Rationale

Choice D is correct. A system of two linear equations in two variables, x and y , has zero solutions if the lines representing the equations in the xy -plane are distinct and parallel. Two lines are distinct and parallel if they have the same slope but different y -intercepts. Each equation in the given system can be written in slope-intercept form $y = mx + b$, where m is the slope of the line representing the equation in the xy -plane and $(0, b)$ is the y -intercept. Adding $12x$ to both sides of the first equation in the given system of equations, $-12x + 14y = 36$, yields $14y = 12x + 36$. Dividing both sides of this equation by 14 yields $y = \frac{6}{7}x + \frac{18}{7}$. It follows that the first equation in the given system of equations has a slope of $\frac{6}{7}$ and a y -intercept of $(0, \frac{18}{7})$. Adding $6x$ to both sides of the second equation in the given system of equations, $-6x + 7y = -18$, yields $7y = 6x - 18$. Dividing both sides of this equation by 7 yields $y = \frac{6}{7}x - \frac{18}{7}$. It follows that the second equation in the given system of equations has a slope of $\frac{6}{7}$ and a y -intercept of $(0, -\frac{18}{7})$. Since the slopes of these lines are the same and the y -intercepts are different, it follows that the given system of equations has zero solutions.

Alternate approach: To solve the system by elimination, multiplying the second equation in the given system of equations, $-6x + 7y = -18$, by -2 yields $12x - 14y = 36$. Adding this equation to the first equation in the given system of equations, $-12x + 14y = 36$, yields $(-12x + 12x) + (-14y + 14y) = 36 + 36$, or $0 = 72$. Since this equation isn't true, the given system of equations has zero solutions.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 4f1342d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 4f1342d6

In August, a car dealer completed **15** more than **3** times the number of sales the car dealer completed in September. In August and September, the car dealer completed **363** sales. How many sales did the car dealer complete in September?

ID: 4f1342d6 Answer

Correct Answer:

87

Rationale

The correct answer is **87**. It's given that in August, the car dealer completed **15** more than **3** times the number of sales the car dealer completed in September. Let x represent the number of sales the car dealer completed in September. It follows that $3x + 15$ represents the number of sales the car dealer completed in August. It's also given that in August and September, the car dealer completed **363** sales. It follows that $x + (3x + 15) = 363$, or $4x + 15 = 363$. Subtracting **15** from each side of this equation yields $4x = 348$. Dividing each side of this equation by **4** yields $x = 87$. Therefore, the car dealer completed **87** sales in September.

Question Difficulty:

Hard

Question ID cdec4c87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: cdec4c87

$$y = 12x - 20$$

$$y = 28$$

What is the solution (x, y) to the given system of equations?

- A. $(4, 28)$
- B. $(20, 28)$
- C. $(28, 4)$
- D. $(28, 20)$

ID: cdec4c87 Answer

Correct Answer:

A

Rationale

Choice A is correct. The second equation in the given system is $y = 28$. Substituting 28 for y in the first equation in the given system yields $28 = 12x - 20$. Adding 20 to both sides of this equation yields $48 = 12x$. Dividing both sides of this equation by 12 yields $4 = x$. Therefore, the solution (x, y) to the given system of equations is $(4, 28)$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the solution (y, x) , not (x, y) , to the given system of equations.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID Odd6227f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: Odd6227f

At how many points do the graphs of the equations $y = x + 20$ and $y = 8x$ intersect in the xy -plane?

- A. 0
- B. 1
- C. 2
- D. 8

ID: Odd6227f Answer

Correct Answer:

B

Rationale

Choice B is correct. Each given equation is written in slope-intercept form, $y = mx + b$, where m is the slope and $(0, b)$ is the y -intercept of the graph of the equation in the xy -plane. The graphs of two lines that have different slopes will intersect at exactly one point. The graph of the first equation is a line with slope 1. The graph of the second equation is a line with slope 8. Since the graphs are lines with different slopes, they will intersect at exactly one point.

Choice A is incorrect because two graphs of linear equations have 0 intersection points only if they are parallel and therefore have the same slope.

Choice C is incorrect because two graphs of linear equations in the xy -plane can have only 0, 1, or infinitely many points of intersection.

Choice D is incorrect because two graphs of linear equations in the xy -plane can have only 0, 1, or infinitely many points of intersection.

Question Difficulty:

Medium

Question ID 7efe5495

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7efe5495

$$\begin{aligned}y &= 3x \\2x + y &= 12\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $5x$?

- A. 24
- B. 15
- C. 12
- D. 5

ID: 7efe5495 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = 3x$. Substituting $3x$ for y in the equation $2x + y = 12$ yields $2x + 3x = 12$, or $5x = 12$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID b5f62071

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: b5f62071

$$\begin{aligned}48x - 64y &= 48y + 24 \\ry &= \frac{1}{8} - 12x\end{aligned}$$

In the given system of equations, r is a constant. If the system has no solution, what is the value of r ?

ID: b5f62071 Answer

Correct Answer:

-28

Rationale

The correct answer is **-28**. A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are distinct and parallel. The graphs of two lines in the xy -plane represented by equations in the form $Ax + By = C$, where A , B , and C are constants, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients for x and y in the other equation. The first equation in the given system, $48x - 64y = 48y + 24$, can be written in the form $Ax + By = C$ by subtracting $48y$ from both sides of the equation to yield $48x - 112y = 24$. The second equation in the given system, $ry = \frac{1}{8} - 12x$, can be written in the form $Ax + By = C$ by adding $12x$ to both sides of the equation to yield $12x + ry = \frac{1}{8}$. The coefficient of x in the second equation is $\frac{1}{4}$ times the coefficient of x in the first equation. That is, $48(\frac{1}{4}) = 12$. For the lines to be parallel, the coefficient of y in the second equation must also be $\frac{1}{4}$ times the coefficient of y in the first equation. Therefore, $-112(\frac{1}{4}) = r$, or $-28 = r$. Thus, if the given system has no solution, the value of r is **-28**.

Question Difficulty:

Hard

Question ID 71189542

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 71189542

A group of 202 people went on an overnight camping trip, taking 60 tents with them. Some of the tents held 2 people each, and the rest held 4 people each. Assuming all the tents were filled to capacity and every person got to sleep in a tent, exactly how many of the tents were 2-person tents?

- A. 30
- B. 20
- C. 19
- D. 18

ID: 71189542 Answer

Correct Answer:

C

Rationale

Choice C is correct. Let x represent the number of 2-person tents and let y represent the number of 4-person tents. It is given that the total number of tents was 60 and the total number of people in the group was 202. This situation can be expressed as a system of two equations, $x + y = 60$ and $2x + 4y = 202$. The first equation can be rewritten as $y = -x + 60$. Substituting $-x + 60$ for y in the equation $2x + 4y = 202$ yields $2x + 4(-x + 60) = 202$. Distributing and combining like terms gives $-2x + 240 = 202$. Subtracting 240 from both sides of $-2x + 240 = 202$ and then dividing both sides by -2 gives $x = 19$. Therefore, the number of 2-person tents is 19.

Alternate approach: If each of the 60 tents held 4 people, the total number of people that could be accommodated in tents would be 240. However, the actual number of people who slept in tents was 202. The difference of 38 accounts for the 2-person tents.

Since each of these tents holds 2 people fewer than a 4-person tent, $\frac{38}{2} = 19$ gives the number of 2-person tents.

Choice A is incorrect. This choice may result from assuming exactly half of the tents hold 2 people. If that were true, then the total number of people who slept in tents would be $2(30) + 4(30) = 180$; however, the total number of people who slept in tents was 202, not 180. Choice B is incorrect. If 20 tents were 2-person tents, then the remaining 40 tents would be 4-person tents. Since all the tents were filled to capacity, the total number of people who slept in tents would be $2(20) + 4(40) = 40 + 160 = 200$; however, the total number of people who slept in tents was 202, not 200. Choice D is incorrect. If 18 tents were 2-person tents, then the remaining 42 tents would be 4-person tents. Since all the tents were filled to capacity, the total number of people who slept in tents would be $2(18) + 4(42) = 36 + 168 = 204$; however, the total number of people who slept in tents was 202, not 204.

Question Difficulty:

Medium

Question ID dba8d38a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: dba8d38a

A petting zoo sells two types of tickets. The standard ticket, for admission only, costs \$5. The premium ticket, which includes admission and food to give to the animals, costs \$12. One Saturday, the petting zoo sold a total of 250 tickets and collected a total of \$2,300 from ticket sales. Which of the following systems of equations can be used to find the number of standard tickets, s , and premium tickets, p , sold on that Saturday?

$$s + p = 250$$

A. $5s + 12p = 2,300$

$$s + p = 250$$

B. $12s + 5p = 2,300$

$$5s + 12p = 250$$

C. $s + p = 2,300$

$$12s + 5p = 250$$

D. $s + p = 2,300$

ID: dba8d38a Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the petting zoo sells two types of tickets, standard and premium, and that s represents the number of standard tickets sold and p represents the number of premium tickets sold. It's also given that the petting zoo sold 250 tickets on one Saturday; thus, $s + p = 250$. It's also given that each standard ticket costs \$5 and each premium ticket costs \$12. Thus, the amount collected in ticket sales can be represented by $5s$ for standard tickets and $12p$ for premium tickets. On that Saturday the petting zoo collected a total of \$2,300 from ticket sales; thus, $5s + 12p = 2,300$. These two equations are correctly represented in choice A.

Choice B is incorrect. The second equation in the system represents the cost per standard ticket as \$12, not \$5, and the cost per premium ticket as \$5, not \$12. Choices C and D are incorrect. The equations represent the total collected from standard and premium ticket sales as \$250, not \$2,300, and the total number of standard and premium tickets sold as \$2,300, not \$250. Additionally, the first equation in choice D represents the cost per standard ticket as \$12, not \$5, and the cost per premium ticket as \$5, not \$12.

Question Difficulty:

Easy

Question ID 0c541d87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 0c541d87

Two customers purchased the same kind of bread and eggs at a store. The first customer paid **12.45** dollars for **1** loaf of bread and **2** dozen eggs. The second customer paid **19.42** dollars for **4** loaves of bread and **1** dozen eggs. What is the cost, in dollars, of **1** dozen eggs?

- A. **3.77**
- B. **3.88**
- C. **4.15**
- D. **4.34**

ID: 0c541d87 Answer

Correct Answer:

D

Rationale

Choice D is correct. Let ℓ represent the cost, in dollars, of **1** loaf of bread, and let d represent the cost, in dollars, of **1** dozen eggs. It's given that the first customer paid **12.45** dollars for **1** loaf of bread and **2** dozen eggs. Therefore, the first customer's purchase can be represented by the equation $\ell + 2d = 12.45$. It's also given that the second customer paid **19.42** dollars for **4** loaves of bread and **1** dozen eggs. Therefore, the second customer's purchase can be represented by the equation $4\ell + d = 19.42$. The equations $\ell + 2d = 12.45$ and $4\ell + d = 19.42$ form a system of linear equations, which can be solved by elimination to find the value of d . Multiplying the first equation in the system by -4 yields $-4\ell - 8d = -49.8$. Adding $-4\ell - 8d = -49.8$ to the second equation, $4\ell + d = 19.42$, yields $(-4\ell + 4\ell) + (-8d + d) = (-49.8 + 19.42)$, which is equivalent to $-7d = -30.38$. Dividing both sides of this equation by -7 yields $d = 4.34$. Therefore, the cost, in dollars, of **1** dozen eggs is **4.34**.

Choice A is incorrect. This is the cost, in dollars, of **1** loaf of bread.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID f5563c26

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: f5563c26

$$\begin{aligned}y &= 4 \\x &= y + 6\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of x ?

- A. 10
- B. 6
- C. 4
- D. 2

ID: f5563c26 Answer

Correct Answer:

A

Rationale

Choice A is correct. According to the first equation in the given system, $y = 4$. Substituting 4 for y in the second equation in the given system yields $x = 4 + 6$, or $x = 10$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the value of y , not x .

Choice D is incorrect and may result from conceptual or calculation errors.

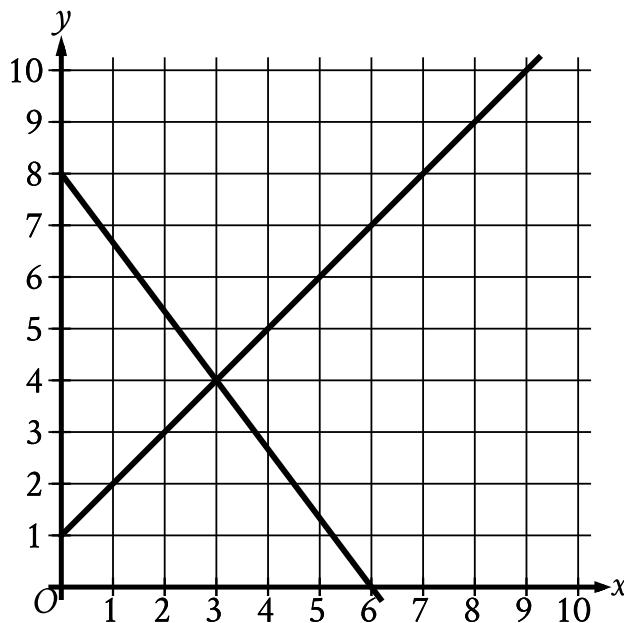
Question Difficulty:

Easy

Question ID e6545fa8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: e6545fa8



The graph of a system of linear equations is shown. What is the solution (x, y) to the system?

- A. $(2, 3)$
- B. $(3, 4)$
- C. $(4, 5)$
- D. $(5, 6)$

ID: e6545fa8 Answer

Correct Answer:

B

Rationale

Choice B is correct. If a point (x, y) lies on both lines in the graph of a system of two linear equations, the ordered pair (x, y) is a solution to the system. The graph shown is the graph of a system of two linear equations, where the two lines in the graph intersect at the point $(3, 4)$. Therefore, the point $(3, 4)$ lies on both lines, so the ordered pair $(3, 4)$ is the solution to the system.

Choice A is incorrect. The point $(2, 3)$ lies on one, not both, of the lines in the graph shown.

Choice C is incorrect. The point $(4, 5)$ lies on one, not both, of the lines in the graph shown.

Choice D is incorrect. The point $(5, 6)$ lies on one, not both, of the lines in the graph shown.

Question Difficulty:
Easy

Question ID 38a43902

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 38a43902

$$\begin{aligned}y &= -2x \\3x + y &= 40\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of x ?

ID: 38a43902 Answer

Correct Answer:

40

Rationale

The correct answer is **40**. It's given in the first equation of the system that $y = -2x$. Substituting $-2x$ for y in the second equation of the system yields $3x + (-2x) = 40$. Combining like terms on the left-hand side of this equation yields $x = 40$. Therefore, the value of x is **40**.

Question Difficulty:

Medium

Question ID 317e80f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 317e80f9

$$x + y = 18$$

$$5y = x$$

What is the solution (x, y) to the given system of equations?

- A. $(15, 3)$
- B. $(16, 2)$
- C. $(17, 1)$
- D. $(18, 0)$

ID: 317e80f9 Answer

Correct Answer:

A

Rationale

Choice A is correct. The second equation in the given system defines the value of x as $5y$. Substituting $5y$ for x into the first equation yields $5y + y = 18$ or $6y = 18$. Dividing each side of this equation by 6 yields $y = 3$. Substituting 3 for y in the second equation yields $5(3) = x$ or $x = 15$. Therefore, the solution (x, y) to the given system of equations is $(15, 3)$.

Choice B is incorrect. Substituting 16 for x and 2 for y in the second equation yields $5(2) = 16$, which is not true. Therefore, $(16, 2)$ is not a solution to the given system of equations.

Choice C is incorrect. Substituting 17 for x and 1 for y in the second equation yields $5(1) = 17$, which is not true. Therefore, $(17, 1)$ is not a solution to the given system of equations.

Choice D is incorrect. Substituting 18 for x and 0 for y in the second equation yields $5(0) = 18$, which is not true. Therefore, $(18, 0)$ is not a solution to the given system of equations.

Question Difficulty:

Easy

Question ID 6a87902f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 6a87902f

$$y = 2x + 10$$

$$y = 2x - 1$$

At how many points do the graphs of the given equations intersect in the xy -plane?

- A. Zero
- B. Exactly one
- C. Exactly two
- D. Infinitely many

ID: 6a87902f Answer

Correct Answer:

A

Rationale

Choice A is correct. A system of two linear equations in two variables, x and y , has zero points of intersection if the lines represented by the equations in the xy -plane are distinct and parallel. The graphs of two lines in the xy -plane represented by equations in slope-intercept form, $y = mx + b$, are distinct if the y -coordinates of their y -intercepts, b , are different and are parallel if their slopes, m , are the same. For the two equations in the given system, $y = 2x + 10$ and $y = 2x - 1$, the values of b are 10 and -1 , respectively, and the values of m are both 2. Since the values of b are different, the graphs of these lines have different y -coordinates of the y -intercept and are distinct. Since the values of m are the same, the graphs of these lines have the same slope and are parallel. Therefore, the graphs of the given equations are lines that intersect at zero points in the xy -plane.

Choice B is incorrect. The graphs of a system of two linear equations have exactly one point of intersection if the lines represented by the equations have different slopes. Since the given equations represent lines with the same slope, there is not exactly one intersection point.

Choice C is incorrect. The graphs of a system of two linear equations can never have exactly two intersection points.

Choice D is incorrect. The graphs of a system of two linear equations have infinitely many intersection points when the lines represented by the equations have the same slope and the same y -coordinate of the y -intercept. Since the given equations represent lines with different y -coordinates of their y -intercepts, there are not infinitely many intersection points.

Question Difficulty:

Medium

Question ID f75bd744

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f75bd744

$$\begin{aligned}4x - 6y &= 10y + 2 \\ty &= \frac{1}{2} + 2x\end{aligned}$$

In the given system of equations, t is a constant. If the system has no solution, what is the value of t ?

ID: f75bd744 Answer

Correct Answer:

8

Rationale

The correct answer is 8. The given system of equations can be solved using the elimination method. Multiplying both sides of the second equation in the given system by -2 yields $-2ty = -1 - 4x$, or $-1 - 4x = -2ty$. Adding this equation to the first equation in the given system, $4x - 6y = 10y + 2$, yields $(4x - 6y) + (-1 - 4x) = (10y + 2) + (-2ty)$, or $-1 - 6y = 10y - 2ty + 2$. Subtracting $10y$ from both sides of this equation yields $(-1 - 6y) - (10y) = (10y - 2ty + 2) - (10y)$, or $-1 - 16y = -2ty + 2$. If the given system has no solution, then the equation $-1 - 16y = -2ty + 2$ has no solution. If this equation has no solution, the coefficients of y on each side of the equation, -16 and $-2t$, must be equal, which yields the equation $-16 = -2t$. Dividing both sides of this equation by -2 yields $8 = t$. Thus, if the system has no solution, the value of t is 8.

Alternate approach: A system of two linear equations in two variables, x and y , has no solution if the lines represented by the equations in the xy -plane are parallel and distinct. Lines represented by equations in the form $Ax + By = C$, where A , B , and C are constant terms, are parallel if the ratio of the x -coefficients is equal to the ratio of the y -coefficients, and distinct if the ratio of the x -coefficients are not equal to the ratio of the constant terms. Subtracting $10y$ from both sides of the first equation in the given system yields $(4x - 6y) - (10y) = (10y + 2) - (10y)$, or $4x - 16y = 2$. Subtracting $2x$ from both sides of the second equation in the given system yields $(ty) - (2x) = (\frac{1}{2} + 2x) - (2x)$, or $-2x + ty = \frac{1}{2}$. The ratio of the x -coefficients for these equations is $-\frac{2}{4}$, or $-\frac{1}{2}$. The ratio of the y -coefficients for these equations is $-\frac{t}{16}$. The ratio of the constant terms for these equations is $\frac{1/2}{2}$, or $\frac{1}{4}$. Since the ratio of the x -coefficients, $-\frac{1}{2}$, is not equal to the ratio of the constants, $\frac{1}{4}$, the lines represented by the equations are distinct. Setting the ratio of the x -coefficients equal to the ratio of the y -coefficients yields $-\frac{1}{2} = -\frac{t}{16}$. Multiplying both sides of this equation by -16 yields $(-\frac{1}{2})(-16) = (-\frac{t}{16})(-16)$, or $t = 8$. Therefore, when $t = 8$, the lines represented by these equations are parallel. Thus, if the system has no solution, the value of t is 8.

Question Difficulty:

Hard

Question ID 6e6a3241

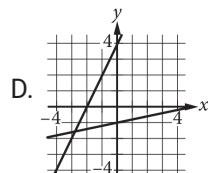
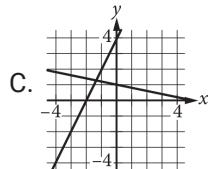
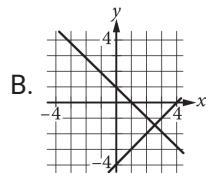
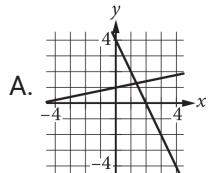
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e6a3241

$$x + 5y = 5$$

$$2x - y = -4$$

Which of the following graphs in the xy -plane could be used to solve the system of equations above?



ID: 6e6a3241 Answer

Correct Answer:

C

Rationale

Choice C is correct. The graph of a system of equations is the graph that shows the lines represented by each of the equations in the system. The x -intercept of the graph of each given equation can be found by substituting 0 for y in each equation: $x + 5(0) = 5$, or $x = 5$, and $2x - 0 = -4$, or $x = -2$. The y -intercept of the graph of each equation can be found by substituting 0 for x in each equation: $0 + 5y = 5$, or $y = 1$, and $2(0) - y = -4$ or $y = 4$. Using these x - and y -intercept values, the line that has equation $x + 5y = 5$ passes through the points $(0, 1)$ and $(5, 0)$, and the line that has equation $2x - y = -4$ passes through the points $(0, 4)$ and $(-2, 0)$. Only the lines in choice C pass through these points and can be used to solve the given system of equations.

Choices A, B, and D are incorrect. In choices A and B, neither line passes through $(0,1)$ and $(5,0)$ or $(0,4)$ and $(-2,0)$. In choice D, although one line passes through $(0,4)$ and $(-2,0)$ the other line doesn't pass through $(0,1)$ and $(5,0)$.

Question Difficulty:

Medium

Question ID aff28230

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: aff28230

$$x = 10$$

$$y = x + 21$$

The solution to the given system of equations is (x, y) . What is the value of y ?

- A. 2.1
- B. 10
- C. 21
- D. 31

ID: aff28230 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given by the first equation in the given system of equations that $x = 10$. Substituting 10 for x in the second equation in the given system yields $y = 10 + 21$, or $y = 31$. Therefore, the value of y is 31.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of x , not the value of y .

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID f5929f7a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f5929f7a

$$\begin{aligned}y &= -\frac{1}{9}x \\y &= \frac{1}{2}x\end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of x ?

- A. -9
- B. -7
- C. 0
- D. 2

ID: f5929f7a Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given by the first equation in the system that $y = -\frac{1}{9}x$. Substituting $-\frac{1}{9}x$ for y in the second equation in the system yields $-\frac{1}{9}x = \frac{1}{2}x$. Multiplying the left-hand side of this equation by $\frac{2}{2}$ and the right-hand side by $\frac{9}{9}$ yields $-\frac{2}{18}x = \frac{9}{18}x$. Adding $\frac{2}{18}x$ to both sides of this equation yields $0 = \frac{11}{18}x$. Multiplying both sides of this equation by $\frac{18}{11}$ yields $x = 0$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 74c03c21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 74c03c21

A bus traveled on the highway and on local roads to complete a trip of **160 miles**. The trip took **4 hours**. The bus traveled at an average speed of **55 miles per hour (mph)** on the highway and an average speed of **25 mph** on local roads. If x is the time, in hours, the bus traveled on the highway and y is the time, in hours, it traveled on local roads, which system of equations represents this situation?

A. $55x + 25y = 4$
 $x + y = 160$

B. $55x + 25y = 160$
 $x + y = 4$

C. $25x + 55y = 4$
 $x + y = 160$

D. $25x + 55y = 160$
 $x + y = 4$

ID: 74c03c21 Answer

Correct Answer:

B

Rationale

Choice B is correct. If the bus traveled at an average speed of **55 miles per hour (mph)** on the highway for x hours, then the bus traveled $55x$ miles on the highway. If the bus traveled at an average speed of **25 mph** on local roads for y hours, then the bus traveled $25y$ miles on local roads. It's given that the trip was **160 miles**. This can be represented by the equation $55x + 25y = 160$. It's also given that the trip took **4 hours**. This can be represented by the equation $x + y = 4$. Therefore, the system consisting of the equations $55x + 25y = 160$ and $x + y = 4$ represents this situation.

Choice A is incorrect. This system of equations represents a situation where the trip was **4 miles** and took **160 hours**.

Choice C is incorrect. This system of equations represents a situation where the trip was **4 miles** and took **160 hours**, and the bus traveled at an average speed of **25 mph** on the highway and **55 mph** on local roads.

Choice D is incorrect. This system of equations represents a situation where the bus traveled at an average speed of **25 mph** on the highway and **55 mph** on local roads.

Question Difficulty:

Medium

Question ID 8abed0fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 8abed0fb

$$y = 2x + 3$$

$$x = 1$$

What is the solution (x, y) to the given system of equations?

- A. $(1, 2)$
- B. $(1, 5)$
- C. $(2, 3)$
- D. $(2, 7)$

ID: 8abed0fb Answer

Correct Answer:

B

Rationale

Choice B is correct. Since it's given that $x = 1$, substituting 1 for x in the first equation yields $y = 2(1) + 3$. Simplifying the right-hand side of this equation yields $y = 2 + 3$, or $y = 5$. Therefore, the ordered pair $(1, 5)$ is a solution to the given system of equations.

Choice A is incorrect and may result from a calculation error when substituting 1 for x in the first equation. Choices C and D are incorrect. Because it's given that $x = 1$, x cannot equal 2 as stated in these ordered pairs.

Question Difficulty:

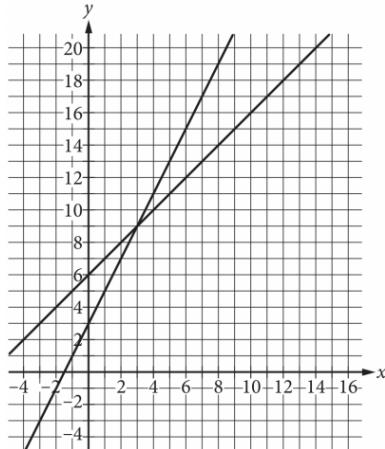
Easy

Question ID e1259a5a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Systems of two linear equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e1259a5a

A system of two linear equations is graphed in the xy -plane below.



Which of the following points is the solution to the system of equations?

- A. (3,9)
- B. (6,15)
- C. (8,10)
- D. (12,18)

ID: e1259a5a Answer

Correct Answer:

A

Rationale

Choice A is correct. The solution to this system of linear equations is the point that lies on both lines graphed, or the point of intersection of the two lines. According to the graphs, the point of intersection occurs when $x = 3$ and $y = 9$, or at the point (3,9).

Choices B and D are incorrect. Each of these points lies on one line, but not on both lines in the xy -plane. Choice C is incorrect. This point doesn't lie on either of the lines graphed in the xy -plane.

Question Difficulty:

Easy

Question ID e86f0651

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e86f0651

A circle has a radius of **43** meters. What is the area, in square meters, of the circle?

- A. $\frac{43\pi}{2}$
- B. 43π
- C. 86π
- D. $1,849\pi$

ID: e86f0651 Answer

Correct Answer:

D

Rationale

Choice D is correct. The area, A , of a circle is given by the formula $A = \pi r^2$, where r is the radius of the circle. It's given that the circle has a radius of **43** meters. Substituting **43** for r in the formula $A = \pi r^2$ yields $A = \pi(43)^2$, or $A = 1,849\pi$. Therefore, the area, in square meters, of the circle is **$1,849\pi$** .

Choice A is incorrect. This is the area, in square meters, of a circle with a radius of $\sqrt{\frac{43}{2}}$ meters.

Choice B is incorrect. This is the area, in square meters, of a circle with a radius of $\sqrt{43}$ meters.

Choice C is incorrect. This is the circumference, in meters, of the circle.

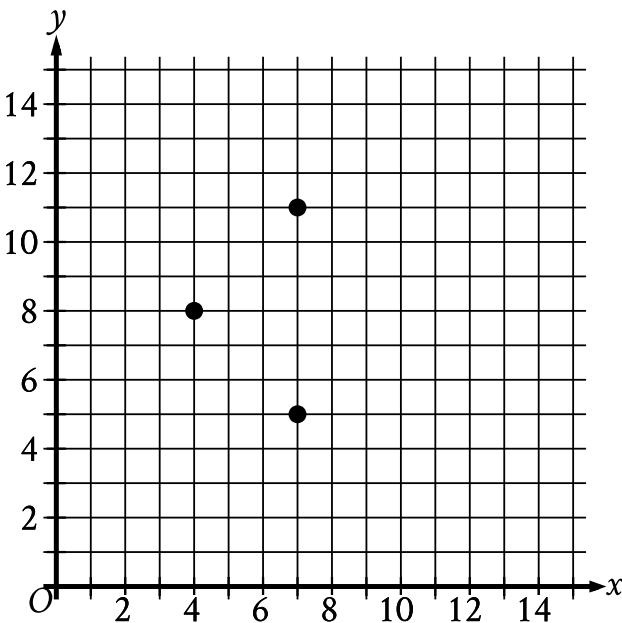
Question Difficulty:

Medium

Question ID 096c7ef5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 096c7ef5



The three points shown define a circle. The circumference of this circle is $k\pi$, where k is a constant. What is the value of k ?

- A. 3
- B. 6
- C. 7
- D. 9

ID: 096c7ef5 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the three points shown define a circle, so the center of that circle is an equal distance from each of the three points. The point $(7, 8)$ is halfway between the points $(7, 5)$ and $(7, 11)$ and is a distance of 3 units from each of those two points. The point $(7, 8)$ is also a distance of 3 units from $(4, 8)$. Because the point $(7, 8)$ is the same distance from all three given points, it must be the center of the circle. The radius of a circle is the distance from the center to any point on the circle. Since that distance is 3, it follows that the radius of the circle is 3. The circumference of a circle with radius r is equal to $2\pi r$. It follows that the circumference of the circle is $2(\pi)(3)$, or 6π . It's given that the circumference of the circle is $k\pi$. Therefore, the value of k is 6.

Choice A is incorrect. This is the radius of the circle, not the value of k in the expression $k\pi$.

Choice C is incorrect. This is the x -coordinate of the center of the circle, not the value of k in the expression $k\pi$.

Choice D is incorrect. This is the value of k for which $k\pi$ represents the area of the circle, in square units, not the circumference of the circle, in units.

Question Difficulty:

Medium

Question ID ec5d4823

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ec5d4823

What is the volume, in cubic centimeters, of a right rectangular prism that has a length of 4 centimeters, a width of 9 centimeters, and a height of 10 centimeters?

ID: ec5d4823 Answer

Rationale

The correct answer is 360. The volume of a right rectangular prism is calculated by multiplying its dimensions: length, width, and height. Multiplying the values given for these dimensions yields a volume of $(4)(9)(10) = 360$ cubic centimeters.

Question Difficulty:

Medium

Question ID 9966235e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 9966235e

A cube has an edge length of **68** inches. A solid sphere with a radius of **34** inches is inside the cube, such that the sphere touches the center of each face of the cube. To the nearest cubic inch, what is the volume of the space in the cube not taken up by the sphere?

- A. **149,796**
- B. **164,500**
- C. **190,955**
- D. **310,800**

ID: 9966235e Answer

Correct Answer:

A

Rationale

Choice A is correct. The volume of a cube can be found by using the formula $V = s^3$, where V is the volume and s is the edge length of the cube. Therefore, the volume of the given cube is $V = 68^3$, or **314,432** cubic inches. The volume of a sphere can be found by using the formula $V = \frac{4}{3}\pi r^3$, where V is the volume and r is the radius of the sphere. Therefore, the volume of the given sphere is $V = \frac{4}{3}\pi(34)^3$, or approximately **164,636** cubic inches. The volume of the space in the cube not taken up by the sphere is the difference between the volume of the cube and volume of the sphere. Subtracting the approximate volume of the sphere from the volume of the cube gives $314,432 - 164,636 = 149,796$ cubic inches.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 2b41a4c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2b41a4c4

A right rectangular prism has a length of **11** meters, a width of **8** meters, and a height of **10** meters. What is the volume, in cubic meters, of the prism?

ID: 2b41a4c4 Answer

Correct Answer:

880

Rationale

The correct answer is **880**. The volume, V , of a right rectangular prism is given by the formula $V = \ell wh$, where ℓ is the length, w is the width, and h is the height of the prism. It's given that a right rectangular prism has a length of **11** meters, a width of **8** meters, and a height of **10** meters. Substituting **11** for ℓ , **8** for w , and **10** for h in the formula $V = \ell wh$ yields $V = (11)(8)(10)$, or $V = 880$. Therefore, the volume, in cubic meters, of the prism is **880**.

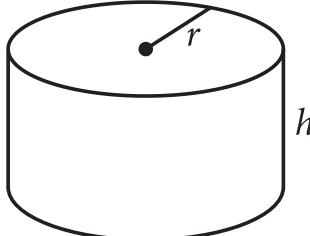
Question Difficulty:

Easy

Question ID a07ed090

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div>

ID: a07ed090



The figure shown is a right circular cylinder with a radius of r and height of h . A second right circular cylinder (not shown) has a volume that is 392 times as large as the volume of the cylinder shown. Which of the following could represent the radius R , in terms of r , and the height H , in terms of h , of the second cylinder?

- A. $R = 8r$ and $H = 7h$
- B. $R = 8r$ and $H = 49h$
- C. $R = 7r$ and $H = 8h$
- D. $R = 49r$ and $H = 8h$

ID: a07ed090 Answer

Correct Answer:

C

Rationale

Choice C is correct. The volume of a right circular cylinder is equal to $\pi a^2 b$, where a is the radius of a base of the cylinder and b is the height of the cylinder. It's given that the cylinder shown has a radius of r and a height of h . It follows that the volume of the cylinder shown is equal to $\pi r^2 h$. It's given that the second right circular cylinder has a radius of R and a height of H . It follows that the volume of the second cylinder is equal to $\pi R^2 H$. Choice C gives $R = 7r$ and $H = 8h$. Substituting $7r$ for R and $8h$ for H in the expression that represents the volume of the second cylinder yields $\pi(7r)^2(8h)$, or $\pi(49r^2)(8h)$, which is equivalent to $\pi(392r^2h)$, or $392(\pi r^2 h)$. This expression is equal to 392 times the volume of the cylinder shown, $\pi r^2 h$. Therefore, $R = 7r$ and $H = 8h$ could represent the radius R , in terms of r , and the height H , in terms of h , of the second cylinder.

Choice A is incorrect. Substituting $8r$ for R and $7h$ for H in the expression that represents the volume of the second cylinder yields $\pi(8r)^2(7h)$, or $\pi(64r^2)(7h)$, which is equivalent to $\pi(448r^2h)$, or $448(\pi r^2 h)$. This expression is equal to 448, not 392, times the volume of the cylinder shown.

Choice B is incorrect. Substituting $8r$ for R and $49h$ for H in the expression that represents the volume of the second cylinder yields $\pi(8r)^2(49h)$, or $\pi(64r^2)(49h)$, which is equivalent to $\pi(3,136r^2h)$, or $3,136(\pi r^2 h)$. This expression is equal to 3,136, not 392, times the volume of the cylinder shown.

Choice D is incorrect. Substituting $49r$ for R and $8h$ for H in the expression that represents the volume of the second cylinder yields $\pi(49r)^2(8h)$, or $\pi(2,401r^2)(8h)$, which is equivalent to $\pi(19,208r^2h)$, or $19,208(\pi r^2 h)$. This expression is equal to 19,208, not 392, times the volume of the cylinder shown.

Question Difficulty:
Hard

Question ID 3b931fb0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3b931fb0

A right circular cylinder has a volume of **377** cubic centimeters. The area of the base of the cylinder is **13** square centimeters. What is the height, in centimeters, of the cylinder?

ID: 3b931fb0 Answer

Correct Answer:

29

Rationale

The correct answer is **29**. The volume, V , of a right circular cylinder is given by the formula $V = \pi r^2 h$, where r is the radius of the base of the cylinder and h is the height of the cylinder. Since the base of the cylinder is a circle with radius r , the area of the base of the cylinder is πr^2 . It's given that a right circular cylinder has a volume of **377** cubic centimeters; therefore, $V = 377$. It's also given that the area of the base of the cylinder is **13** square centimeters; therefore, $\pi r^2 = 13$. Substituting **377** for V and **13** for πr^2 in the formula $V = \pi r^2 h$ yields $377 = 13h$. Dividing both sides of this equation by **13** yields $29 = h$. Therefore, the height of the cylinder, in centimeters, is **29**.

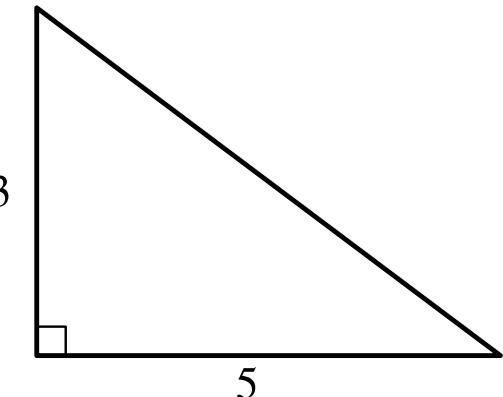
Question Difficulty:

Medium

Question ID a4ed5285

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a4ed5285



Note: Figure not drawn to scale.

The figure shows the lengths, in inches, of two sides of a right triangle. What is the area of the triangle, in square inches?

ID: a4ed5285 Answer

Correct Answer:

7.5, 15/2

Rationale

The correct answer is $\frac{15}{2}$. The area, A , of a triangle is given by the formula $A = \frac{1}{2}bh$, where b is the length of the base of the triangle and h is the height of the triangle. In the right triangle shown, the length of the base of the triangle is 5 inches, and the height is 3 inches. It follows that $b = 5$ and $h = 3$. Substituting 5 for b and 3 for h in the formula $A = \frac{1}{2}bh$ yields $A = \frac{1}{2}(5)(3)$, which is equivalent to $A = \frac{1}{2}(15)$, or $A = \frac{15}{2}$. Therefore, the area of the triangle, in square inches, is $\frac{15}{2}$. Note that 15/2 and 7.5 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID e336a1d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: e336a1d2

A cube has an edge length of **41** inches. What is the volume, in cubic inches, of the cube?

- A. **164**
- B. **1,681**
- C. **10,086**
- D. **68,921**

ID: e336a1d2 Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a cube can be found using the formula $V = s^3$, where s is the edge length of the cube. It's given that a cube has an edge length of **41** inches. Substituting **41** inches for s in this equation yields $V = 41^3$ cubic inches, or $V = 68,921$ cubic inches. Therefore, the volume of the cube is **68,921** cubic inches.

Choice A is incorrect. This is the perimeter, in inches, of the cube.

Choice B is incorrect. This is the area, in square inches, of a face of the cube.

Choice C is incorrect. This is the surface area, in square inches, of the cube.

Question Difficulty:

Medium

Question ID e4b4e9ea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: e4b4e9ea

The length of the edge of the base of a right square prism is **6** units. The volume of the prism is **2,880** cubic units. What is the height, in units, of the prism?

- A. $4\sqrt{30}$
- B. **36**
- C. $24\sqrt{5}$
- D. **80**

ID: e4b4e9ea Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a right square prism is given by the formula $V = s^2h$, where s represents the length of the edge of the base and h represents the height of the prism. It's given that the volume of a right square prism is **2,880** cubic units and the length of the edge of the base is **6** units. Substituting **2,880** for V and **6** for s in the formula $V = s^2h$ yields $2,880 = (6^2)h$, or $2,880 = 36h$. Dividing both sides of this equation by **36** yields $80 = h$. Therefore, the height, in units, of the prism is **80**.

Choice A is incorrect. This is the height, in units, of a right square prism where the length of the edge of the base is **6** units and the volume of the prism is $144\sqrt{30}$, not **2,880**, units.

Choice B is incorrect. This is the area, in square units, of the base, not the height, in units, of the prism.

Choice C is incorrect. This is the height, in units, of a right square prism where the length of the edge of the base is **6** units and the volume of the prism is $864\sqrt{5}$, not **2,880**, units.

Question Difficulty:

Medium

Question ID c0586eb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c0586eb5

A cylinder has a diameter of **8** inches and a height of **12** inches. What is the volume, in cubic inches, of the cylinder?

- A. 16π
- B. 96π
- C. 192π
- D. 768π

ID: c0586eb5 Answer

Correct Answer:

C

Rationale

Choice C is correct. The base of a cylinder is a circle with a diameter equal to the diameter of the cylinder. The volume, V , of a cylinder can be found by multiplying the area of the circular base, A , by the height of the cylinder, h , or $V = Ah$. The area of a circle can be found using the formula $A = \pi r^2$, where r is the radius of the circle. It's given that the diameter of the cylinder is **8** inches. Thus, the radius of this circle is **4** inches. Therefore, the area of the circular base of the cylinder is $A = \pi(4)^2$, or 16π square inches. It's given that the height h of the cylinder is **12** inches. Substituting 16π for A and **12** for h in the formula $V = Ah$ gives $V = 16\pi(12)$, or 192π cubic inches.

Choice A is incorrect. This is the area of the circular base of the cylinder.

Choice B is incorrect and may result from using **8**, instead of **16**, as the value of r^2 in the formula for the area of a circle.

Choice D is incorrect and may result from using **8**, instead of **4**, for the radius of the circular base.

Question Difficulty:

Medium

Question ID 03c6994f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 03c6994f

Square A has side lengths that are **246** times the side lengths of square B. The area of square A is **k** times the area of square B. What is the value of **k**?

- A. **60,516**
- B. **492**
- C. **246**
- D. **123**

ID: 03c6994f Answer

Correct Answer:

A

Rationale

Choice A is correct. The area of a square is s^2 , where s is the side length of the square. Therefore, the area of square B is b^2 , where b is the side length of square B. It's given that square A has side lengths that are **246** times the side lengths of square B. Therefore, the side length of square A can be represented by the expression $246b$. It follows that the area of square A is $(246b)^2$, or $60,516b^2$. It's given that the area of square A is **k** times the area of square B, so $60,516b^2 = kb^2$. Therefore, the value of **k** is **60,516**.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 151eda3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 151eda3c

A manufacturing company produces two sizes of cylindrical containers that each have a height of 50 centimeters. The radius of container A is 16 centimeters, and the radius of container B is 25% longer than the radius of container A. What is the volume, in cubic centimeters, of container B?

- A. $16,000\pi$
- B. $20,000\pi$
- C. $25,000\pi$
- D. $31,250\pi$

ID: 151eda3c Answer

Correct Answer:

B

Rationale

Choice B is correct. If the radius of container A is 16 centimeters and the radius of container B is 25% longer than the radius of container A, then the radius of container B is $16 + (0.25)(16) = 20$ centimeters. The volume of a cylinder is $\pi r^2 h$, where r is the radius of the cylinder and h is its height. Substituting $r = 20$ and $h = 50$ into $\pi r^2 h$ yields that the volume of cylinder B is $\pi(20)^2(50) = 20,000\pi$ cubic centimeters.

Choice A is incorrect and may result from multiplying the radius of cylinder B by the radius of cylinder A rather than squaring the radius of cylinder B. Choice C is incorrect and may result from multiplying the radius of cylinder B by 25 rather than squaring it. Choice D is incorrect and may result from taking the radius of cylinder B to be 25 centimeters rather than 20 centimeters.

Question Difficulty:

Medium

Question ID 167aff9e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 167aff9e

Right rectangular prism X is similar to right rectangular prism Y. The surface area of right rectangular prism X is **58 square centimeters (cm^2)**, and the surface area of right rectangular prism Y is **1,450 cm^2** . The volume of right rectangular prism Y is **1,250 cubic centimeters (cm^3)**. What is the sum of the volumes, **in cm^3** , of right rectangular prism X and right rectangular prism Y?

ID: 167aff9e Answer

Correct Answer:

1260

Rationale

The correct answer is **1,260**. Since it's given that prisms X and Y are similar, all the linear measurements of prism Y are k times the respective linear measurements of prism X, where k is a positive constant. Therefore, the surface area of prism Y is k^2 times the surface area of prism X and the volume of prism Y is k^3 times the volume of prism X. It's given that the surface area of prism Y is **1,450 cm^2** , and the surface area of prism X is **58 cm^2** , which implies that $1,450 = 58k^2$. Dividing both sides of this equation by 58 yields $\frac{1,450}{58} = k^2$, or $k^2 = 25$. Since k is a positive constant, $k = 5$. It's given that the volume of prism Y is **1,250 cm^3** . Therefore, the volume of prism X is equal to $\frac{1,250}{k^3}$ cm^3 , which is equivalent to $\frac{1,250}{5^3}$ cm^3 , or **10 cm^3** . Thus, the sum of the volumes, in cm^3 , of the two prisms is **1,250 + 10**, or **1,260**.

Question Difficulty:

Hard

Question ID d0b6d927

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d0b6d927

A rectangle has an area of **63** square meters and a length of **9** meters. What is the width, in meters, of the rectangle?

- A. **7**
- B. **54**
- C. **81**
- D. **567**

ID: d0b6d927 Answer

Correct Answer:

A

Rationale

Choice A is correct. The area A , in square meters, of a rectangle is the product of its length ℓ , in meters, and its width w , in meters; thus, $A = \ell w$. It's given that a rectangle has an area of **63** square meters and a length of **9** meters. Substituting **63** for A and **9** for ℓ in the equation $A = \ell w$ yields $63 = 9w$. Dividing both sides of this equation by **9** yields $7 = w$. Therefore, the width, in meters, of the rectangle is **7**.

Choice B is incorrect. This is the difference between the area, in square meters, and the length, in meters, of the rectangle, not the width, in meters, of the rectangle.

Choice C is incorrect. This is the square of the length, in meters, not the width, in meters, of the rectangle.

Choice D is incorrect. This is the product of the area, in square meters, and the length, in meters, of the rectangle, not the width, in meters, of the rectangle.

Question Difficulty:

Easy

Question ID d621cffb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: d621cffb

A sphere has a radius of $\frac{17}{5}$ feet. What is the volume, in cubic feet, of the sphere?

- A. $\frac{5\pi}{17}$
- B. $\frac{68\pi}{15}$
- C. $\frac{32\pi}{5}$
- D. $\frac{19,652\pi}{375}$

ID: d621cffb Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a sphere can be found using the formula $V = \frac{4}{3}\pi r^3$, where r is the radius of the sphere. It's given that the sphere has a radius of $\frac{17}{5}$ feet. Substituting $\frac{17}{5}$ for r in the formula $V = \frac{4}{3}\pi r^3$ yields $V = \frac{4}{3}\pi\left(\frac{17}{5}\right)^3$, which is equivalent to $V = \frac{4}{3}\pi\left(\frac{4,913}{125}\right)$, or $V = \frac{19,652\pi}{375}$. Therefore, the volume, in cubic feet, of the sphere is $\frac{19,652\pi}{375}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the volume, in cubic feet, of a sphere with a radius of $\sqrt[3]{\frac{17}{5}}$ feet.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID a2659088

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a2659088

A right circular cylinder has a height of **8 meters (m)** and a base with a radius of **12 m**. What is the volume, in **m³**, of the cylinder?

- A. 8π
- B. 20π
- C. 768π
- D. $1,152\pi$

ID: a2659088 Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a right circular cylinder is given by $V = \pi r^2 h$, where r is the radius of the circular base and h is the height of the cylinder. It's given that the cylinder has a height of 8 meters and a base with a radius of 12 meters.

Substituting 12 for r and 8 for h in $V = \pi r^2 h$ yields $V = \pi(12)^2(8)$, or $V = 1,152\pi$. Therefore, the volume, in m^3 , of the cylinder is $1,152\pi$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the volume, in m^3 , of a cylinder with a radius of 8 meters and a height of 12 meters.

Question Difficulty:

Medium

Question ID 502d9690

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: 502d9690

Rectangle $ABCD$ is similar to rectangle $EFGH$. The area of rectangle $ABCD$ is 648 square inches, and the area of rectangle $EFGH$ is 72 square inches. The length of the longest side of rectangle $ABCD$ is 36 inches. What is the length, in inches, of the longest side of rectangle $EFGH$?

- A. 4
- B. 9
- C. 12
- D. 36

ID: 502d9690 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that rectangle $ABCD$ is similar to rectangle $EFGH$. Therefore, if the length of each side of rectangle $ABCD$ is k times the length of the corresponding side of rectangle $EFGH$, then the area of rectangle $ABCD$ is k^2 times the area of rectangle $EFGH$. It's given that the area of rectangle $ABCD$ is 648 square inches and the area of rectangle $EFGH$ is 72 square inches. It follows that $k^2 = \frac{648}{72}$, or $k^2 = 9$. Taking the square root of each side of this equation yields $k = \sqrt{9}$, or $k = 3$. It follows that the length of each side of rectangle $ABCD$ is 3 times the length of the corresponding side of rectangle $EFGH$. It's given that the length of the longest side of rectangle $ABCD$ is 36 inches. Therefore, 36 inches is 3 times the length of the longest side of rectangle $EFGH$, and the longest side of rectangle $EFGH$ is equal to $\frac{36}{3}$, or 12, inches.

Choice A is incorrect. This is the length, in inches, of the longest side of a rectangle with side lengths that are $\frac{1}{9}$ the corresponding side lengths of rectangle $ABCD$, rather than a rectangle with an area that is $\frac{1}{9}$ the area of rectangle $ABCD$.

Choice B is incorrect. This is the factor by which the area of rectangle $ABCD$ is larger than the area of rectangle $EFGH$, not the length, in inches, of the longest side of rectangle $EFGH$.

Choice D is incorrect. This is the length, in inches, of the longest side of rectangle $ABCD$, not rectangle $EFGH$.

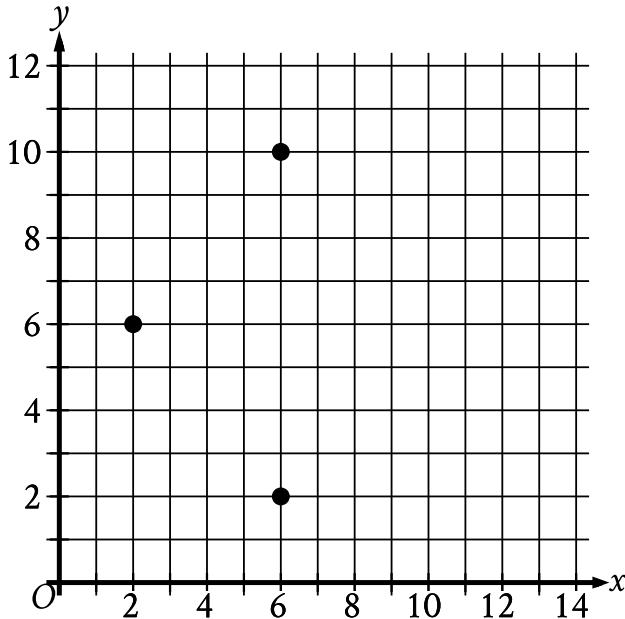
Question Difficulty:

Hard

Question ID b2528e6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: b2528e6b



The three points shown define a circle. The circumference of this circle is $k\pi$, where k is a constant. What is the value of k ?

ID: b2528e6b Answer

Correct Answer:

8

Rationale

The correct answer is 8. It's given that the three points shown define a circle, so the center of that circle is an equal distance from each of the three points. The point $(6, 6)$ is halfway between the points $(6, 2)$ and $(6, 10)$, and is a distance of 4 units from each of those two points. The point $(6, 6)$ is also a distance of 4 units from $(2, 6)$. Because the point $(6, 6)$ is the same distance from all three points shown, it must be the center of the circle. Since that distance is 4, it follows that the radius of the circle is 4. The circumference of a circle with radius r is equal to $2\pi r$. It follows that the circumference of the given circle is $2\pi(4)$, or 8π . It's given that the circumference of the circle is $k\pi$. Therefore, the value of k is 8.

Question Difficulty:

Hard

Question ID 9fec9d49

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div>

ID: 9fec9d49

The floor of a ballroom has an area of **600** square meters. An architect creates a scale model of the floor of the ballroom, where the length of each side of the model is $\frac{1}{10}$ times the length of the corresponding side of the actual floor of the ballroom. What is the area, in square meters, of the scale model?

- A. **6**
- B. **10**
- C. **60**
- D. **150**

ID: 9fec9d49 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the length of each side of a scale model is $\frac{1}{10}$ times the length of the corresponding side of the actual floor of a ballroom. Therefore, the area of the scale model is $\left(\frac{1}{10}\right)^2$, or $\frac{1}{100}$, times the area of the actual floor of the ballroom. It's given that the area of the floor of the ballroom is **600** square meters. Therefore, the area, in square meters, of the scale model is $\left(\frac{1}{100}\right)(600)$, or **6**.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID ba8ca563

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 33%; background-color: #0056b3; height: 10px;"></div> <div style="width: 37%; background-color: #0056b3; height: 10px;"></div>

ID: ba8ca563

A cube has a volume of **474,552** cubic units. What is the surface area, in square units, of the cube?

ID: ba8ca563 Answer

Correct Answer:

36504

Rationale

The correct answer is **36,504**. The volume of a cube can be found using the formula $V = s^3$, where s represents the edge length of a cube. It's given that this cube has a volume of **474,552** cubic units. Substituting **474,552** for V in $V = s^3$ yields $474,552 = s^3$. Taking the cube root of both sides of this equation yields $78 = s$. Thus, the edge length of the cube is **78** units. Since each face of a cube is a square, it follows that each face has an edge length of **78** units. The area of a square can be found using the formula $A = s^2$. Substituting **78** for s in this formula yields $A = 78^2$, or $A = 6,084$. Therefore, the area of one face of this cube is **6,084** square units. Since a cube has **6** faces, the surface area, in square units, of this cube is $6(6,084)$, or **36,504**.

Question Difficulty:

Hard

Question ID 0d43db90

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0d43db90

The perimeter of triangle ABC is 17 inches, the length of side AB is 4 inches, and the length of side AC is 7 inches. What is the length, in inches, of side BC ?

- A. 4
- B. 6
- C. 7
- D. 11

ID: 0d43db90 Answer

Correct Answer:

B

Rationale

Choice B is correct. The perimeter of a triangle is the sum of the lengths of all three sides of the triangle. It's given that the lengths of side AB and side AC are 4 inches and 7 inches, respectively. Let x represent the length, in inches, of side BC . The sum of the lengths, in inches, of all three sides of triangle ABC can be represented by the expression $4 + 7 + x$. Since it's given that the perimeter of triangle ABC is 17 inches, it follows that $17 = 4 + 7 + x$, or $17 = 11 + x$. Subtracting 11 from both sides of this equation yields $6 = x$. Therefore, the length, in inches, of side BC is 6.

Choice A is incorrect. This is the length, in inches, of side AB .

Choice C is incorrect. This is the length, in inches, of side AC .

Choice D is incorrect. This is the sum of the lengths, in inches, of sides AB and AC .

Question Difficulty:

Easy

Question ID e0874bc2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: e0874bc2

The table gives the perimeters of similar triangles TUV and XYZ , where \overline{TU} corresponds to \overline{XY} . The length of \overline{TU} is 18.

	Perimeter
Triangle TUV	37
Triangle XYZ	333

What is the length of \overline{XY} ?

- A. 2
- B. 18
- C. 55
- D. 162

ID: e0874bc2 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that triangle XYZ is similar to triangle TUV . Therefore, each side of triangle XYZ is k times its corresponding side of triangle TUV , where k is a constant. It follows that the perimeter of triangle XYZ is k times the perimeter of triangle TUV . It's also given that \overline{TU} corresponds to \overline{XY} and the length of \overline{TU} is 18. Let x represent the length of \overline{XY} . It follows that $x = 18k$. The table shows that the perimeters of triangles TUV and XYZ are 37 and 333, respectively. It follows that $333 = 37k$, or $9 = k$. Substituting 9 for k in the equation $x = 18k$ yields $x = (18)(9)$, or $x = 162$. Therefore, the length of \overline{XY} is 162.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the length of \overline{TU} , not the length of \overline{XY} .

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 899c6042

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 899c6042

A right circular cone has a height of **22 centimeters (cm)** and a base with a diameter of **6 cm**. The volume of this cone is $n\pi \text{ cm}^3$. What is the value of n ?

ID: 899c6042 Answer

Correct Answer:

66

Rationale

The correct answer is **66**. It's given that the right circular cone has a height of **22 centimeters (cm)** and a base with a diameter of **6 cm**. Since the diameter of the base of the cone is **6 cm**, the radius of the base is **3 cm**. The volume V , **in cm³**, of a right circular cone can be found using the formula $V = \frac{1}{3}\pi r^2 h$, where h is the height, **in cm**, and r is the radius, **in cm**, of the base of the cone. Substituting **22** for h and **3** for r in this formula yields $V = \frac{1}{3}\pi(3)^2(22)$, or $V = 66\pi$. Therefore, the volume of the cone is **$66\pi \text{ cm}^3$** . It's given that the volume of the cone is $n\pi \text{ cm}^3$. Therefore, the value of n is **66**.

Question Difficulty:

Hard

Question ID 0e40dfb0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 0e40dfb0

A rectangle has a length of **3** units and a width of **39** units. Which expression gives the area, in square units, of this rectangle?

- A. $2(3 + 39)$
- B. $2(3 \cdot 39)$
- C. $3 + 39$
- D. $3 \cdot 39$

ID: 0e40dfb0 Answer

Correct Answer:

D

Rationale

Choice D is correct. The area of a rectangle is given by ℓw , where ℓ is the length of the rectangle and w is the width of the rectangle. It's given that a rectangle has a length of **3** units and a width of **39** units. It follows that the area of the rectangle is **$3 \cdot 39$** square units. Therefore, the expression that gives the area, in square units, of this rectangle, is **$3 \cdot 39$** .

Choice A is incorrect. This expression gives the perimeter, in units, of this rectangle.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Easy

Question ID fc5ef8d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: fc5ef8d3

The table gives the perimeters of similar triangles TUV and XYZ , where \overline{TU} corresponds to \overline{XY} . The length of \overline{TU} is 6.

	Perimeter
Triangle TUV	50
Triangle XYZ	150

What is the length of \overline{XY} ?

- A. 2
- B. 6
- C. 18
- D. 56

ID: fc5ef8d3 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that triangle TUV is similar to triangle XYZ , and \overline{TU} corresponds to \overline{XY} . If two triangles are similar, then the ratio of their perimeters is equal to the ratio of their corresponding sides. It's given that the perimeter of triangle TUV is 50, the perimeter of triangle XYZ is 150, and the length of \overline{TU} is 6. Let n represent the length of \overline{XY} . It follows that $\frac{50}{150} = \frac{6}{n}$, or $\frac{1}{3} = \frac{6}{n}$. Multiplying each side of this equation by n yields $\frac{n}{3} = 6$. Multiplying each side of this equation by 3 yields $n = 18$. Therefore, the length of \overline{XY} is 18.

Choice A is incorrect. This is the solution to $\frac{3}{1} = \frac{6}{n}$, not $\frac{1}{3} = \frac{6}{n}$.

Choice B is incorrect. This is the length of \overline{TU} , not \overline{XY} .

Choice D is incorrect. This is the sum of the length of \overline{TU} and the perimeter of triangle TUV , not the length of \overline{XY} .

Question Difficulty:

Easy

Question ID 38517165

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 38517165

A circle has a circumference of 31π centimeters. What is the diameter, in centimeters, of the circle?

ID: 38517165 Answer

Correct Answer:

31

Rationale

The correct answer is **31**. The circumference of a circle is equal to $2\pi r$ centimeters, where r represents the radius, in centimeters, of the circle, and the diameter of the circle is equal to $2r$ centimeters. It's given that a circle has a circumference of 31π centimeters. Therefore, $31\pi = 2\pi r$. Dividing both sides of this equation by π yields $31 = 2r$. Since the diameter of the circle is equal to $2r$ centimeters, it follows that the diameter, in centimeters, of the circle is **31**.

Question Difficulty:

Medium

Question ID 98c12e38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 98c12e38

Circle K has a radius of 4 millimeters (mm). Circle L has an area of $100\pi \text{ mm}^2$. What is the total area, in mm^2 , of circles K and L ?

- A. 14π
- B. 28π
- C. 56π
- D. 116π

ID: 98c12e38 Answer

Correct Answer:

D

Rationale

Choice D is correct. The area, A , of a circle is given by the formula $A = \pi r^2$, where r represents the radius of the circle. It's given that circle K has a radius of 4 millimeters (mm). Substituting 4 for r in the formula $A = \pi r^2$ yields $A = \pi(4)^2$, or $A = 16\pi$. Therefore, the area of circle K is $16\pi \text{ mm}^2$. It's given that circle L has an area of $100\pi \text{ mm}^2$. Therefore, the total area, in mm^2 , of circles K and L is $16\pi + 100\pi$, or 116π .

Choice A is incorrect. This is the sum of the radii, in mm, of circles K and L multiplied by π , not the total area, in mm^2 , of the circles.

Choice B is incorrect. This is the sum of the diameters, in mm, of circles K and L multiplied by π , not the total area, in mm^2 , of the circles.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID b0dc920d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b0dc920d

A manufacturer determined that right cylindrical containers with a height that is 4 inches longer than the radius offer the optimal number of containers to be displayed on a shelf. Which of the following expresses the volume, V , in cubic inches, of such containers, where r is the radius, in inches?

- A. $V = 4\pi r^3$
- B. $V = \pi(2r)^3$
- C. $V = \pi r^2 + 4\pi r$
- D. $V = \pi r^3 + 4\pi r^2$

ID: b0dc920d Answer

Correct Answer:

D

Rationale

Choice D is correct. The volume, V , of a right cylinder is given by the formula $V = \pi r^2 h$, where r represents the radius of the base of the cylinder and h represents the height. Since the height is 4 inches longer than the radius, the expression $r + 4$ represents the height of each cylindrical container. It follows that the volume of each container is represented by the equation $V = \pi r^2(r+4)$.

Distributing the expression πr^2 into each term in the parentheses yields $V = \pi r^3 + 4\pi r^2$.

Choice A is incorrect and may result from representing the height as $4r$ instead of $r + 4$. Choice B is incorrect and may result from representing the height as $2r$ instead of $r + 4$. Choice C is incorrect and may result from representing the volume of a right cylinder as $V = \pi rh$ instead of $V = \pi r^2 h$.

Question Difficulty:

Hard

Question ID 689abc2a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Area and volume	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 689abc2a

Rectangle P has an area of **72** square inches. If a rectangle with an area of **20** square inches is removed from rectangle P, what is the area, in square inches, of the resulting figure?

- A. **92**
- B. **84**
- C. **80**
- D. **52**

ID: 689abc2a Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that rectangle P has an area of **72** square inches. If a rectangle with an area of **20** square inches is removed from rectangle P, the area, in square inches, of the resulting figure is $72 - 20$, or **52**.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 8e7689e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 8e7689e0

The number of radians in a 720-degree angle can be written as $a\pi$, where a is a constant. What is the value of a ?

ID: 8e7689e0 Answer

Rationale

The correct answer is 4. There are π radians in a 180° angle. An angle measure of 720° is 4 times greater than an angle measure of 180° . Therefore, the number of radians in a 720° angle is 4π .

Question Difficulty:

Medium

Question ID f2495de4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: f2495de4

What is the value of $\cos \frac{565\pi}{6}$?

- A. $\frac{1}{2}$
- B. 1
- C. $\frac{\sqrt{3}}{2}$
- D. $\sqrt{3}$

ID: f2495de4 Answer

Correct Answer:

C

Rationale

Choice C is correct. The cosine of an angle is equal to the cosine of $n(2\pi)$ radians more than the angle, where n is an integer constant. Since $\frac{565\pi}{6}$ is equivalent to $47(2\pi) + \frac{\pi}{6}$, $\cos(\frac{565\pi}{6})$ can be rewritten as $\cos(47(2\pi) + \frac{\pi}{6})$, which is equal to $\cos(\frac{\pi}{6})$. Therefore, the value of $\cos(\frac{565\pi}{6})$ is equal to the value of $\cos(\frac{\pi}{6})$, which is $\frac{\sqrt{3}}{2}$.

Alternate approach: A trigonometric ratio can be found using the unit circle, that is, a circle with radius 1 unit. The cosine of a number t is the x -coordinate of the point resulting from traveling a distance of t counterclockwise from the point $(1, 0)$ around a unit circle centered at the origin in the xy -plane. A unit circle has a circumference of 2π . It follows that since $\frac{565\pi}{6}$ is equal to $47(2\pi) + \frac{\pi}{6}$, traveling a distance of $\frac{565\pi}{6}$ counterclockwise around a unit circle means traveling around the circle completely 47 times and then another $\frac{\pi}{6}$ beyond that. That is, traveling $\frac{565\pi}{6}$ results in the same point as traveling $\frac{\pi}{6}$. Traveling $\frac{\pi}{6}$ counterclockwise from the point $(1, 0)$ around a unit circle centered at the origin in the xy -plane results in the point $(\frac{\sqrt{3}}{2}, \frac{1}{2})$. Thus, the value of $\cos \frac{565\pi}{6}$ is the x -coordinate of the point $(\frac{\sqrt{3}}{2}, \frac{1}{2})$, which is $\frac{\sqrt{3}}{2}$.

Choice A is incorrect. This is the value of $\sin \frac{565\pi}{6}$, not $\cos \frac{565\pi}{6}$.

Choice B is incorrect. This is the value of the cosine of a multiple of 2π , not $\frac{565\pi}{6}$.

Choice D is incorrect. This is the value of $\frac{1}{\tan \frac{565\pi}{6}}$, not $\cos \frac{565\pi}{6}$.

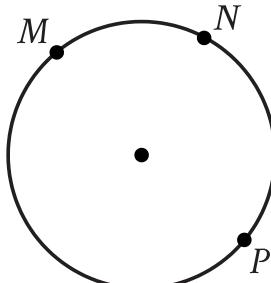
Question Difficulty:

Easy

Question ID 800e71b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 800e71b8



Points M , N , and P lie on the circle shown. On this circle, minor arc MN has a length of 39 centimeters and major arc MPN has a length of 195 centimeters. What is the circumference, in centimeters, of the circle shown?

- A. 39
- B. 156
- C. 195
- D. 234

ID: 800e71b8 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since the endpoints of minor arc MN and major arc MPN are the same, and the arcs together form a full circle, the sum of the lengths of these two arcs is equal to the circumference of the circle. It's given that the length of minor arc MN is 39 centimeters and the length of major arc MPN is 195 centimeters. Therefore, the circumference of the circle, in centimeters, is $39 + 195$, or 234.

Choice A is incorrect. This is the length, in centimeters, of minor arc MN , not the circumference, in centimeters, of the circle.

Choice B is incorrect. This is the difference of the lengths of major arc MPN and minor arc MN , in centimeters.

Choice C is incorrect. This is the length, in centimeters, of major arc MPN , not the circumference, in centimeters, of the circle.

Question Difficulty:

Medium

Question ID 24cec8d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 24cec8d1

A circle has center O , and points R and S lie on the circle. In triangle ORS , the measure of $\angle ROS$ is 88° . What is the measure of $\angle RSO$, in degrees? (Disregard the degree symbol when entering your answer.)

ID: 24cec8d1 Answer

Correct Answer:

46

Rationale

The correct answer is **46**. It's given that O is the center of a circle and that points R and S lie on the circle. Therefore, \overline{OR} and \overline{OS} are radii of the circle. It follows that $OR = OS$. If two sides of a triangle are congruent, then the angles opposite them are congruent. It follows that the angles $\angle RSO$ and $\angle ORS$, which are across from the sides of equal length, are congruent. Let x° represent the measure of $\angle RSO$. It follows that the measure of $\angle ORS$ is also x° . It's given that the measure of $\angle ROS$ is 88° . Because the sum of the measures of the interior angles of a triangle is 180° , the equation $x^\circ + x^\circ + 88^\circ = 180^\circ$, or $2x + 88 = 180$, can be used to find the measure of $\angle RSO$. Subtracting 88 from both sides of this equation yields $2x = 92$. Dividing both sides of this equation by 2 yields $x = 46$. Therefore, the measure of $\angle RSO$, in degrees, is **46**.

Question Difficulty:

Hard

Question ID 9e44284b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9e44284b

In the xy -plane, the graph of $2x^2 - 6x + 2y^2 + 2y = 45$ is a

circle. What is the radius of the circle?

- A. 5
- B. 6.5
- C. $\sqrt{40}$
- D. $\sqrt{50}$

ID: 9e44284b Answer

Correct Answer:

A

Rationale

Choice A is correct. One way to find the radius of the circle is to rewrite the given equation in standard form, $(x-h)^2 + (y-k)^2 = r^2$, where (h,k) is the center of the circle and the radius of the circle is r . To do this, divide the original equation, $2x^2 - 6x + 2y^2 + 2y = 45$, by 2 to make the leading coefficients of x^2 and y^2 each equal to 1: $x^2 - 3x + y^2 + y = 22.5$. Then complete the square to put the equation in standard form. To do so, first rewrite $x^2 - 3x + y^2 + y = 22.5$ as $(x^2 - 3x + 2.25) - 2.25 + (y^2 + y + 0.25) - 0.25 = 22.5$. Second, add 2.25 and 0.25 to both sides of the equation: $(x^2 - 3x + 2.25) + (y^2 + y + 0.25) = 25$. Since $x^2 - 3x + 2.25 = (x - 1.5)^2$, $y^2 + y + 0.25 = (y + 0.5)^2$, and $25 = 5^2$, it follows that $(x - 1.5)^2 + (y + 0.5)^2 = 5^2$. Therefore, the radius of the circle is 5.

Choices B, C, and D are incorrect and may be the result of errors in manipulating the equation or of a misconception about the standard form of the equation of a circle in the xy -plane.

Question Difficulty:

Hard

Question ID fc8aa563

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #005a9f;"></div> <div style="width: 20%; background-color: #005a9f;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: fc8aa563

What is the center of the circle in the xy -plane defined by the equation $(x - 1)^2 + (y + 7)^2 = 1$?

- A. $(-1, -7)$
- B. $(-1, 7)$
- C. $(1, -7)$
- D. $(1, 7)$

ID: fc8aa563 Answer

Correct Answer:

C

Rationale

Choice C is correct. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r . It's given that the circle in the xy -plane is defined by the equation $(x - 1)^2 + (y + 7)^2 = 1$. This equation can be written as $(x - 1)^2 + (y - (-7))^2 = 1$. For this equation, it follows that $h = 1$ and $k = -7$. Therefore, the center of the circle in the xy -plane defined by the given equation is $(1, -7)$.

Choice A is incorrect. This is the center of the circle in the xy -plane that is defined by the equation $(x + 1)^2 + (y + 7)^2 = 1$, not $(x - 1)^2 + (y + 7)^2 = 1$.

Choice B is incorrect. This is the center of the circle in the xy -plane that is defined by the equation $(x + 1)^2 + (y - 7)^2 = 1$, not $(x - 1)^2 + (y + 7)^2 = 1$.

Choice D is incorrect. This is the center of the circle in the xy -plane that is defined by the equation $(x - 1)^2 + (y - 7)^2 = 1$, not $(x - 1)^2 + (y + 7)^2 = 1$.

Question Difficulty:

Medium

Question ID 2855cb58

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 2855cb58

A circle in the xy -plane has its center at $(16, 17)$ and has a radius of $7k$. Which equation represents this circle?

- A. $(x - 16)^2 + (y - 17)^2 = 49k$
- B. $(x - 16)^2 + (y - 17)^2 = 49k^2$
- C. $(x - 16)^2 + (y - 17)^2 = 7k$
- D. $(x - 16)^2 + (y - 17)^2 = 7k^2$

ID: 2855cb58 Answer

Correct Answer:

B

Rationale

Choice B is correct. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r . It's given that this circle has a center at $(16, 17)$ and a radius of $7k$. Substituting 16 for h , 17 for k , and $7k$ for r in $(x - h)^2 + (y - k)^2 = r^2$ yields $(x - 16)^2 + (y - 17)^2 = (7k)^2$, or $(x - 16)^2 + (y - 17)^2 = 49k^2$. Therefore, the equation that represents this circle is $(x - 16)^2 + (y - 17)^2 = 49k^2$.

Choice A is incorrect. This equation represents a circle with radius $7\sqrt{k}$, not $7k$.

Choice C is incorrect. This equation represents a circle with radius $\sqrt{7k}$, not $7k$.

Choice D is incorrect. This equation represents a circle with radius $\sqrt{7k}$, not $7k$.

Question Difficulty:

Hard

Question ID 74d8b897

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 74d8b897

An angle has a measure of $\frac{9\pi}{20}$ radians. What is the measure of the angle in degrees?

ID: 74d8b897 Answer

Correct Answer:

81

Rationale

The correct answer is 81. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$. Multiplying the given angle measure, $\frac{9\pi}{20}$ radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ yields $\left(\frac{9\pi}{20} \text{ radians}\right) \left(\frac{180 \text{ degrees}}{\pi \text{ radians}}\right)$, which is equivalent to 81 degrees.

Question Difficulty:

Medium

Question ID ee540927

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: ee540927

$$x^2 + 58x + y^2 = 0$$

In the xy -plane, the graph of the given equation is a circle. What are the coordinates (x, y) of the center of the circle?

- A. $(0, 29)$
- B. $(0, -29)$
- C. $(29, 0)$
- D. $(-29, 0)$

ID: ee540927 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that in the xy -plane, the graph of $x^2 + 58x + y^2 = 0$ is a circle. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the radius of the circle is r . By completing the square, the equation $x^2 + 58x + y^2 = 0$ can be rewritten as

$\left(x^2 + 58x + \left(\frac{58}{2}\right)^2\right) + y^2 = 0 + \left(\frac{58}{2}\right)^2$, or $(x^2 + 58x + 841) + y^2 = 841$. This equation is equivalent to $(x + 29)^2 + y^2 = 841$, or $(x - (-29))^2 + (y - 0)^2 = 841$. Therefore, h is -29 and k is 0 , and the coordinates (x, y) of the center of the circle are $(-29, 0)$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID a0cacec1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: a0cacec1

An angle has a measure of $\frac{16\pi}{15}$ radians. What is the measure of the angle, in degrees?

ID: a0cacec1 Answer

Correct Answer:

192

Rationale

The correct answer is 192. The measure of an angle, in degrees, can be found by multiplying its measure, in radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$. Multiplying the given angle measure, $\frac{16\pi}{15}$ radians, by $\frac{180 \text{ degrees}}{\pi \text{ radians}}$ yields $\left(\frac{16\pi}{15} \text{ radians}\right) \left(\frac{180 \text{ degrees}}{\pi \text{ radians}}\right)$, which simplifies to 192 degrees.

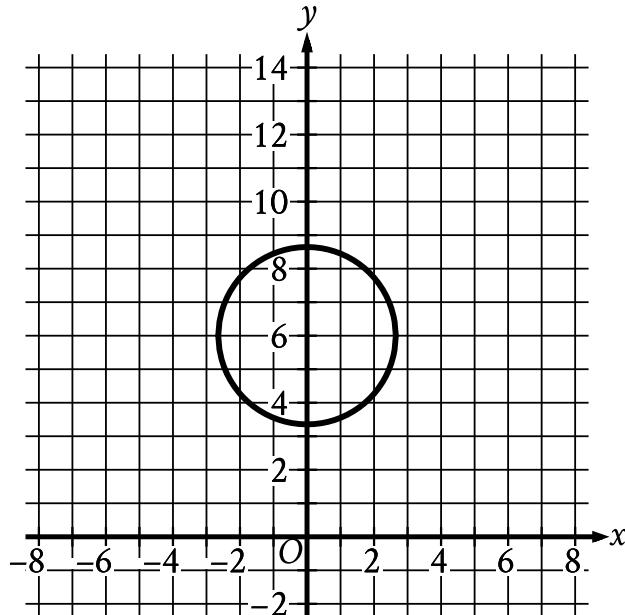
Question Difficulty:

Medium

Question ID 1b2b20b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 1b2b20b9



Circle A shown is defined by the equation $x^2 + (y - 6)^2 = 7$. Circle B (not shown) has the same radius but is translated 96 units to the right. If the equation of circle B is $(x - h)^2 + (y - k)^2 = a$, where h , k , and a are constants, what is the value of $4a$?

ID: 1b2b20b9 Answer

Correct Answer:

28

Rationale

The correct answer is 28. The equation of a circle in the xy -plane can be written as $(x - t)^2 + (y - s)^2 = r^2$, where the center of the circle is (t, s) and the radius of the circle is r . It's given that circle A is defined by the equation $x^2 + (y - 6)^2 = 7$, which can be written as $(x - 0)^2 + (y - 6)^2 = (\sqrt{7})^2$. It follows that $r = \sqrt{7}$ and the radius of circle A is $\sqrt{7}$. It's also given that circle B has the same radius as circle A. If the equation of circle B is $(x - h)^2 + (y - k)^2 = a$, then $a = r^2$. Substituting $\sqrt{7}$ for r in this equation yields $a = (\sqrt{7})^2$, or $a = 7$. It follows that the value of $4a$ is $4(7)$, or 28.

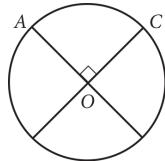
Question Difficulty:

Hard

Question ID 23c5fcce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 23c5fcce



The circle above with center O has a circumference of 36.

What is the length of minor arc \overarc{AC} ?

- A. 9
- B. 12
- C. 18
- D. 36

ID: 23c5fcce Answer

Correct Answer:

A

Rationale

Choice A is correct. A circle has 360 degrees of arc. In the circle shown, O is the center of the circle and $\angle AOC$ is a central angle of the circle. From the figure, the two diameters that meet to form $\angle AOC$ are perpendicular, so the measure of $\angle AOC$ is 90° .

Therefore, the length of minor arc \overarc{AC} is $\frac{90}{360}$ of the circumference of the circle. Since the circumference of the circle is 36, the

length of minor arc \overarc{AC} is $\frac{90}{360} \times 36 = 9$.

Choices B, C, and D are incorrect. The perpendicular diameters divide the circumference of the circle into four equal arcs; therefore, minor arc \overarc{AC} is $\frac{1}{4}$ of the circumference. However, the lengths in choices B and C are, respectively, $\frac{1}{3}$ and $\frac{1}{2}$ the circumference of the circle, and the length in choice D is the length of the entire circumference. None of these lengths is $\frac{1}{4}$ the circumference.

Question Difficulty:

Easy

Question ID f1c1e971

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f1c1e971

The measure of angle R is $\frac{2\pi}{3}$ radians. The measure of angle T is $\frac{5\pi}{12}$ radians greater than the measure of angle R . What is the measure of angle T , in degrees?

- A. 75
- B. 120
- C. 195
- D. 390

ID: f1c1e971 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the measure of angle R is $\frac{2\pi}{3}$ radians, and the measure of angle T is $\frac{5\pi}{12}$ radians greater than the measure of angle R . Therefore, the measure of angle T is equal to $\frac{2\pi}{3} + \frac{5\pi}{12}$ radians. Multiplying $\frac{2\pi}{3}$ by $\frac{4}{4}$ to get a common denominator with $\frac{5\pi}{12}$ yields $\frac{8\pi}{12}$. Therefore, $\frac{2\pi}{3} + \frac{5\pi}{12}$ is equivalent to $\frac{8\pi}{12} + \frac{5\pi}{12}$, or $\frac{13\pi}{12}$. Therefore, the measure of angle T is $\frac{13\pi}{12}$ radians. The measure of angle T , in degrees, can be found by multiplying its measure, in radians, by $\frac{180}{\pi}$. This yields $\frac{13\pi}{12} \times \frac{180}{\pi}$, which is equivalent to 195 degrees. Therefore, the measure of angle T is 195 degrees.

Choice A is incorrect. This is the number of degrees that the measure of angle T is greater than the measure of angle R .

Choice B is incorrect. This is the measure of angle R , in degrees.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 2d521ca9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2d521ca9

The measure of angle Z is 60° . What is the measure, in radians, of angle Z ?

- A. $\frac{1}{6}\pi$
- B. $\frac{1}{3}\pi$
- C. $\frac{2}{3}\pi$
- D. 1π

ID: 2d521ca9 Answer

Correct Answer:

B

Rationale

Choice B is correct. The measure of an angle, in radians, can be found by multiplying its measure, in degrees, by $\frac{\pi}{180}$. It's given that the measure of angle Z is 60° . It follows that the measure, in radians, of angle Z is $60\left(\frac{\pi}{180}\right)$, or $\frac{1}{3}\pi$.

Choice A is incorrect. This is the measure, in radians, of an angle whose measure is 30° , not 60° .

Choice C is incorrect. This is the measure, in radians, of an angle whose measure is 120° , not 60° .

Choice D is incorrect. This is the measure, in radians, of an angle whose measure is 180° , not 60° .

Question Difficulty:

Medium

Question ID 9acd101f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9acd101f

The equation $x^2 + (y - 1)^2 = 49$ represents circle A. Circle B is obtained by shifting circle A down **2** units in the xy -plane. Which of the following equations represents circle B?

- A. $(x - 2)^2 + (y - 1)^2 = 49$
- B. $x^2 + (y - 3)^2 = 49$
- C. $(x + 2)^2 + (y - 1)^2 = 49$
- D. $x^2 + (y + 1)^2 = 49$

ID: 9acd101f Answer

Correct Answer:

D

Rationale

Choice D is correct. The graph in the xy -plane of an equation of the form $(x - h)^2 + (y - k)^2 = r^2$ is a circle with center (h, k) and a radius of length r . It's given that circle A is represented by $x^2 + (y - 1)^2 = 49$, which can be rewritten as $x^2 + (y - 1)^2 = 7^2$. Therefore, circle A has center $(0, 1)$ and a radius of length **7**. Shifting circle A down two units is a rigid vertical translation of circle A that does not change its size or shape. Since circle B is obtained by shifting circle A down two units, it follows that circle B has the same radius as circle A, and for each point (x, y) on circle A, the point $(x, y - 2)$ lies on circle B. Moreover, if (h, k) is the center of circle A, then $(h, k - 2)$ is the center of circle B. Therefore, circle B has a radius of **7** and the center of circle B is $(0, 1 - 2)$, or $(0, -1)$. Thus, circle B can be represented by the equation $x^2 + (y + 1)^2 = 7^2$, or $x^2 + (y + 1)^2 = 49$.

Choice A is incorrect. This is the equation of a circle obtained by shifting circle A right **2** units.

Choice B is incorrect. This is the equation of a circle obtained by shifting circle A up **2** units.

Choice C is incorrect. This is the equation of a circle obtained by shifting circle A left **2** units.

Question Difficulty:

Hard

Question ID 244ff6c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 244ff6c4

What is the value of $\tan \frac{92\pi}{3}$?

- A. $-\sqrt{3}$
- B. $-\frac{\sqrt{3}}{3}$
- C. $\frac{\sqrt{3}}{3}$
- D. $\sqrt{3}$

ID: 244ff6c4 Answer

Correct Answer:

A

Rationale

Choice A is correct. A trigonometric ratio can be found using the unit circle, that is, a circle with radius 1 unit. If a central angle of a unit circle in the xy-plane centered at the origin has its starting side on the positive x-axis and its terminal side intersects the circle at a point (x, y) , then the value of the tangent of the central angle is equal to the y-coordinate divided by the x-coordinate. There are 2π radians in a circle. Dividing $\frac{92\pi}{3}$ by 2π yields $\frac{92}{6}$, which is equivalent to $15 + \frac{2}{3}$. It follows that on the unit circle centered at the origin in the xy-plane, the angle $\frac{92\pi}{3}$ is the result of 15 revolutions from its starting side on the positive x-axis followed by a rotation through $\frac{2\pi}{3}$ radians. Therefore, the angles $\frac{92\pi}{3}$ and $\frac{2\pi}{3}$ are coterminal angles and $\tan(\frac{92\pi}{3})$ is equal to $\tan(\frac{2\pi}{3})$. Since $\frac{2\pi}{3}$ is greater than $\frac{\pi}{2}$ and less than π , it follows that the terminal side of the angle is in quadrant II and forms an angle of $\frac{\pi}{3}$, or 60° , with the negative x-axis. Therefore, the terminal side of the angle intersects the unit circle at the point $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$. It follows that the value of $\tan(\frac{2\pi}{3})$ is $\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$, which is equivalent to $-\sqrt{3}$. Therefore, the value of $\tan(\frac{92\pi}{3})$ is $-\sqrt{3}$.

Choice B is incorrect. This is the value of $\frac{1}{\tan(\frac{92\pi}{3})}$, not $\tan(\frac{92\pi}{3})$.

Choice C is incorrect. This is the value of $\tan(\frac{\pi}{3})$, not $\tan(\frac{92\pi}{3})$.

Choice D is incorrect. This is the value of $\tan(\frac{\pi}{3})$, not $\tan(\frac{92\pi}{3})$.

Question Difficulty:

Hard

Question ID 0acfddb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0acfddb5

A circle has center G , and points M and N lie on the circle. Line segments MH and NH are tangent to the circle at points M and N , respectively. If the radius of the circle is 168 millimeters and the perimeter of quadrilateral $GMHN$ is 3,856 millimeters, what is the distance, in millimeters, between points G and H ?

- A. 168
- B. 1,752
- C. 1,760
- D. 1,768

ID: 0acfddb5 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the radius of the circle is 168 millimeters. Since points M and N both lie on the circle, segments GM and GN are both radii. Therefore, segments GM and GN each have length 168 millimeters. Two segments that are tangent to a circle and have a common exterior endpoint have equal length. Therefore, segment MH and segment NH have equal length. Let x represent the length of segment MH . Then x also represents the length of segment NH . It's given that the perimeter of quadrilateral $GMHN$ is 3,856 millimeters. Since the perimeter of a quadrilateral is equal to the sum of the lengths of the sides of the quadrilateral, $3,856 = 168 + 168 + x + x$, or $3,856 = 336 + 2x$. Subtracting 336 from both sides of this equation yields $3,520 = 2x$, and dividing both sides of this equation by 2 yields $1,760 = x$. Therefore, the length of segment MH is 1,760 millimeters. A line segment that's tangent to a circle is perpendicular to the radius of the circle at the point of tangency. Therefore, segment GM is perpendicular to segment MH . Since perpendicular segments form right angles, angle GMH is a right angle. Therefore, triangle GMH is a right triangle with legs of length 1,760 millimeters and 168 millimeters, and hypotenuse GH . By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b , then $a^2 + b^2 = c^2$. Substituting 1,760 for a and 168 for b in this equation yields $1,760^2 + 168^2 = c^2$, or $3,125,824 = c^2$. Taking the square root of both sides of this equation yields $\pm 1,768 = c$. Since c represents a length, which must be positive, the value of c is 1,768. Therefore, the length of segment GH is 1,768 millimeters, so the distance between points G and H is 1,768 millimeters.

Choice A is incorrect. This is the distance between points G and M and between points G and N , not the distance between points G and H .

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the distance between points M and H and between points N and H , not the distance between points G and H .

Question Difficulty:

Hard

Question ID ca2235f6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: ca2235f6

A circle has center O , and points A and B lie on the circle. The measure of arc AB is 45° and the length of arc AB is 3 inches. What is the circumference, in inches, of the circle?

- A. 3
- B. 6
- C. 9
- D. 24

ID: ca2235f6 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the measure of arc AB is 45° and the length of arc AB is 3 inches. The arc measure of the full circle is 360° . If x represents the circumference, in inches, of the circle, it follows that $\frac{45^\circ}{360^\circ} = \frac{3 \text{ inches}}{x \text{ inches}}$. This equation is equivalent to $\frac{45}{360} = \frac{3}{x}$, or $\frac{1}{8} = \frac{3}{x}$. Multiplying both sides of this equation by $8x$ yields $1(x) = 3(8)$, or $x = 24$. Therefore, the circumference of the circle is 24 inches.

Choice A is incorrect. This is the length of arc AB .

Choice B is incorrect and may result from multiplying the length of arc AB by 2.

Choice C is incorrect and may result from squaring the length of arc AB .

Question Difficulty:

Hard

Question ID 856372ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 856372ca

In the xy -plane, a circle with radius 5 has center $(-8, 6)$. Which of the following is an equation of the circle?

- A. $(x - 8)^2 + (y + 6)^2 = 25$
- B. $(x + 8)^2 + (y - 6)^2 = 25$
- C. $(x - 8)^2 + (y + 6)^2 = 5$
- D. $(x + 8)^2 + (y - 6)^2 = 5$

ID: 856372ca Answer

Correct Answer:

B

Rationale

Choice B is correct. An equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius is r . It's given that the center of this circle is $(-8, 6)$ and the radius is 5. Substituting these values into the equation gives $(x - (-8))^2 + (y - 6)^2 = 5^2$, or $(x + 8)^2 + (y - 6)^2 = 25$.

Choice A is incorrect. This is an equation of a circle that has center $(8, -6)$. Choice C is incorrect. This is an equation of a circle that has center $(8, -6)$ and radius $\sqrt{5}$. Choice D is incorrect. This is an equation of a circle that has radius $\sqrt{5}$.

Question Difficulty:

Medium

Question ID 9d159400

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9d159400

Which of the following equations represents a circle in the xy -plane that intersects the y -axis at exactly one point?

- A. $(x - 8)^2 + (y - 8)^2 = 16$
- B. $(x - 8)^2 + (y - 4)^2 = 16$
- C. $(x - 4)^2 + (y - 9)^2 = 16$
- D. $x^2 + (y - 9)^2 = 16$

ID: 9d159400 Answer

Correct Answer:

C

Rationale

Choice C is correct. The graph of the equation $(x - h)^2 + (y - k)^2 = r^2$ in the xy -plane is a circle with center (h, k) and a radius of length r . The radius of a circle is the distance from the center of the circle to any point on the circle. If a circle in the xy -plane intersects the y -axis at exactly one point, then the perpendicular distance from the center of the circle to this point on the y -axis must be equal to the length of the circle's radius. It follows that the x -coordinate of the circle's center must be equivalent to the length of the circle's radius. In other words, if the graph of $(x - h)^2 + (y - k)^2 = r^2$ is a circle that intersects the y -axis at exactly one point, then $r = |h|$ must be true. The equation in choice C is $(x - 4)^2 + (y - 9)^2 = 16$, or $(x - 4)^2 + (y - 9)^2 = 4^2$. This equation is in the form $(x - h)^2 + (y - k)^2 = r^2$, where $h = 4$, $k = 9$, and $r = 4$, and represents a circle in the xy -plane with center $(4, 9)$ and radius of length 4. Substituting 4 for r and 4 for h in the equation $r = |h|$ yields $4 = |4|$, or $4 = 4$, which is true. Therefore, the equation in choice C represents a circle in the xy -plane that intersects the y -axis at exactly one point.

Choice A is incorrect. This is the equation of a circle that does not intersect the y -axis at any point.

Choice B is incorrect. This is an equation of a circle that intersects the x -axis, not the y -axis, at exactly one point.

Choice D is incorrect. This is the equation of a circle with the center located on the y -axis and thus intersects the y -axis at exactly two points, not exactly one point.

Question Difficulty:

Hard

Question ID 981275d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 981275d2

$$(x - 6)^2 + (y + 5)^2 = 16$$

In the xy -plane, the graph of the equation above is a circle. Point P is on the circle and has coordinates $(10, -5)$. If \overline{PQ} is a diameter of the circle, what are the coordinates of point Q ?

- A. $(2, -5)$
- B. $(6, -1)$
- C. $(6, -5)$
- D. $(6, -9)$

ID: 981275d2 Answer

Correct Answer:

A

Rationale

Choice A is correct. The standard form for the equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) are the coordinates of the center and r is the length of the radius. According to the given equation, the center of the circle is $(6, -5)$. Let (x_1, y_1) represent the coordinates of point Q. Since point P $(10, -5)$ and point Q (x_1, y_1) are the endpoints of a diameter of the circle, the

center $(6, -5)$ lies on the diameter, halfway between P and Q. Therefore, the following relationships hold: $\frac{x_1 + 10}{2} = 6$ and

$\frac{y_1 + (-5)}{2} = -5$. Solving the equations for x_1 and y_1 , respectively, yields $x_1 = 2$ and $y_1 = -5$. Therefore, the coordinates of point Q are $(2, -5)$.

Alternate approach: Since point P $(10, -5)$ on the circle and the center of the circle $(6, -5)$ have the same y-coordinate, it follows that the radius of the circle is $10 - 6 = 4$. In addition, the opposite end of the diameter \overline{PQ} must have the same y-coordinate as P and be 4 units away from the center. Hence, the coordinates of point Q must be $(2, -5)$.

Choices B and D are incorrect because the points given in these choices lie on a diameter that is perpendicular to the diameter \overline{PQ} . If either of these points were point Q, then \overline{PQ} would not be the diameter of the circle. Choice C is incorrect because $(6, -5)$ is the center of the circle and does not lie on the circle.

Question Difficulty:
Hard

Question ID 89661424

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 89661424

A circle in the xy -plane has its center at $(-5, 2)$ and has a radius of 9. An equation of this circle is $x^2 + y^2 + ax + by + c = 0$, where a , b , and c are constants. What is the value of c ?

ID: 89661424 Answer

Correct Answer:

-52

Rationale

The correct answer is -52. The equation of a circle in the xy -plane with its center at (h, k) and a radius of r can be written in the form $(x - h)^2 + (y - k)^2 = r^2$. It's given that a circle in the xy -plane has its center at $(-5, 2)$ and has a radius of 9.

Substituting -5 for h , 2 for k , and 9 for r in the equation $(x - h)^2 + (y - k)^2 = r^2$ yields $(x - (-5))^2 + (y - 2)^2 = 9^2$, or $(x + 5)^2 + (y - 2)^2 = 81$. It's also given that an equation of this circle is $x^2 + y^2 + ax + by + c = 0$, where a , b , and c are constants. Therefore, $(x + 5)^2 + (y - 2)^2 = 81$ can be rewritten in the form $x^2 + y^2 + ax + by + c = 0$. The equation $(x + 5)^2 + (y - 2)^2 = 81$, or $(x + 5)(x + 5) + (y - 2)(y - 2) = 81$, can be rewritten as

$x^2 + 5x + 25 + y^2 - 4y + 4 = 81$. Combining like terms on the left-hand side of this equation yields

$x^2 + y^2 + 10x - 4y + 29 = 81$. Subtracting 81 from both sides of this equation yields $x^2 + y^2 + 10x - 4y - 52 = 0$, which is equivalent to $x^2 + y^2 + 10x + (-4)y + (-52) = 0$. This equation is in the form $x^2 + y^2 + ax + by + c = 0$. Therefore, the value of c is -52.

Question Difficulty:

Hard

Question ID 196e8e6e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 196e8e6e

In the xy -plane, a circle has center C with coordinates (h, k) . Points A and B lie on the circle. Point A has coordinates $(h + 1, k + \sqrt{102})$, and $\angle ACB$ is a right angle. What is the length of \overline{AB} ?

- A. $\sqrt{206}$
- B. $2\sqrt{102}$
- C. $103\sqrt{2}$
- D. $103\sqrt{3}$

ID: 196e8e6e Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that points A and B lie on the circle with center C . Therefore, \overline{AC} and \overline{BC} are both radii of the circle. Since all radii of a circle are congruent, \overline{AC} is congruent to \overline{BC} . The length of \overline{AC} , or the distance from point A to point C , can be found using the distance formula, which gives the distance between two points, (x_1, y_1) and (x_2, y_2) , as

$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. Substituting the given coordinates of point A , $(h + 1, k + \sqrt{102})$, for (x_1, y_1) and the given coordinates of point C , (h, k) , for (x_2, y_2) in the distance formula yields $\sqrt{(h + 1 - h)^2 + (k + \sqrt{102} - k)^2}$, or $\sqrt{1^2 + (\sqrt{102})^2}$, which is equivalent to $\sqrt{1 + 102}$, or $\sqrt{103}$. Therefore, the length of \overline{AC} is $\sqrt{103}$ and the length of \overline{BC} is $\sqrt{103}$. It's given that angle ACB is a right angle. Therefore, triangle ACB is a right triangle with legs \overline{AC} and \overline{BC} and hypotenuse \overline{AB} . By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b , then $a^2 + b^2 = c^2$. Substituting $\sqrt{103}$ for a and b in this equation yields $(\sqrt{103})^2 + (\sqrt{103})^2 = c^2$, or $103 + 103 = c^2$, which is equivalent to $206 = c^2$. Taking the positive square root of both sides of this equation yields $\sqrt{206} = c$. Therefore, the length of \overline{AB} is $\sqrt{206}$.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This would be the length of \overline{AB} if the length of \overline{AC} were 103 , not $\sqrt{103}$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID d03e29f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d03e29f1

$$(x - 6)^2 + (y - 3)^2 = 81$$

The graph of the given equation in the xy -plane is a circle. What is the length of the radius of this circle?

- A. 3
- B. 6
- C. 9
- D. 81

ID: d03e29f1 Answer

Correct Answer:

C

Rationale

Choice C is correct. The equation of a circle in the xy -plane can be written as $(x - h)^2 + (y - k)^2 = r^2$, where the center of the circle is (h, k) and the radius of the circle is r . The graph of the given equation, $(x - 6)^2 + (y - 3)^2 = 81$, is a circle in the xy -plane. This equation can be written as $(x - 6)^2 + (y - 3)^2 = 9^2$, where $h = 6$, $k = 3$, and $r = 9$. Therefore, the radius of this circle is 9.

Choice A is incorrect. This is the y -coordinate of the center, not the radius, of the circle defined by the given equation.

Choice B is incorrect. This is the x -coordinate of the center, not the radius, of the circle defined by the given equation.

Choice D is incorrect. This is the value of the radius squared, not the radius, of the circle defined by the given equation.

Question Difficulty:

Easy

Question ID e80d62c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: e80d62c6

The equation $x^2 + (y - 2)^2 = 36$ represents circle A. Circle B is obtained by shifting circle A down 4 units in the xy -plane. Which of the following equations represents circle B?

- A. $x^2 + (y + 2)^2 = 36$
- B. $x^2 + (y - 6)^2 = 36$
- C. $(x - 4)^2 + (y - 2)^2 = 36$
- D. $(x + 4)^2 + (y - 2)^2 = 36$

ID: e80d62c6 Answer

Correct Answer:

A

Rationale

Choice A is correct. The standard form of an equation of a circle in the xy -plane is $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the length of the radius of the circle is r . The equation of circle A, $x^2 + (y - 2)^2 = 36$, can be rewritten as $(x - 0)^2 + (y - 2)^2 = 6^2$. Therefore, the center of circle A is at $(0, 2)$ and the length of the radius of circle A is 6. If circle A is shifted down 4 units, the y -coordinate of its center will decrease by 4; the radius of the circle and the x -coordinate of its center will not change. Therefore, the center of circle B is at $(0, 2 - 4)$, or $(0, -2)$, and its radius is 6. Substituting 0 for h , -2 for k , and 6 for r in the equation $(x - h)^2 + (y - k)^2 = r^2$ yields $(x - 0)^2 + (y - (-2))^2 = (6)^2$, or $x^2 + (y + 2)^2 = 36$. Therefore, the equation $x^2 + (y + 2)^2 = 36$ represents circle B.

Choice B is incorrect. This equation represents a circle obtained by shifting circle A up, rather than down, 4 units.

Choice C is incorrect. This equation represents a circle obtained by shifting circle A right, rather than down, 4 units.

Choice D is incorrect. This equation represents a circle obtained by shifting circle A left, rather than down, 4 units.

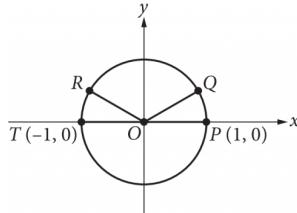
Question Difficulty:

Hard

Question ID 95ba2d09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 95ba2d09



In the xy -plane above, points P , Q , R , and T lie on the circle with center O . The degree measures of angles $\angle POQ$ and $\angle ROT$ are each 30° . What is the radian measure of angle $\angle QOR$?

A. $\frac{5}{6}\pi$

B. $\frac{3}{4}\pi$

C. $\frac{2}{3}\pi$

D. $\frac{1}{3}\pi$

ID: 95ba2d09 Answer

Correct Answer:

C

Rationale

Choice C is correct. Because points T , O , and P all lie on the x -axis, they form a line. Since the angles on a line add up to 180° , and it's given that angles $\angle POQ$ and $\angle ROT$ each measure 30° , it follows that the measure of angle $\angle QOR$ is $180^\circ - 30^\circ - 30^\circ = 120^\circ$.

Since the arc of a complete circle is 360° or 2π radians, a proportion can be set up to convert the measure of angle $\angle QOR$ from

degrees to radians:
$$\frac{360 \text{ degrees}}{2\pi \text{ radians}} = \frac{120 \text{ degrees}}{x \text{ radians}}$$
, where x is the radian measure of angle $\angle QOR$. Multiplying each side of the proportion by $2\pi x$ gives $360x = 240\pi$. Solving for x gives $\frac{240}{360}\pi$, or $\frac{2}{3}\pi$.

Choice A is incorrect and may result from subtracting only angle $\angle POQ$ from 180° to get a value of 150° and then finding the radian measure equivalent to that value. Choice B is incorrect and may result from a calculation error. Choice D is incorrect and may result from calculating the sum of the angle measures, in radians, of angles $\angle POQ$ and $\angle ROT$.

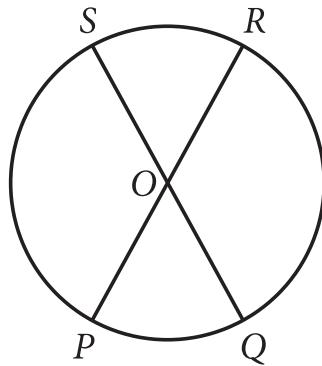
Question Difficulty:

Medium

Question ID 0815a5af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0815a5af



Note: Figure not drawn to scale.

The circle shown has center O , circumference 144π , and diameters \overline{PR} and \overline{QS} . The length of arc PS is twice the length of arc PQ . What is the length of arc QR ?

- A. 24π
- B. 48π
- C. 72π
- D. 96π

ID: 0815a5af Answer

Correct Answer:

B

Rationale

Choice B is correct. Since \overline{PR} and \overline{QS} are diameters of the circle shown, \overline{OS} , \overline{OR} , \overline{OP} , and \overline{OQ} are radii of the circle and are therefore congruent. Since $\angle SOP$ and $\angle ROQ$ are vertical angles, they are congruent. Therefore, arc PS and arc QR are formed by congruent radii and have the same angle measure, so they are congruent arcs. Similarly, $\angle SOR$ and $\angle POQ$ are vertical angles, so they are congruent. Therefore, arc SR and arc PQ are formed by congruent radii and have the same angle measure, so they are congruent arcs. Let x represent the length of arc SR . Since arc SR and arc PQ are congruent arcs, the length of arc PQ can also be represented by x . It's given that the length of arc PS is twice the length of arc PQ . Therefore, the length of arc PS can be represented by the expression $2x$. Since arc PS and arc QR are congruent arcs, the length of arc QR can also be represented by $2x$. This gives the expression $x + x + 2x + 2x$. Since it's given that the circumference is 144π , the expression $x + x + 2x + 2x$ is equal to 144π . Thus $x + x + 2x + 2x = 144\pi$, or $6x = 144\pi$. Dividing both sides of this equation by 6 yields $x = 24\pi$. Therefore, the length of arc QR is $2(24\pi)$, or 48π .

Choice A is incorrect. This is the length of arc PQ , not arc QR .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID fb58c0db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fb58c0db

Points A and B lie on a circle with radius 1, and arc \widehat{AB} has length $\frac{\pi}{3}$. What fraction of the circumference of the circle is the length of arc \widehat{AB} ?

ID: fb58c0db Answer

Rationale

$\frac{1}{6}$

The correct answer is $\frac{1}{6}$. The circumference, C, of a circle is $C = 2\pi r$, where r is the length of the radius of the circle. For the given circle with a radius of 1, the circumference is $C = 2(\pi)(1)$, or $C = 2\pi$. To find what fraction of the circumference the length of arc \widehat{AB} is, divide the length of the arc by the circumference, which gives $\frac{\pi}{3} \div 2\pi$. This division can be represented by $\frac{\pi}{3} \cdot \frac{1}{2\pi} = \frac{1}{6}$. Note that 1/6, .1666, .1667, 0.166, and 0.167 are examples of ways to enter a correct answer.

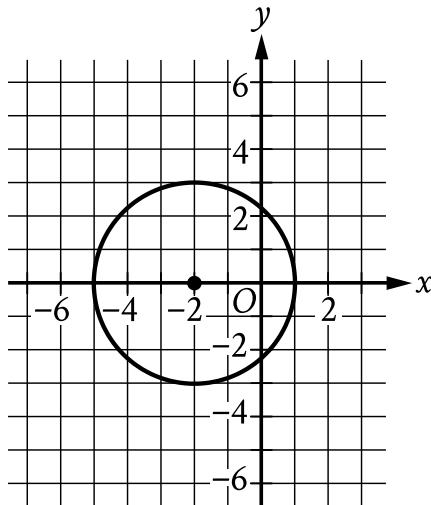
Question Difficulty:

Hard

Question ID a38c0183

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: a38c0183



Circle A (shown) is defined by the equation $(x + 2)^2 + y^2 = 9$. Circle B (not shown) is the result of shifting circle A down 6 units and increasing the radius so that the radius of circle B is 2 times the radius of circle A. Which equation defines circle B?

- A. $(x + 2)^2 + (y + 6)^2 = (4)(9)$
- B. $2(x + 2)^2 + 2(y + 6)^2 = 9$
- C. $(x + 2)^2 + (y - 6)^2 = (4)(9)$
- D. $2(x + 2)^2 + 2(y - 6)^2 = 9$

ID: a38c0183 Answer

Correct Answer:

A

Rationale

Choice A is correct. According to the graph, the center of circle A has coordinates $(-2, 0)$, and the radius of circle A is 3. It's given that circle B is the result of shifting circle A down 6 units and increasing the radius so that the radius of circle B is 2 times the radius of circle A. It follows that the center of circle B is 6 units below the center of circle A. The point that's 6 units below $(-2, 0)$ has the same x-coordinate as $(-2, 0)$ and has a y-coordinate that is 6 less than the y-coordinate of $(-2, 0)$. Therefore, the coordinates of the center of circle B are $(-2, 0 - 6)$, or $(-2, -6)$. Since the radius of circle B is 2 times the radius of circle A, the radius of circle B is $(2)(3)$. A circle in the xy-plane can be defined by an equation of the form $(x - h)^2 + (y - k)^2 = r^2$, where the coordinates of the center of the circle are (h, k) and the radius of the circle is r . Substituting -2 for h , -6 for k , and $(2)(3)$ for r in this equation yields $(x - (-2))^2 + (y - (-6))^2 = ((2)(3))^2$, which is equivalent to $(x + 2)^2 + (y + 6)^2 = (2)^2(3)^2$, or $(x + 2)^2 + (y + 6)^2 = (4)(9)$. Therefore, the equation $(x + 2)^2 + (y + 6)^2 = (4)(9)$ defines circle B.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This equation defines a circle that's the result of shifting circle A up, not down, by 6 units and increasing the radius.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID acd30391

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Circles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: acd30391

A circle in the xy -plane has equation $(x + 3)^2 + (y - 1)^2 = 25$. Which of the following points does NOT lie in the interior of the circle?

- A. $(-7, 3)$
- B. $(-3, 1)$
- C. $(0, 0)$
- D. $(3, 2)$

ID: acd30391 Answer

Correct Answer:

D

Rationale

Choice D is correct. The circle with equation $(x + 3)^2 + (y - 1)^2 = 25$ has center $(-3, 1)$ and radius 5. For a point to be inside of the circle, the distance from that point to the center must be less than the radius, 5. The distance between $(3, 2)$ and $(-3, 1)$ is $\sqrt{(-3 - 3)^2 + (1 - 2)^2} = \sqrt{(-6)^2 + (-1)^2} = \sqrt{37}$, which is greater than 5. Therefore, $(3, 2)$ does NOT lie in the interior of the circle.

Choice A is incorrect. The distance between $(-7, 3)$ and $(-3, 1)$ is $\sqrt{(-7 + 3)^2 + (3 - 1)^2} = \sqrt{(-4)^2 + (2)^2} = \sqrt{20}$, which is less than 5, and therefore $(-7, 3)$ lies in the interior of the circle. Choice B is incorrect because it is the center of the circle. Choice C is incorrect because the distance between $(0, 0)$ and $(-3, 1)$ is $\sqrt{(0 + 3)^2 + (0 - 1)^2} = \sqrt{(3)^2 + (1)^2} = \sqrt{8}$, which is less than 5, and therefore $(0, 0)$ in the interior of the circle.

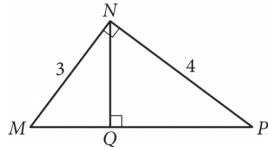
Question Difficulty:

Hard

Question ID 740bf79f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 740bf79f



In the figure above, what is the length of NQ ?

- A. 2.2
- B. 2.3
- C. 2.4
- D. 2.5

ID: 740bf79f Answer

Correct Answer:

C

Rationale

Choice C is correct. First, \overline{MP} is the hypotenuse of right $\triangle MNP$, whose legs have lengths 3 and 4. Therefore, $(MP)^2 = 3^2 + 4^2$, so $(MP)^2 = 25$ and $MP = 5$. Second, because $\angle MNP$ corresponds to $\angle NQP$ and because $\angle MPN$ corresponds to $\angle NPQ$, $\triangle MNP$ is similar to $\triangle NQP$. The ratio of corresponding sides of similar triangles is constant, so $\frac{NQ}{MN} = \frac{NP}{MP}$. Since $MP = 5$ and it's given that $MN = 3$ and $NP = 4$, $\frac{NQ}{3} = \frac{4}{5}$. Solving for NQ results in $NQ = \frac{12}{5}$, or 2.4.

Choices A, B, and D are incorrect and may result from setting up incorrect ratios.

Question Difficulty:

Hard

Question ID 3b225698

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3b225698

Triangle XYZ is similar to triangle RST such that X , Y , and Z correspond to R , S , and T , respectively. The measure of $\angle Z$ is 20° and $2XY = RS$. What is the measure of $\angle T$?

- A. 2°
- B. 10°
- C. 20°
- D. 40°

ID: 3b225698 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that triangle XYZ is similar to triangle RST , such that X , Y , and Z correspond to R , S , and T , respectively. Since corresponding angles of similar triangles are congruent, it follows that the measure of $\angle Z$ is congruent to the measure of $\angle T$. It's given that the measure of $\angle Z$ is 20° . Therefore, the measure of $\angle T$ is 20° .

Choice A is incorrect and may result from a conceptual error.

Choice B is incorrect. This is half the measure of $\angle Z$.

Choice D is incorrect. This is twice the measure of $\angle Z$.

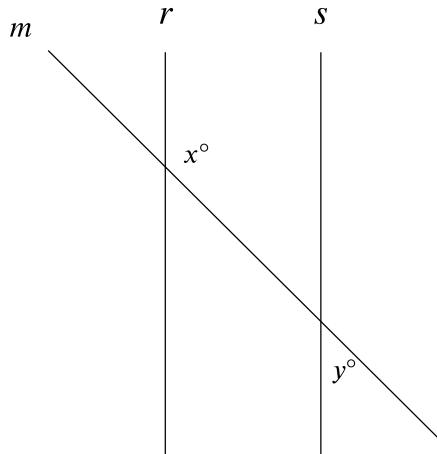
Question Difficulty:

Hard

Question ID a4c05a1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a4c05a1b



Note: Figure not drawn to scale.

In the figure shown, lines r and s are parallel, and line m intersects both lines. If $y < 65$, which of the following must be true?

- A. $x < 115$
- B. $x > 115$
- C. $x + y < 180$
- D. $x + y > 180$

ID: a4c05a1b Answer

Correct Answer:

B

Rationale

Choice B is correct. In the figure shown, the angle measuring y° is congruent to its vertical angle formed by lines s and m , so the measure of the vertical angle is also y° . The vertical angle forms a same-side interior angle pair with the angle measuring x° . It's given that lines r and s are parallel. Therefore, same-side interior angles in the figure are supplementary, which means the sum of the measure of the vertical angle and the measure of the angle measuring x° is 180° , or $x + y = 180$. Subtracting x from both sides of this equation yields $y = 180 - x$. Substituting $180 - x$ for y in the inequality $y < 65$ yields $180 - x < 65$. Adding x to both sides of this inequality yields $180 < 65 + x$. Subtracting 65 from both sides of this inequality yields $115 < x$, or $x > 115$. Thus, if $y < 65$, it must be true that $x > 115$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. $x + y$ must be equal to, not less than, 180 .

Choice D is incorrect. $x + y$ must be equal to, not greater than, 180 .

Question Difficulty:

Medium

Question ID d3fe472f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d3fe472f

Triangle ABC is similar to triangle XYZ , such that A , B , and C correspond to X , Y , and Z respectively. The length of each side of triangle XYZ is 2 times the length of its corresponding side in triangle ABC . The measure of side AB is 16. What is the measure of side XY ?

- A. 14
- B. 16
- C. 18
- D. 32

ID: d3fe472f Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that triangle ABC is similar to triangle XYZ , such that A , B , and C correspond to X , Y , and Z , respectively. Therefore, side AB corresponds to side XY . Since the length of each side of triangle XYZ is 2 times the length of its corresponding side in triangle ABC , it follows that the measure of side XY is 2 times the measure of side AB . Thus, since the measure of side AB is 16, then the measure of side XY is $2(16)$, or 32.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the measure of side AB , not side XY .

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID f9d40000

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: f9d40000

In $\triangle XYZ$, the measure of $\angle X$ is 23° and the measure of $\angle Y$ is 66° . What is the measure of $\angle Z$?

- A. 43°
- B. 89°
- C. 91°
- D. 179°

ID: f9d40000 Answer

Correct Answer:

C

Rationale

Choice C is correct. The triangle angle sum theorem states that the sum of the measures of the interior angles of a triangle is 180° . It's given that in $\triangle XYZ$, the measure of $\angle X$ is 23° and the measure of $\angle Y$ is 66° . It follows that the measure of $\angle Z$ is $(180 - 23 - 66)^\circ$, or 91° .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the sum of the measures of $\angle X$ and $\angle Y$, not the measure of $\angle Z$.

Choice D is incorrect and may result from conceptual or calculation errors.

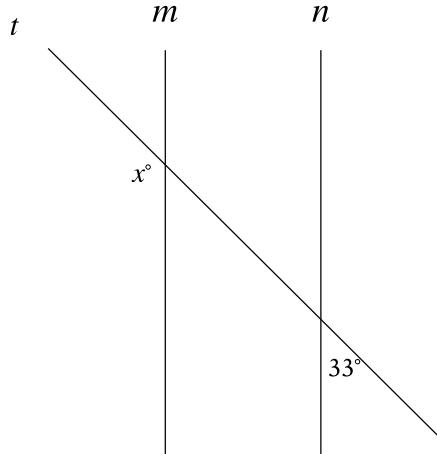
Question Difficulty:

Easy

Question ID 0d3f51dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0d3f51dc



Note: Figure not drawn to scale.

In the figure, line m is parallel to line n , and line t intersects both lines. What is the value of x ?

- A. 33
- B. 57
- C. 123
- D. 147

ID: 0d3f51dc Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that line m is parallel to line n , and line t intersects both lines. It follows that line t is a transversal. When two lines are parallel and intersected by a transversal, exterior angles on the same side of the transversal are supplementary. Thus, $x + 33 = 180$. Subtracting 33 from both sides of this equation yields $x = 147$. Therefore, the value of x is 147.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID fd8745fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: fd8745fc

In triangle JKL , the measures of $\angle K$ and $\angle L$ are each 48° . What is the measure of $\angle J$, in degrees? (Disregard the degree symbol when entering your answer.)

ID: fd8745fc Answer

Correct Answer:

84

Rationale

The correct answer is **84**. The sum of the measures of the interior angles of a triangle is 180° . It's given that in triangle JKL , the measures of $\angle K$ and $\angle L$ are each 48° . Adding the measures, in degrees, of $\angle K$ and $\angle L$ gives $48 + 48$, or **96**. Therefore, the measure of $\angle J$, in degrees, is $180 - 96$, or **84**.

Question Difficulty:

Medium

Question ID b434e103

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: b434e103

In $\triangle RST$, the measure of $\angle R$ is 63° . Which of the following could be the measure, in degrees, of $\angle S$?

- A. 116
- B. 118
- C. 126
- D. 180

ID: b434e103 Answer

Correct Answer:

A

Rationale

Choice A is correct. The sum of the measures of the angles of a triangle is 180° . Therefore, the sum of the measures of $\angle R$, $\angle S$, and $\angle T$ is 180° . It's given that the measure of $\angle R$ is 63° . It follows that the sum of the measures of $\angle S$ and $\angle T$ is $(180 - 63)^\circ$, or 117° . Therefore, the measure of $\angle S$, in degrees, must be less than 117 . Of the given choices, only 116 is less than 117. Thus, the measure, in degrees, of $\angle S$ could be 116.

Choice B is incorrect. If the measure of $\angle S$ is 118° , then the sum of the measures of the angles of the triangle is greater than, not equal to, 180° .

Choice C is incorrect. If the measure of $\angle S$ is 126° , then the sum of the measures of the angles of the triangle is greater than, not equal to, 180° .

Choice D is incorrect. This is the sum of the measures of the angles of a triangle, in degrees.

Question Difficulty:

Easy

Question ID 2085e10e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2085e10e

In triangle DEF , the measure of angle D is 47° and the measure of angle E is 97° . In triangle RST , the measure of angle R is 47° and the measure of angle S is 97° . Which of the following additional pieces of information is needed to determine whether triangle DEF is similar to triangle RST ?

- A. The measure of angle F
- B. The measure of angle T
- C. The measure of angle F and the measure of angle T
- D. No additional information is needed.

ID: 2085e10e Answer

Correct Answer:

D

Rationale

Choice D is correct. When two angles of one triangle are congruent to two angles of another triangle, the triangles are similar. It's given that in triangle DEF , the measure of angle D is 47° and the measure of angle E is 97° . It's also given that in triangle RST , the measure of angle R is 47° and the measure of angle S is 97° . It follows that angle D is congruent to angle R and that angle E is congruent to angle S . Therefore, triangle DEF is similar to triangle RST and no additional information is needed.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID c7bed21d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c7bed21d

Quadrilateral $P'Q'R'S'$ is similar to quadrilateral $PQRS$, where P, Q, R , and S correspond to P', Q', R' , and S' , respectively. The measure of angle P is 30° , the measure of angle Q is 50° , and the measure of angle R is 70° . The length of each side of $P'Q'R'S'$ is 3 times the length of each corresponding side of $PQRS$. What is the measure of angle P' ?

- A. 10°
- B. 30°
- C. 40°
- D. 90°

ID: c7bed21d Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that quadrilateral $P'Q'R'S'$ is similar to quadrilateral $PQRS$, where P, Q, R , and S correspond to P', Q', R' , and S' , respectively. Since corresponding angles of similar quadrilaterals are congruent, it follows that the measure of angle P is equal to the measure of angle P' . It's given that the measure of angle P is 30° . Therefore, the measure of angle P' is 30° .

Choice A is incorrect. This is $\frac{1}{3}$ the measure of angle P' .

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is 3 times the measure of angle P' .

Question Difficulty:

Medium

Question ID fecc446d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fecc446d

A line intersects two parallel lines, forming four acute angles and four obtuse angles. The measure of one of these eight angles is $(7x - 250)^\circ$. The sum of the measures of four of the eight angles is k° . Which of the following could NOT be equivalent to k , for all values of x ?

- A. $-14x + 1,540$
- B. $14x - 320$
- C. $-28x + 1,720$
- D. 360

ID: fecc446d Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a line intersects two parallel lines, forming four acute angles and four obtuse angles. Since there are two parallel lines intersected by a transversal, all four acute angles have the same measure and all four obtuse angles have the same measure. Additionally, each acute angle is supplementary to each obtuse angle. It's given that the measure of one of these eight angles is $(7x - 250)^\circ$. It follows that a supplementary angle has measure $(180 - (7x - 250))^\circ$, or $(-7x + 430)^\circ$. It's also given that the sum of the measures of four of the eight angles is k° . It follows that the possible values of k are $4(7x - 250)$; $(7x - 250) + 3(-7x + 430)$; $2(7x - 250) + 2(-7x + 430)$; $3(7x - 250) + (-7x + 430)$; and $4(-7x + 430)$. These values are equivalent to $28x - 1,000$; $-14x + 1,040$; 360 ; $14x - 320$; and $-28x + 1,720$, respectively. It follows that of the given choices, only $-14x + 1,540$ could NOT be equivalent to k , for all values of x .

Choice B is incorrect. This is the sum of three angles with measure $(7x - 250)^\circ$ and one angle with measure $(-7x + 430)^\circ$.

Choice C is incorrect. This is the sum of four angles with measure $(-7x + 430)^\circ$.

Choice D is incorrect. This is the sum of two angles with measure $(7x - 250)^\circ$ and two angles with measure $(-7x + 430)^\circ$.

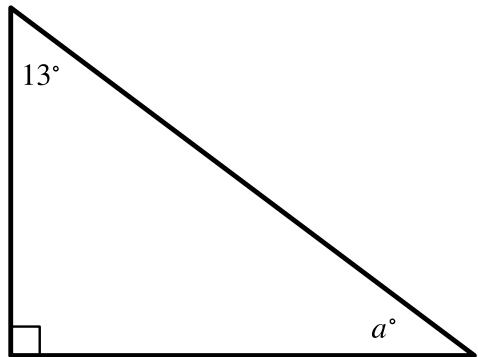
Question Difficulty:

Hard

Question ID 69f4bbdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 69f4bbdc



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of a ?

- A. 13
- B. 77
- C. 90
- D. 103

ID: 69f4bbdc Answer

Correct Answer:

B

Rationale

Choice B is correct. The triangle shown is a right triangle, where the interior angle shown with a right angle symbol has a measure of 90° . It's shown that the other two interior angles measure 13° and a° . The sum of the measures of the interior angles of a triangle is 180° ; therefore, $90 + 13 + a = 180$. Combining like terms on the left-hand side of this equation yields $103 + a = 180$. Subtracting 103 from both sides of this equation yields $a = 77$.

Choice A is incorrect. This is the measure, in degrees, of the other acute interior angle of the right triangle, not the value of a .

Choice C is incorrect. This is the measure, in degrees, of the right angle of the right triangle, not the value of a .

Choice D is incorrect. This is the sum of the measures, in degrees, of the other two interior angles of the right triangle, not the value of a .

Question Difficulty:

Easy

Question ID 3563d76d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 3563d76d

At a certain time and day, the Washington Monument in Washington, DC, casts a shadow that is 300 feet long. At the same time, a nearby cherry tree casts a shadow that is 16 feet long. Given that the Washington Monument is approximately 555 feet tall, which of the following is closest to the height, in feet, of the cherry tree?

- A. 10
- B. 20
- C. 30
- D. 35

ID: 3563d76d Answer

Rationale

Choice C is correct. There is a proportional relationship between the height of an object and the length of its shadow. Let c represent the height, in feet, of the cherry tree. The given relationship can be expressed by the proportion $\frac{555}{300} = \frac{c}{16}$. Multiplying both sides of this equation by 16 yields $c = 29.6$. This height is closest to the value given in choice C, 30.

Choices A, B, and D are incorrect and may result from calculation errors.

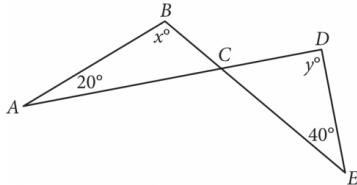
Question Difficulty:

Easy

Question ID dfc420b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: dfc420b2



Note: Figure not drawn to scale.

In the figure above, \overline{AD} intersects \overline{BE} at C . If

$x = 100$, what is the value of y ?

- A. 100
- B. 90
- C. 80
- D. 60

ID: dfc420b2 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that $x = 100$; therefore, substituting 100 for x in triangle ABC gives two known angle measures for this triangle. The sum of the measures of the interior angles of any triangle equals 180° . Subtracting the two known angle measures of triangle ABC from 180° gives the third angle measure: $180^\circ - 100^\circ - 20^\circ = 60^\circ$. This is the measure of angle BCA. Since vertical angles are congruent, the measure of angle DCE is also 60° . Subtracting the two known angle measures of triangle CDE from 180° gives the third angle measure: $180^\circ - 60^\circ - 40^\circ = 80^\circ$. Therefore, the value of y is 80.

Choice A is incorrect and may result from a calculation error. Choice B is incorrect and may result from classifying angle CDE as a right angle. Choice D is incorrect and may result from finding the measure of angle BCA or DCE instead of the measure of angle CDE.

Question Difficulty:

Easy

Question ID 901e3285

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 901e3285

In triangle ABC , the measure of angle A is 50° . If triangle ABC is isosceles, which of the following is NOT a possible measure of angle B ?

- A. 50°
- B. 65°
- C. 80°
- D. 100°

ID: 901e3285 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sum of the three interior angles in a triangle is 180° . It's given that angle A measures 50° . If angle B measured 100° , the measure of angle C would be $180^\circ - (50^\circ + 100^\circ) = 30^\circ$. Thus, the measures of the angles in the triangle would be 50° , 100° , and 30° . However, an isosceles triangle has two angles of equal measure. Therefore, angle B can't measure 100° .

Choice A is incorrect. If angle B has measure 50° , then angle C would measure $180^\circ - (50^\circ + 50^\circ) = 80^\circ$, and 50° , 50° , and 80° could be the angle measures of an isosceles triangle. Choice B is incorrect. If angle B has measure 65° , then angle C would measure $180^\circ - (65^\circ + 50^\circ) = 65^\circ$, and 50° , 65° , and 65° could be the angle measures of an isosceles triangle. Choice C is incorrect. If angle B has measure 80° , then angle C would measure $180^\circ - (80^\circ + 50^\circ) = 50^\circ$, and 50° , 80° , and 50° could be the angle measures of an isosceles triangle.

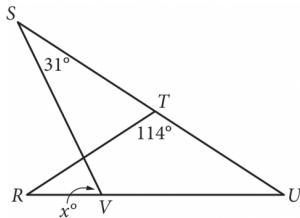
Question Difficulty:

Medium

Question ID bd7f6e30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: bd7f6e30



In the figure above, $RT = TU$.

What is the value of x ?

- A. 72
- B. 66
- C. 64
- D. 58

ID: bd7f6e30 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since $RT = TU$, it follows that $\triangle RTU$ is an isosceles triangle with base RU. Therefore, $\angle TRU$ and $\angle TUR$ are the base angles of an isosceles triangle and are congruent. Let the measures of both $\angle TRU$ and $\angle TUR$ be t° . According to the triangle sum theorem, the sum of the measures of the three angles of a triangle is 180° . Therefore, $114^\circ + 2t^\circ = 180^\circ$, so $t = 33$.

Note that $\angle TUR$ is the same angle as $\angle SUV$. Thus, the measure of $\angle SUV$ is 33° . According to the triangle exterior angle theorem, an external angle of a triangle is equal to the sum of the opposite interior angles. Therefore, x° is equal to the sum of the measures of $\angle VSU$ and $\angle SUV$; that is, $31^\circ + 33^\circ = 64^\circ$. Thus, the value of x is 64.

Choice B is incorrect. This is the measure of $\angle STR$, but $\angle STR$ is not congruent to $\angle SVR$. Choices A and D are incorrect and may result from a calculation error.

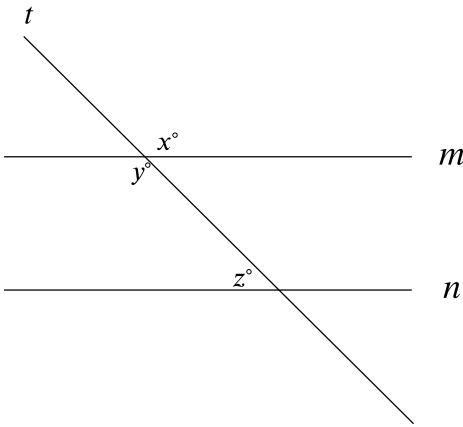
Question Difficulty:

Hard

Question ID 2adbf1b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2adbf1b1



Note: Figure not drawn to scale.

In the figure, lines m and n are parallel. If $x = 6k + 13$ and $y = 8k - 29$, what is the value of z ?

- A. 3
- B. 21
- C. 41
- D. 139

ID: 2adbf1b1 Answer

Correct Answer:

C

Rationale

Choice C is correct. Vertical angles, which are angles that are opposite each other when two lines intersect, are congruent. The figure shows that lines t and m intersect. It follows that the angle with measure x° and the angle with measure y° are vertical angles, so $x = y$. It's given that $x = 6k + 13$ and $y = 8k - 29$. Substituting $6k + 13$ for x and $8k - 29$ for y in the equation $x = y$ yields $6k + 13 = 8k - 29$. Subtracting $6k$ from both sides of this equation yields $13 = 2k - 29$. Adding 29 to both sides of this equation yields $42 = 2k$, or $2k = 42$. Dividing both sides of this equation by 2 yields $k = 21$. It's given that lines m and n are parallel, and the figure shows that lines m and n are intersected by a transversal, line t . If two parallel lines are intersected by a transversal, then the same-side interior angles are supplementary. It follows that the same-side interior angles with measures y° and z° are supplementary, so $y + z = 180$. Substituting $8k - 29$ for y in this equation yields $8k - 29 + z = 180$. Substituting 21 for k in this equation yields $8(21) - 29 + z = 180$, or $139 + z = 180$. Subtracting 139 from both sides of this equation yields $z = 41$. Therefore, the value of z is 41 .

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of k , not z .

Choice D is incorrect. This is the value of x or y , not z .

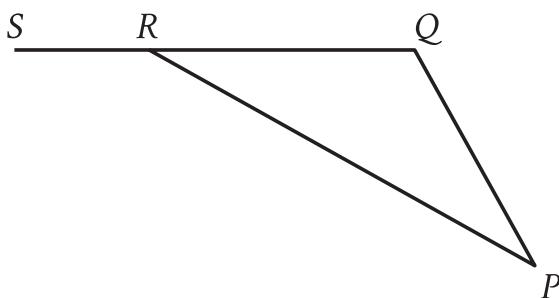
Question Difficulty:

Medium

Question ID 014edcb7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 014edcb7



Note: Figure not drawn to scale.

In triangle PQR , \overline{QR} is extended to point S . The measure of $\angle PQR$ is 132° , and the measure of $\angle PRS$ is 163° . What is the measure of $\angle QPR$?

- A. 48°
- B. 31°
- C. 24°
- D. 17°

ID: 014edcb7 Answer

Correct Answer:

B

Rationale

Choice B is correct. In the figure shown, since \overline{QS} is a line segment, the sum of the measures of $\angle PRS$ and $\angle PRQ$ is 180° . It's given that the measure of $\angle PRS$ is 163° . Thus, the measure of $\angle PRQ$ is $(180 - 163)^\circ$, or 17° . The sum of the measures of the interior angles of a triangle is 180° . It's given that the measure of $\angle PQR$ is 132° . Therefore, the measure of $\angle QPR$ is $(180 - 17 - 132)^\circ$, or 31° .

Choice A is incorrect. This is the measure of the supplement of $\angle PQR$, not the measure of $\angle QPR$.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the measure of $\angle PRQ$, not the measure of $\angle QPR$.

Question Difficulty:

Medium

Question ID 322a6dfe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 322a6dfe

Quadrilaterals $PQRS$ and $WXYZ$ are similar, where P, Q , and R correspond to W, X , and Y , respectively. The measure of $\angle S$ is 135° , $PS = 45$, and $WZ = 9$. What is the measure of $\angle Z$?

- A. 5°
- B. 27°
- C. 45°
- D. 135°

ID: 322a6dfe Answer

Correct Answer:

D

Rationale

Choice D is correct. Corresponding angles in similar figures have equal measure. It's given that quadrilaterals $PQRS$ and $WXYZ$ are similar and that P, Q , and R correspond to W, X , and Y . It follows that $\angle S$ corresponds to $\angle Z$. It's also given that the measure of $\angle S$ is 135° . Therefore, the measure of $\angle Z$ is 135° .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect. This is the supplement of the measure of $\angle Z$, not the measure of $\angle Z$.

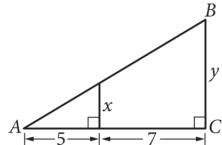
Question Difficulty:

Hard

Question ID eeb4143c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: eeb4143c



Note: Figure not drawn to scale.

The area of triangle ABC above is at least 48 but no more than 60. If y is an integer, what is one possible value of x?

ID: eeb4143c Answer

Rationale

The correct answer is either $\frac{10}{3}$, $\frac{15}{4}$, or $\frac{25}{6}$. The area of triangle ABC can be expressed as $\frac{1}{2}(5+7)y$ or $6y$. It's given that the area of triangle ABC is at least 48 but no more than 60. It follows that $48 \leq 6y \leq 60$. Dividing by 6 to isolate y in this compound inequality yields $8 \leq y \leq 10$. Since y is an integer, $y = 8, 9$, or 10 . In the given figure, the two right triangles shown are similar because they have two pairs of congruent angles: their respective right angles and angle A. Therefore, the following proportion is true: $\frac{x}{y} = \frac{5}{12}$. Substituting 8 for y in the proportion results in $\frac{x}{8} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{10}{3}$.

Substituting 9 for y in the proportion results in $\frac{x}{9} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{15}{4}$. Substituting 10 for y in the proportion results in $\frac{x}{10} = \frac{5}{12}$. Cross multiplying and solving for x yields $\frac{25}{6}$. Note that $10/3$, $15/4$, $25/6$, 3.333 , 3.75 , 4.166 , and 4.167 are examples of ways to enter a correct answer.

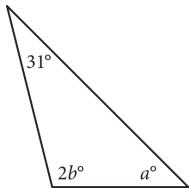
Question Difficulty:

Hard

Question ID 410bdb6e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 410bdb6e6



In the triangle above, $a = 45$. What is the value of b ?

- A. 52
- B. 59
- C. 76
- D. 104

ID: 410bdb6e6 Answer

Correct Answer:

A

Rationale

Choice A is correct. The sum of the measures of the three interior angles of a triangle is 180° . Therefore, $31 + 2b + a = 180$. Since it's given that $a = 45$, it follows that $31 + 2b + 45 = 180$, or $2b = 104$. Dividing both sides of this equation by 2 yields $b = 52$.

Choice B is incorrect and may result from a calculation error. Choice C is incorrect. This is the value of $a + 31$. Choice D is incorrect. This is the value of $2b$.

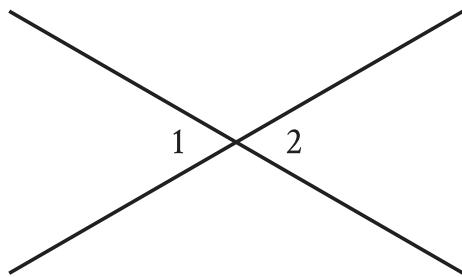
Question Difficulty:

Easy

Question ID a456f28c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a456f28c



Note: Figure not drawn to scale.

In the figure, two lines intersect at a point. Angle 1 and angle 2 are vertical angles. The measure of angle 1 is 72° . What is the measure of angle 2?

- A. 72°
- B. 108°
- C. 144°
- D. 288°

ID: a456f28c Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that angle 1 and angle 2 are vertical angles, and the measure of angle 1 is 72° . Vertical angles have equal measures. Therefore, the measure of angle 2 is 72° .

Choice B is incorrect. This is the measure of an angle that is supplementary, not congruent, to angle 1.

Choice C is incorrect. This is the sum of the measures of angle 1 and angle 2.

Choice D is incorrect and may result from conceptual or calculation errors.

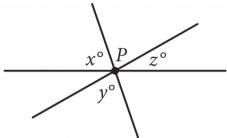
Question Difficulty:

Easy

Question ID 087cdcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 087cdcf



Note: Figure not drawn to scale.

In the figure, three lines intersect at point P. If $x = 65$ and $y = 75$, what is the value of z ?

- A. 140
- B. 80
- C. 40
- D. 20

ID: 087cdcf Answer

Correct Answer:

C

Rationale

Choice C is correct. The angle that is shown as lying between the y° angle and the z° angle is a vertical angle with the x° angle. Since vertical angles are congruent and $x = 65$, the angle between the y° angle and the z° angle measures 65° . Since the 65° angle, the y° angle, and the z° angle are adjacent and form a straight angle, it follows that the sum of the measures of these three angles is 180° , which is represented by the equation $65^\circ + y^\circ + z^\circ = 180^\circ$. It's given that $y = 75$. Substituting 75 for y yields $65^\circ + 75^\circ + z^\circ = 180^\circ$, which can be rewritten as $140^\circ + z^\circ = 180^\circ$. Subtracting 140° from both sides of this equation yields $z^\circ = 40^\circ$. Therefore, $z = 40$.

Choice A is incorrect and may result from finding the value of $x + y$ rather than z . Choices B and D are incorrect and may result from conceptual or computational errors.

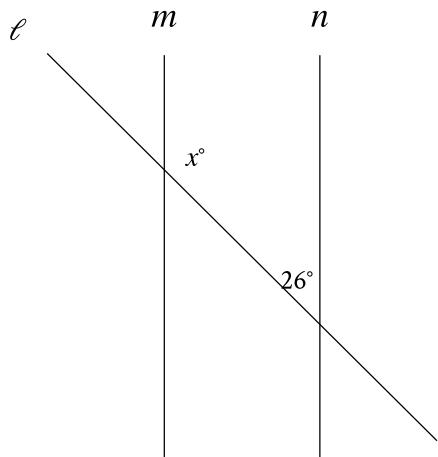
Question Difficulty:

Easy

Question ID afa3c48b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: afa3c48b



Note: Figure not drawn to scale.

In the figure shown, line m is parallel to line n . What is the value of x ?

- A. 13
- B. 26
- C. 52
- D. 154

ID: afa3c48b Answer

Correct Answer:

D

Rationale

Choice D is correct. The sum of consecutive interior angles between two parallel lines and on the same side of the transversal is 180 degrees. Since it's given that line m is parallel to line n , it follows that $x + 26 = 180$. Subtracting 26 from both sides of this equation yields 154. Therefore, the value of x is 154.

Choice A is incorrect. This is half of the given angle measure.

Choice B is incorrect. This is the value of the given angle measure.

Choice C is incorrect. This is twice the value of the given angle measure.

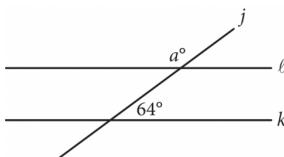
Question Difficulty:

Easy

Question ID 992f4e93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 992f4e93



Note: Figure not drawn to scale.

In the figure above, lines ℓ and k are parallel.

What is the value of a ?

- A. 26
- B. 64
- C. 116
- D. 154

ID: 992f4e93 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since lines ℓ and k are parallel, corresponding angles formed by the intersection of line j with lines ℓ and k are congruent. Therefore, the angle with measure a° must be the supplement of the angle with measure 64° . The sum of two supplementary angles is 180° , so $a = 180 - 64 = 116$.

Choice A is incorrect and likely results from thinking the angle with measure a° is the complement of the angle with measure 64° . Choice B is incorrect and likely results from thinking the angle with measure a° is congruent to the angle with measure 64° . Choice D is incorrect and likely results from a conceptual or computational error.

Question Difficulty:

Easy

Question ID f1747a6a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: f1747a6a

In triangle ABC , the measure of angle B is 52° and the measure of angle C is 17° . What is the measure of angle A ?

- A. 21°
- B. 35°
- C. 69°
- D. 111°

ID: f1747a6a Answer

Correct Answer:

D

Rationale

Choice D is correct. The sum of the angle measures of a triangle is 180° . Adding the measures of angles B and C gives $52 + 17 = 69^\circ$. Therefore, the measure of angle A is $180 - 69 = 111^\circ$.

Choice A is incorrect and may result from subtracting the sum of the measures of angles B and C from 90° , instead of from 180° .

Choice B is incorrect and may result from subtracting the measure of angle C from the measure of angle B .

Choice C is incorrect and may result from adding the measures of angles B and C but not subtracting the result from 180° .

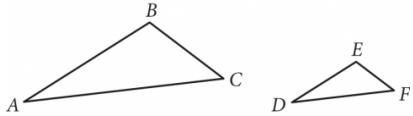
Question Difficulty:

Easy

Question ID 1c3d613c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1c3d613c



Note: Figures not drawn to scale.

Triangle ABC and triangle DEF are shown. The relationship between the side lengths of the two triangles is such that $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = 3$. If the measure of angle BAC is 20° , what is the measure, in degrees, of angle EDF ? (Disregard the degree symbol when gridding your answer.)

ID: 1c3d613c Answer

Rationale

The correct answer is 20. By the equality given, the three pairs of corresponding sides of the two triangles are in the same proportion. By the side-side-side (SSS) similarity theorem, triangle ABC is similar to triangle DEF . In similar triangles, the measures of corresponding angles are congruent. Since angle BAC corresponds to angle EDF , these two angles are congruent and their measures are equal. It's given that the measure of angle BAC is 20° , so the measure of angle EDF is also 20° .

Question Difficulty:

Medium

Question ID 48fb6483

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 48fb6483

In triangle XZY , angle Y is a right angle, point P lies on \overline{XZ} , and point Q lies on \overline{YZ} such that \overline{PQ} is parallel to \overline{XY} . If the measure of angle XZY is 63° , what is the measure, in degrees, of angle XPQ ?

ID: 48fb6483 Answer

Correct Answer:

153

Rationale

The correct answer is 153. Since it's given that \overline{PQ} is parallel to \overline{XY} and angle Y is a right angle, angle ZQP is also a right angle. Angle ZPQ is complementary to angle XZY , which means its measure, in degrees, is $90 - 63$, or 27. Since angle XPQ is supplementary to angle ZPQ , its measure, in degrees, is $180 - 27$, or 153.

Question Difficulty:

Hard

Question ID 010243e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 010243e6

Triangles PQR and LMN are graphed in the xy -plane. Triangle PQR has vertices P , Q , and R at $(4, 5)$, $(4, 7)$, and $(6, 5)$, respectively. Triangle LMN has vertices L , M , and N at $(4, 5)$, $(4, 7 + k)$, and $(6 + k, 5)$, respectively, where k is a positive constant. If the measure of $\angle Q$ is t° , what is the measure of $\angle N$?

- A. $(90 - (t - k))^\circ$
- B. $(90 - (t + k))^\circ$
- C. $(90 - t)^\circ$
- D. $(90 + k)^\circ$

ID: 010243e6 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since $P = (4, 5)$ and $Q = (4, 7)$, side PQ is parallel to the y -axis and has a length of 2. Since $P = (4, 5)$ and $R = (6, 5)$, side PR is parallel to the x -axis and has a length of 2. Therefore, triangle PQR is a right isosceles triangle, where $\angle P$ has measure 90° and $\angle Q$ and $\angle R$ each have measure 45° . It follows that if the measure of $\angle Q$ is t° , then $t = 45$. Since $L = (4, 5)$ and $M = (4, 7 + k)$, side LM is parallel to the y -axis and has a length of $k + 2$. Since $L = (4, 5)$ and $N = (6 + k, 5)$, side LN is parallel to the x -axis and has a length of $k + 2$. Therefore, triangle LMN is a right isosceles triangle, where $\angle L$ has measure 90° and $\angle M$ and $\angle N$ each have measure 45° . Of the given choices, only $(90 - t)^\circ$ is equal to 45° , so the measure of $\angle N$ is $(90 - t)^\circ$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

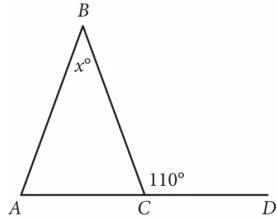
Question Difficulty:

Hard

Question ID 5733ce30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Lines, angles, and triangles	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5733ce30



In the given figure, \overline{AC} extends to point D. If the measure of $\angle BAC$ is equal to the measure of $\angle BCA$, what is the value of x?

- A. 110
- B. 70
- C. 55
- D. 40

ID: 5733ce30 Answer

Correct Answer:

D

Rationale

Choice D is correct. Since $\angle BCD$ and $\angle BCA$ form a linear pair of angles, their measures sum to 180° . It's given that the measure of $\angle BCD$ is 110° . Therefore, $110^\circ + \angle BCA = 180^\circ$. Subtracting 110° from both sides of this equation gives the measure of $\angle BCA$ as 70° . It's also given that the measure of $\angle BAC$ is equal to the measure of $\angle BCA$. Thus, the measure of $\angle BAC$ is also 70° . The measures of the interior angles of a triangle sum to 180° . Thus, $70^\circ + 70^\circ + x^\circ = 180^\circ$. Combining like terms on the left-hand side of this equation yields $140^\circ + x^\circ = 180^\circ$. Subtracting 140° from both sides of this equation yields $x^\circ = 40^\circ$, or $x = 40$.

Choice A is incorrect. This is the value of the measure of $\angle BCD$. Choice B is incorrect. This is the value of the measure of each of the other two interior angles, $\angle BCA$ and $\angle BAC$. Choice C is incorrect and may result from an error made when identifying the relationship between the exterior angle of a triangle and the interior angles of the triangle.

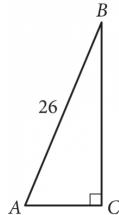
Question Difficulty:

Easy

Question ID bd87bc09

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: bd87bc09



Triangle ABC above is a right triangle, and $\sin(B) = \frac{5}{13}$.

What is the length of side \overline{BC} ?

ID: bd87bc09 Answer

Rationale

The correct answer is 24. The sine of an acute angle in a right triangle is equal to the ratio of the length of the side opposite the angle to the length of the hypotenuse. In the triangle shown, the sine of angle B, or $\sin(B)$, is equal to the ratio of the length of side

\overline{AC} to the length of side \overline{AB} . It's given that the length of side \overline{AB} is 26 and that $\sin(B) = \frac{5}{13}$. Therefore, $\frac{5}{13} = \frac{AC}{26}$.

Multiplying both sides of this equation by 26 yields $AC = 10$.

By the Pythagorean Theorem, the relationship between the lengths of the sides of triangle ABC is as follows: $26^2 = 10^2 + BC^2$, or $676 = 100 + BC^2$. Subtracting 100 from both sides of $676 = 100 + BC^2$ yields $576 = BC^2$. Taking the square root of both sides of $576 = BC^2$ yields $24 = BC$.

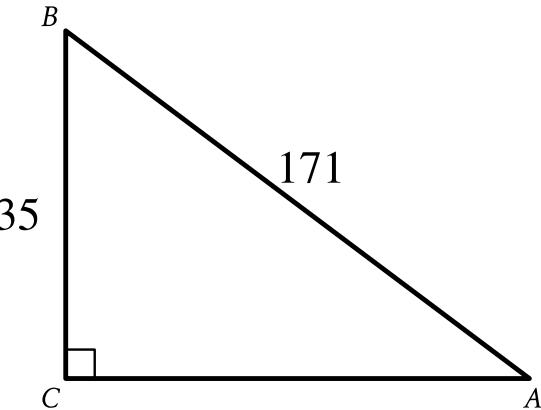
Question Difficulty:

Hard

Question ID 87a9a2d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 87a9a2d4



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of $\sin A$?

- A. $\frac{1}{171}$
- B. $\frac{35}{171}$
- C. $\frac{171}{35}$
- D. 171

ID: 87a9a2d4 Answer

Correct Answer:

B

Rationale

Choice B is correct. The sine of an acute angle in a right triangle is the ratio of the length of the side opposite that angle to the length of the hypotenuse. The hypotenuse of a right triangle is the side opposite the right angle. In right triangle ABC , side BC is the side opposite angle A and side AB is the hypotenuse. It's given that the length of side BC is 35 units and the length of side AB is 171 units. Therefore, the value of $\sin A$ is $\frac{35}{171}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the ratio of the length of the hypotenuse to the length of the side opposite angle A rather than the ratio of the length of the side opposite angle A to the length of the hypotenuse.

Choice D is incorrect. This is the length of the hypotenuse rather than $\sin A$.

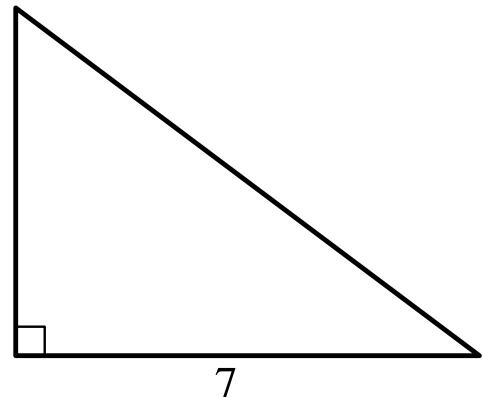
Question Difficulty:

Easy

Question ID e6f2ace7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e6f2ace7



Note: Figure not drawn to scale.

The lengths of the legs of a right triangle are shown. Which of the following is closest to the length of the triangle's hypotenuse?

- A. 3.2
- B. 5
- C. 7.6
- D. 20

ID: e6f2ace7 Answer

Correct Answer:

C

Rationale

Choice C is correct. The Pythagorean theorem states that for a right triangle, $a^2 + b^2 = c^2$, where a and b represent the lengths of the legs of the triangle and c represents the length of its hypotenuse. In the triangle shown, the legs have lengths of 3 and 7. Substituting 3 for a and 7 for b in the equation $a^2 + b^2 = c^2$ yields $3^2 + 7^2 = c^2$, which is equivalent to $9 + 49 = c^2$, or $58 = c^2$. Taking the positive square root of both sides of this equation yields $\sqrt{58} = c$. Thus, the value of c is approximately 7.6. Therefore, of the given choices, 7.6 is the closest to the length of the triangle's hypotenuse.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

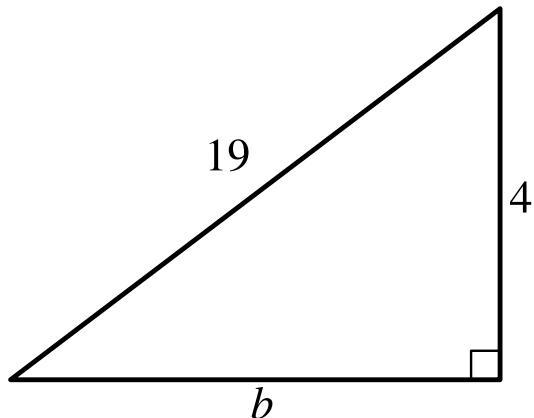
Question Difficulty:

Easy

Question ID b0c5ece5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b0c5ece5



Note: Figure not drawn to scale.

Which equation shows the relationship between the side lengths of the given triangle?

- A. $4b = 19$
- B. $4 + b = 19$
- C. $4^2 + b^2 = 19^2$
- D. $4^2 - b^2 = 19^2$

ID: b0c5ece5 Answer

Correct Answer:

C

Rationale

Choice C is correct. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. Therefore, $a^2 + b^2 = c^2$, where a and b are the lengths of the legs and c is the length of the hypotenuse. For the given right triangle, the lengths of the legs are 4 and b , and the length of the hypotenuse is 19. Substituting 4 for a and 19 for c in the equation $a^2 + b^2 = c^2$ yields $4^2 + b^2 = 19^2$. Thus, the relationship between the side lengths of the given triangle is $4^2 + b^2 = 19^2$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 58c26db8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 58c26db8

The perimeter of an isosceles right triangle is $18 + 18\sqrt{2}$ inches. What is the length, in inches, of the hypotenuse of this triangle?

- A. 9
- B. $9\sqrt{2}$
- C. 18
- D. $18\sqrt{2}$

ID: 58c26db8 Answer

Correct Answer:

C

Rationale

Choice C is correct. The perimeter of a triangle is the sum of the lengths of its sides. Since the given triangle is an isosceles right triangle, the length of each leg is the same and the length of the hypotenuse is equal to $\sqrt{2}$ times the length of a leg. Let x represent the length, in inches, of a leg of this isosceles right triangle. Therefore, the perimeter, in inches, of the triangle is $x + x + x\sqrt{2}$, or $2x + x\sqrt{2}$, which is equivalent to $x(2 + \sqrt{2})$. It's given that the perimeter of this triangle is $18 + 18\sqrt{2}$ inches. Thus, $x(2 + \sqrt{2}) = 18 + 18\sqrt{2}$. Dividing both sides of this equation by $2 + \sqrt{2}$ yields $x = \frac{18+18\sqrt{2}}{2+\sqrt{2}}$. Multiplying the right-hand side of this equation by $\frac{2-\sqrt{2}}{2-\sqrt{2}}$ yields $x = \frac{36+36\sqrt{2}-18\sqrt{2}-36}{2}$, or $x = 9\sqrt{2}$. It follows that the length, in inches, of a leg of this isosceles right triangle is $9\sqrt{2}$. Therefore, the length, in inches, of the hypotenuse of this isosceles right triangle is $(9\sqrt{2})(\sqrt{2})$, or 18.

Choice A is incorrect. If this were the length of the hypotenuse, the perimeter would be $9 + 9\sqrt{2}$ inches.

Choice B is incorrect. This is the length, in inches, of a leg of this triangle, not the hypotenuse.

Choice D is incorrect. If this were the length of the hypotenuse, the perimeter would be $36 + 18\sqrt{2}$ inches.

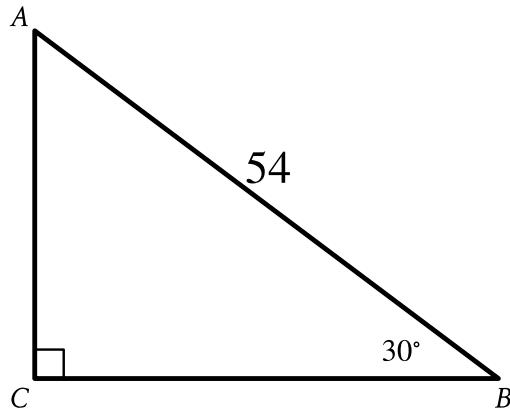
Question Difficulty:

Hard

Question ID 52f7b898

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 52f7b898



Note: Figure not drawn to scale.

Right triangle ABC is shown. What is the value of $\tan A$?

- A. $\frac{\sqrt{3}}{54}$
- B. $\frac{1}{\sqrt{3}}$
- C. $\sqrt{3}$
- D. $27\sqrt{3}$

ID: 52f7b898 Answer

Correct Answer:

C

Rationale

Choice C is correct. In the triangle shown, the measure of angle B is 30° and angle C is a right angle, which means that it has a measure of 90° . Since the sum of the angles in a triangle is equal to 180° , the measure of angle A is equal to $180^\circ - (30 + 90)^\circ$, or 60° . In a right triangle whose acute angles have measures 30° and 60° , the lengths of the legs can be represented by the expressions x , $x\sqrt{3}$, and $2x$, where x is the length of the leg opposite the angle with measure 30° , $x\sqrt{3}$ is the length of the leg opposite the angle with measure 60° , and $2x$ is the length of the hypotenuse. In the triangle shown, the hypotenuse has a length of 54. It follows that $2x = 54$, or $x = 27$. Therefore, the length of the leg opposite angle B is 27 and the length of the leg opposite angle A is $27\sqrt{3}$. The tangent of an acute angle in a right triangle is defined as the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle. The length of the leg opposite angle A is $27\sqrt{3}$ and the length of the leg adjacent to angle A is 27. Therefore, the value of $\tan A$ is $\frac{27\sqrt{3}}{27}$, or $\sqrt{3}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of $\frac{1}{\tan A}$, not the value of $\tan A$.

Choice D is incorrect. This is the length of the leg opposite angle A , not the value of $\tan A$.

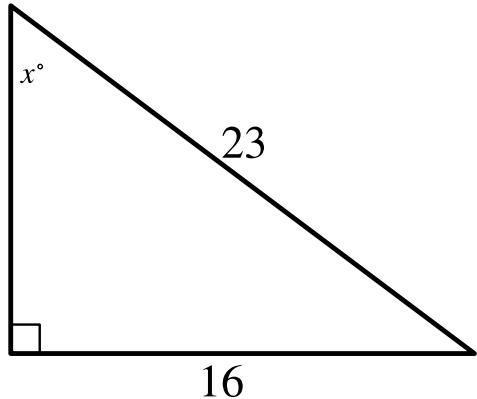
Question Difficulty:

Hard

Question ID 1429dcdf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; height: 10px; background-color: #0056b3;"></div>

ID: 1429dcdf



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\sin x^\circ$?

ID: 1429dcdf Answer

Correct Answer:

.6956, .6957, 16/23

Rationale

The correct answer is $\frac{16}{23}$. In a right triangle, the sine of an acute angle is defined as the ratio of the length of the side opposite the angle to the length of the hypotenuse. In the triangle shown, the length of the side opposite the angle with measure x° is 16 units and the length of the hypotenuse is 23 units. Therefore, the value of $\sin x^\circ$ is $\frac{16}{23}$. Note that 16/23, .6956, .6957, 0.695, and 0.696 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 5a7e3b46

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 5a7e3b46

In $\triangle ABC$, $\angle B$ is a right angle and the length of \overline{BC} is 136 millimeters. If $\cos A = \frac{3}{5}$, what is the length, in millimeters, of \overline{AB} ?

- A. 34
- B. 102
- C. 136
- D. 170

ID: 5a7e3b46 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that in $\triangle ABC$, $\angle B$ is a right angle. Therefore, $\triangle ABC$ is a right triangle, and \overline{AC} is the hypotenuse of the triangle. It's also given that $\cos A = \frac{3}{5}$. Since the cosine of an acute angle in a right triangle is defined as the ratio of the length of the side adjacent to the angle to the length of the hypotenuse, the ratio of the length of \overline{AB} to the length of \overline{AC} is 3 to 5. It follows that the length of \overline{AB} can be represented as $3a$ and the length of \overline{AC} can be represented as $5a$, where a is a constant. The Pythagorean theorem states that the sum of the squares of the length of the legs of a right triangle is equal to the square of the length of its hypotenuse, so it follows that $AB^2 + BC^2 = AC^2$. Substituting $3a$ for AB and $5a$ for AC in this equation yields $(3a)^2 + BC^2 = (5a)^2$, or $9a^2 + BC^2 = 25a^2$. Subtracting $9a^2$ from both sides of this equation yields $BC^2 = 16a^2$, or $BC = 4a$. It follows that the ratio of the length of \overline{AB} to the length of \overline{BC} is 3 to 4. Let x represent the length, in millimeters, of \overline{AB} . It's given that the length of \overline{BC} is 136 millimeters. Since the ratio of the length of \overline{AB} to the length of \overline{BC} is 3 to 4, $\frac{x}{136} = \frac{3}{4}$. Multiplying both sides of this equation by 136 yields $x = \frac{3(136)}{4}$, or $x = 102$. Therefore, the length of \overline{AB} is 102 millimeters.

Choice A is incorrect. This is the scale factor by which the 3 to 4 ratio is multiplied that results in the side lengths of $\triangle ABC$.

Choice C is incorrect. This is the length of \overline{BC} , not the length of \overline{AB} .

Choice D is incorrect. This is the length of \overline{AC} , not the length of \overline{AB} .

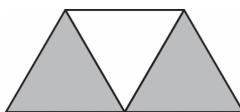
Question Difficulty:

Medium

Question ID 4c95c7d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4c95c7d4



A graphic designer is creating a logo for a company. The logo is shown in the figure above. The logo is in the shape of a trapezoid and consists of three congruent equilateral triangles. If the perimeter of the logo is 20 centimeters, what is the combined area of the shaded regions, in square centimeters, of the logo?

- A. $2\sqrt{3}$
- B. $4\sqrt{3}$
- C. $8\sqrt{3}$
- D. 16

ID: 4c95c7d4 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the logo is in the shape of a trapezoid that consists of three congruent equilateral triangles, and that the perimeter of the trapezoid is 20 centimeters (cm). Since the perimeter of the trapezoid is the sum of the lengths of 5 of the sides of the triangles, the length of each side of an equilateral triangle is $\frac{20}{5} = 4 \text{ cm}$. Dividing up one equilateral triangle into two right triangles yields a pair of congruent $30^\circ-60^\circ-90^\circ$ triangles. The shorter leg of each right triangle is half the length of the side of an equilateral triangle, or 2 cm. Using the Pythagorean Theorem, $a^2 + b^2 = c^2$, the height of the equilateral triangle can be found. Substituting $a = 2$ and $c = 4$ and solving for b yields $\sqrt{4^2 - 2^2} = \sqrt{12} = 2\sqrt{3}$ cm. The area of one equilateral triangle is $\frac{1}{2}bh$, where $b = 2$ and $h = 2\sqrt{3}$. Therefore, the area of one equilateral triangle is $\frac{1}{2}(4)(2\sqrt{3}) = 4\sqrt{3} \text{ cm}^2$. The shaded area consists of two such triangles, so its area is $(2)(4)\sqrt{3} = 8\sqrt{3} \text{ cm}^2$.

Alternate approach: The area of a trapezoid can be found by evaluating the expression $\frac{1}{2}(b_1 + b_2)h$, where b_1 is the length of one base, b_2 is the length of the other base, and h is the height of the trapezoid. Substituting $b_1 = 8$, $b_2 = 4$, and $h = 2\sqrt{3}$ yields the expression $\frac{1}{2}(8+4)(2\sqrt{3})$, or $\frac{1}{2}(12)(2\sqrt{3})$, which gives an area of $12\sqrt{3} \text{ cm}^2$ for the trapezoid. Since two-thirds of the trapezoid is shaded, the area of the shaded region is $\frac{2}{3} \times 12\sqrt{3} = 8\sqrt{3}$.

Choice A is incorrect. This is the height of the trapezoid. Choice B is incorrect. This is the area of one of the equilateral triangles, not two. Choice D is incorrect and may result from using a height of 4 for each triangle rather than the height of $2\sqrt{3}$.

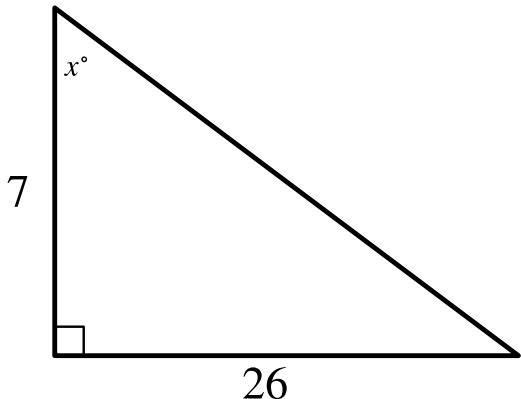
Question Difficulty:

Hard

Question ID 64c1f044

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 64c1f044



Note: Figure not drawn to scale.

In the triangle shown, what is the value of $\tan x^\circ$?

- A. $\frac{1}{26}$
- B. $\frac{19}{26}$
- C. $\frac{26}{7}$
- D. $\frac{33}{7}$

ID: 64c1f044 Answer

Correct Answer:

C

Rationale

Choice C is correct. The tangent of an acute angle in a right triangle is defined as the ratio of the length of the side opposite the angle to the length of the shorter side adjacent to the angle. In the triangle shown, the length of the side opposite the angle with measure x° is 26 units and the length of the side adjacent to the angle with measure x° is 7 units. Therefore, the value of $\tan x^\circ$ is $\frac{26}{7}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID a4bd60a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: a4bd60a3

The perimeter of an equilateral triangle is **624** centimeters. The height of this triangle is $k\sqrt{3}$ centimeters, where k is a constant. What is the value of k ?

ID: a4bd60a3 Answer

Correct Answer:

104

Rationale

The correct answer is **104**. An equilateral triangle is a triangle in which all three sides have the same length and all three angles have a measure of 60° . The height of the triangle, $k\sqrt{3}$, is the length of the altitude from one vertex. The altitude divides the equilateral triangle into two congruent 30-60-90 right triangles, where the altitude is the side across from the 60° angle in each 30-60-90 right triangle. Since the altitude has a length of $k\sqrt{3}$, it follows from the properties of 30-60-90 right triangles that the side across from each 30° angle has a length of k and each hypotenuse has a length of $2k$. In this case, the hypotenuse of each 30-60-90 right triangle is a side of the equilateral triangle; therefore, each side length of the equilateral triangle is $2k$. The perimeter of a triangle is the sum of the lengths of each side. It's given that the perimeter of the equilateral triangle is **624**; therefore, $2k + 2k + 2k = 624$, or $6k = 624$. Dividing both sides of this equation by **6** yields $k = 104$.

Question Difficulty:

Hard

Question ID 498d6795

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 498d6795

In triangle ABC , angle B is a right angle. The length of side AB is $10\sqrt{37}$ and the length of side BC is $24\sqrt{37}$. What is the length of side AC ?

- A. $14\sqrt{37}$
- B. $26\sqrt{37}$
- C. $34\sqrt{37}$
- D. $\sqrt{34 \cdot 37}$

ID: 498d6795 Answer

Correct Answer:

B

Rationale

Choice B is correct. The Pythagorean theorem states that for a right triangle, $c^2 = a^2 + b^2$, where c represents the length of the hypotenuse and a and b represent the lengths of the legs. It's given that in triangle ABC , angle B is a right angle. Therefore, triangle ABC is a right triangle, where the hypotenuse is side AC and the legs are sides AB and BC . It's given that the lengths of sides AB and BC are $10\sqrt{37}$ and $24\sqrt{37}$, respectively. Substituting these values for a and b in the formula $c^2 = a^2 + b^2$ yields $c^2 = (10\sqrt{37})^2 + (24\sqrt{37})^2$, which is equivalent to $c^2 = 100(37) + 576(37)$, or $c^2 = 676(37)$. Taking the square root of both sides of this equation yields $c = \pm 26\sqrt{37}$. Since c represents the length of the hypotenuse, side AC , c must be positive. Therefore, the length of side AC is $26\sqrt{37}$.

Choice A is incorrect. This is the result of solving the equation $c = 24\sqrt{37} - 10\sqrt{37}$, not $c^2 = (10\sqrt{37})^2 + (24\sqrt{37})^2$.

Choice C is incorrect. This is the result of solving the equation $c = 10\sqrt{37} + 24\sqrt{37}$, not $c^2 = (10\sqrt{37})^2 + (24\sqrt{37})^2$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID bbaac300

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bbaac300

Triangle ABC is similar to triangle DEF , where angle A corresponds to angle D , and angles C and F are right angles. If $\cos B = \frac{1}{22}$, what is the value of $\cos E$?

- A. $\frac{1}{22}$
- B. $\frac{1}{23}$
- C. $\frac{21}{22}$
- D. $\frac{22}{23}$

ID: bbaac300 Answer

Correct Answer:

A

Rationale

Choice A is correct. The cosine of an acute angle in a right triangle is defined as the ratio of the length of the leg adjacent to that angle to the length of the hypotenuse. It's given that angle C is a right angle in triangle ABC and that angle F is a right angle in triangle DEF . Therefore, $\cos B$ is equal to the ratio of the length of side BC to the length of side AB , and $\cos E$ is equal to the ratio of the length of side EF to the length of side DE . It's also given that triangle ABC is similar to triangle DEF , where angle A corresponds to angle D . Since similar triangles have proportional side lengths, $\frac{BC}{AB} = \frac{EF}{DE}$. Therefore, the value of $\cos B$ is equal to the value of $\cos E$. Since $\cos B = \frac{1}{22}$, the value of $\cos E$ is $\frac{1}{22}$.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

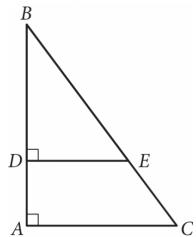
Question Difficulty:

Easy

Question ID 55bb437a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 55bb437a



In the figure above, $\tan B = \frac{3}{4}$. If $BC = 15$ and $DA = 4$, what is the length of \overline{DE} ?

ID: 55bb437a Answer

Rationale

The correct answer is 6. Since $\tan B = \frac{3}{4}$, $\triangle ABC$ and $\triangle DBE$ are both similar to 3-4-5 triangles. This means that they are both similar to the right triangle with sides of lengths 3, 4, and 5. Since $BC = 15$, which is 3 times as long as the hypotenuse of the 3-4-5 triangle, the similarity ratio of $\triangle ABC$ to the 3-4-5 triangle is 3:1. Therefore, the length of \overline{AC} (the side opposite to $\angle B$) is $3 \times 3 = 9$, and the length of \overline{AB} (the side adjacent to $\angle B$) is $4 \times 3 = 12$. It is also given that $DA = 4$. Since $AB = DA + DB$ and $AB = 12$, it follows that $DB = 8$, which means that the similarity ratio of $\triangle DBE$ to the 3-4-5 triangle is 2:1 (\overline{DB} is the side adjacent to $\angle B$). Therefore, the length of \overline{DE} , which is the side opposite to $\angle B$, is $3 \times 2 = 6$.

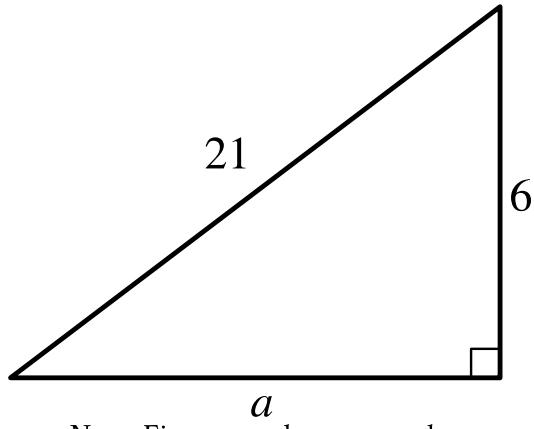
Question Difficulty:

Hard

Question ID de550be0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: de550be0



Note: Figure not drawn to scale.

For the triangle shown, which expression represents the value of a ?

- A. $\sqrt{21^2 - 6^2}$
- B. $21^2 - 6^2$
- C. $\sqrt{21 - 6}$
- D. $21 - 6$

ID: de550be0 Answer

Correct Answer:

A

Rationale

Choice A is correct. For the right triangle shown, the lengths of the legs are a units and 6 units, and the length of the hypotenuse is 21 units. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. Therefore, $a^2 + 6^2 = 21^2$. Subtracting 6^2 from both sides of this equation yields $a^2 = 21^2 - 6^2$. Taking the square root of both sides of this equation yields $a = \pm\sqrt{21^2 - 6^2}$. Since a is a length, a must be positive. Therefore, $a = \sqrt{21^2 - 6^2}$. Thus, for the triangle shown, $\sqrt{21^2 - 6^2}$ represents the value of a .

Choice B is incorrect. For the triangle shown, this expression represents the value of a^2 , not a .

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID ffe862a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: ffe862a3

An isosceles right triangle has a hypotenuse of length **58** inches. What is the perimeter, in inches, of this triangle?

- A. $29\sqrt{2}$
- B. $58\sqrt{2}$
- C. $58 + 58\sqrt{2}$
- D. $58 + 116\sqrt{2}$

ID: ffe862a3 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since the triangle is an isosceles right triangle, the two sides that form the right angle must be the same length. Let x be the length, in inches, of each of those sides. The Pythagorean theorem states that in a right triangle, $a^2 + b^2 = c^2$, where c is the length of the hypotenuse and a and b are the lengths of the other two sides. Substituting x for a , x for b , and 58 for c in this equation yields $x^2 + x^2 = 58^2$, or $2x^2 = 58^2$. Dividing each side of this equation by 2 yields $x^2 = \frac{58^2}{2}$, or $x^2 = \frac{2 \cdot 58^2}{4}$. Taking the square root of each side of this equation yields two solutions: $x = \frac{58\sqrt{2}}{2}$ and $x = -\frac{58\sqrt{2}}{2}$. The value of x must be positive because it represents a side length. Therefore, $x = \frac{58\sqrt{2}}{2}$, or $x = 29\sqrt{2}$. The perimeter, in inches, of the triangle is $58 + x + x$, or $58 + 2x$. Substituting $29\sqrt{2}$ for x in this expression gives a perimeter, in inches, of $58 + 2(29\sqrt{2})$, or $58 + 58\sqrt{2}$.

Choice A is incorrect. This is the length, in inches, of each of the congruent sides of the triangle, not the perimeter, in inches, of the triangle.

Choice B is incorrect. This is the sum of the lengths, in inches, of the congruent sides of the triangle, not the perimeter, in inches, of the triangle.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 44b2b894

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 44b2b894

A rectangle is inscribed in a circle, such that each vertex of the rectangle lies on the circumference of the circle. The diagonal of the rectangle is twice the length of the shortest side of the rectangle. The area of the rectangle is $1,089\sqrt{3}$ square units. What is the length, in units, of the diameter of the circle?

ID: 44b2b894 Answer

Correct Answer:

66

Rationale

The correct answer is **66**. It's given that each vertex of the rectangle lies on the circumference of the circle. Therefore, the length of the diameter of the circle is equal to the length of the diagonal of the rectangle. The diagonal of a rectangle forms a right triangle with the shortest and longest sides of the rectangle, where the shortest side and the longest side of the rectangle are the legs of the triangle and the diagonal of the rectangle is the hypotenuse of the triangle. Let s represent the length, in units, of the shortest side of the rectangle. Since it's given that the diagonal is twice the length of the shortest side, $2s$ represents the length, in units, of the diagonal of the rectangle. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b , then $a^2 + b^2 = c^2$. Substituting s for a and $2s$ for c in this equation yields $s^2 + b^2 = (2s)^2$, or $s^2 + b^2 = 4s^2$. Subtracting s^2 from both sides of this equation yields $b^2 = 3s^2$. Taking the positive square root of both sides of this equation yields $b = s\sqrt{3}$. Therefore, the length, in units, of the rectangle's longest side is $s\sqrt{3}$. The area of a rectangle is the product of the length of the shortest side and the length of the longest side. The lengths, in units, of the shortest and longest sides of the rectangle are represented by s and $s\sqrt{3}$, and it's given that the area of the rectangle is $1,089\sqrt{3}$ square units. It follows that $1,089\sqrt{3} = s(s\sqrt{3})$, or $1,089\sqrt{3} = s^2\sqrt{3}$. Dividing both sides of this equation by $\sqrt{3}$ yields $1,089 = s^2$. Taking the positive square root of both sides of this equation yields $33 = s$. Since the length, in units, of the diagonal is represented by $2s$, it follows that the length, in units, of the diagonal is $2(33)$, or **66**. Since the length of the diameter of the circle is equal to the length of the diagonal of the rectangle, the length, in units, of the diameter of the circle is **66**.

Question Difficulty:

Hard

Question ID 7700d098

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7700d098

One leg of a right triangle has a length of **43.2** millimeters. The hypotenuse of the triangle has a length of **196.8** millimeters. What is the length of the other leg of the triangle, in millimeters?

- A. **43.2**
- B. **120**
- C. **192**
- D. **201.5**

ID: 7700d098 Answer

Correct Answer:

C

Rationale

Choice C is correct. The Pythagorean theorem states that for a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. It's given that one leg of a right triangle has a length of **43.2** millimeters. It's also given that the hypotenuse of the triangle has a length of **196.8** millimeters. Let b represent the length of the other leg of the triangle, in millimeters. Therefore, by the Pythagorean theorem, $43.2^2 + b^2 = 196.8^2$, or $1,866.24 + b^2 = 38,730.24$.

Subtracting **1,866.24** from both sides of this equation yields $b^2 = 36,864$. Taking the positive square root of both sides of this equation yields $b = 192$. Therefore, the length of the other leg of the triangle, in millimeters, is **192**.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 54df8076

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div>

ID: 54df8076

The perimeter of an equilateral triangle is 852 centimeters. The three vertices of the triangle lie on a circle. The radius of the circle is $w\sqrt{3}$ centimeters. What is the value of w ?

ID: 54df8076 Answer

Correct Answer:

284/3, 94.66, 94.67

Rationale

The correct answer is $\frac{284}{3}$. Since the perimeter of a triangle is the sum of the lengths of its sides, and the given triangle is equilateral, the length of each side is $\frac{852}{3}$, or 284, centimeters (cm). Right triangle AMO can be formed, where M is the midpoint of one of the triangle's sides, A is one of this side's endpoints, and O is the center of the circle. It follows that AM is $\frac{284}{2}$, or 142, cm. Additionally, triangle AMO has angles measuring 30° , 60° , and 90° , where the measure of angle OMA is 90° and the measure of angle OAM is 30° . It follows that the length of side MO is half the length of hypotenuse AO , and the length of side AM is $\sqrt{3}$ times the length of side MO . It's given that $AO = w\sqrt{3}$ cm. Therefore, $MO = \frac{w\sqrt{3}}{2}$ cm and $AM = \frac{w\sqrt{3}\sqrt{3}}{2}$ cm, which is equivalent to $AM = \frac{3w}{2}$ cm. Since $AM = 142$ cm, it follows that $\frac{3w}{2} = 142$. Multiplying both sides of this equation by 2 yields $3w = 284$. Dividing both sides of this equation by 3 yields $w = \frac{284}{3}$. Note that 284/3, 94.66, and 94.67 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 568d66a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 568d66a7

An isosceles right triangle has a perimeter of $94 + 94\sqrt{2}$ inches. What is the length, in inches, of one leg of this triangle?

- A. 47
- B. $47\sqrt{2}$
- C. 94
- D. $94\sqrt{2}$

ID: 568d66a7 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the right triangle is isosceles. In an isosceles right triangle, the two legs have equal lengths, and the length of the hypotenuse is $\sqrt{2}$ times the length of one of the legs. Let ℓ represent the length, in inches, of each leg of the isosceles right triangle. It follows that the length of the hypotenuse is $\ell\sqrt{2}$ inches. The perimeter of a figure is the sum of the lengths of the sides of the figure. Therefore, the perimeter of the isosceles right triangle is $\ell + \ell + \ell\sqrt{2}$ inches. It's given that the perimeter of the triangle is $94 + 94\sqrt{2}$ inches. It follows that $\ell + \ell + \ell\sqrt{2} = 94 + 94\sqrt{2}$. Factoring the left-hand side of this equation yields $(1 + 1 + \sqrt{2})\ell = 94 + 94\sqrt{2}$, or $(2 + \sqrt{2})\ell = 94 + 94\sqrt{2}$. Dividing both sides of this equation by $2 + \sqrt{2}$ yields $\ell = \frac{94+94\sqrt{2}}{2+\sqrt{2}}$. Rationalizing the denominator of the right-hand side of this equation by multiplying the right-hand side of the equation by $\frac{2-\sqrt{2}}{2-\sqrt{2}}$ yields $\ell = \frac{(94+94\sqrt{2})(2-\sqrt{2})}{(2+\sqrt{2})(2-\sqrt{2})}$. Applying the distributive property to the numerator and to the denominator of the right-hand side of this equation yields $\ell = \frac{188-94\sqrt{2}+188\sqrt{2}-94\sqrt{4}}{4-2\sqrt{2}+2\sqrt{2}-\sqrt{4}}$. This is equivalent to $\ell = \frac{94\sqrt{2}}{2}$, or $\ell = 47\sqrt{2}$. Therefore, the length, in inches, of one leg of the isosceles right triangle is $47\sqrt{2}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the length, in inches, of the hypotenuse.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 0e709a29

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 0e709a29

$$RS = 440$$

$$ST = 384$$

$$TR = 584$$

The side lengths of right triangle RST are given. Triangle RST is similar to triangle UVW , where S corresponds to V and T corresponds to W . What is the value of $\tan W$?

- A. $\frac{48}{73}$
- B. $\frac{55}{73}$
- C. $\frac{48}{55}$
- D. $\frac{55}{48}$

ID: 0e709a29 Answer

Correct Answer:

D

Rationale

Choice D is correct. The hypotenuse of triangle RST is the longest side and is across from the right angle. The longest side length given is 584, which is the length of side TR . Therefore, the hypotenuse of triangle RST is side TR , so the right angle is angle S . The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side, which is the side across from the angle, to the length of the adjacent side, which is the side closest to the angle that is not the hypotenuse. It follows that the opposite side of angle T is side RS and the adjacent side of angle T is side ST . Therefore, $\tan T = \frac{RS}{ST}$. Substituting 440 for RS and 384 for ST in this equation yields $\tan T = \frac{440}{384}$. This is equivalent to $\tan T = \frac{55}{48}$. It's given that triangle RST is similar to triangle UVW , where S corresponds to V and T corresponds to W . It follows that R corresponds to U . Therefore, the hypotenuse of triangle UVW is side WU , which means $\tan W = \frac{UV}{VW}$. Since the lengths of corresponding sides of similar triangles are proportional, $\frac{RS}{ST} = \frac{UV}{VW}$. Therefore, $\tan W = \frac{UV}{VW}$ is equivalent to $\tan W = \frac{RS}{ST}$, or $\tan W = \tan T$. Thus, $\tan W = \frac{55}{48}$.

Choice A is incorrect. This is the value of $\cos W$, not $\tan W$.

Choice B is incorrect. This is the value of $\sin W$, not $\tan W$.

Choice C is incorrect. This is the value of $\frac{1}{\tan W}$, not $\tan W$.

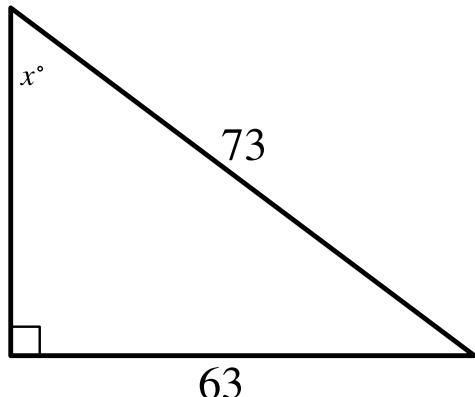
Question Difficulty:

Hard

Question ID a6097ec2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: a6097ec2



Note: Figure not drawn to scale.

In the right triangle shown, what is the value of $\sin x^\circ$?

- A. $\frac{1}{73}$
- B. $\frac{10}{73}$
- C. $\frac{63}{73}$
- D. $\frac{136}{73}$

ID: a6097ec2 Answer

Correct Answer:

C

Rationale

Choice C is correct. The sine of an acute angle in a right triangle is the ratio of the length of the side opposite that angle to the length of the hypotenuse. In the right triangle shown, it's given that the length of the side opposite the angle with measure x° is 63 units and the length of the hypotenuse is 73 units. Therefore, the value of $\sin x^\circ$ is $\frac{63}{73}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID f811d345

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f811d345

A right triangle has legs with lengths **24** centimeters and **21** centimeters. If the length of this triangle's hypotenuse, in centimeters, can be written in the form $3\sqrt{d}$, where d is an integer, what is the value of d ?

ID: f811d345 Answer

Correct Answer:

113

Rationale

The correct answer is **113**. It's given that the legs of a right triangle have lengths **24** centimeters and **21** centimeters. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs. It follows that if h represents the length, in centimeters, of the hypotenuse of the right triangle, $h^2 = 24^2 + 21^2$. This equation is equivalent to $h^2 = 1,017$. Taking the square root of each side of this equation yields $h = \sqrt{1,017}$. This equation can be rewritten as $h = \sqrt{9 \cdot 113}$, or $h = \sqrt{9} \cdot \sqrt{113}$. This equation is equivalent to $h = 3\sqrt{113}$. It's given that the length of the triangle's hypotenuse, in centimeters, can be written in the form $3\sqrt{d}$. It follows that the value of d is **113**.

Question Difficulty:

Hard

Question ID c9931030

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c9931030

$$RS = 20$$

$$ST = 48$$

$$TR = 52$$

The side lengths of right triangle RST are given. Triangle RST is similar to triangle UVW , where S corresponds to V and T corresponds to W . What is the value of $\tan W$?

- A. $\frac{5}{13}$
- B. $\frac{5}{12}$
- C. $\frac{12}{13}$
- D. $\frac{12}{5}$

ID: c9931030 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that right triangle RST is similar to triangle UVW , where S corresponds to V and T corresponds to W . It's given that the side lengths of the right triangle RST are $RS = 20$, $ST = 48$, and $TR = 52$. Corresponding angles in similar triangles are equal. It follows that the measure of angle T is equal to the measure of angle W . The hypotenuse of a right triangle is the longest side. It follows that the hypotenuse of triangle RST is side TR . The hypotenuse of a right triangle is the side opposite the right angle. Therefore, angle S is a right angle. The adjacent side of an acute angle in a right triangle is the side closest to the angle that is not the hypotenuse. It follows that the adjacent side of angle T is side ST . The opposite side of an acute angle in a right triangle is the side across from the acute angle. It follows that the opposite side of angle T is side RS . The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side.

Therefore, $\tan T = \frac{RS}{ST}$. Substituting 20 for RS and 48 for ST in this equation yields $\tan T = \frac{20}{48}$, or $\tan T = \frac{5}{12}$. The tangents of two acute angles with equal measures are equal. Since the measure of angle T is equal to the measure of angle W , it follows that $\tan T = \tan W$. Substituting $\frac{5}{12}$ for $\tan T$ in this equation yields $\frac{5}{12} = \tan W$. Therefore, the value of $\tan W$ is $\frac{5}{12}$.

Choice A is incorrect. This is the value of $\sin W$.

Choice C is incorrect. This is the value of $\cos W$.

Choice D is incorrect. This is the value of $\frac{1}{\tan W}$.

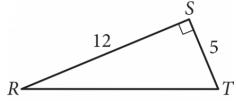
Question Difficulty:

Hard

Question ID 6933b3d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6933b3d9



In triangle RST above, point W (not shown) lies on \overline{RT} . What is the value of $\cos(\angle RSW) - \sin(\angle WST)$?

ID: 6933b3d9 Answer

Rationale

The correct answer is 0. Note that no matter where point W is on \overline{RT} , the sum of the measures of $\angle RSW$ and $\angle WST$ is equal to the measure of $\angle RST$, which is 90° . Thus, $\angle RSW$ and $\angle WST$ are complementary angles. Since the cosine of an angle is equal to the sine of its complementary angle, $\cos(\angle RSW) = \sin(\angle WST)$. Therefore, $\cos(\angle RSW) - \sin(\angle WST) = 0$.

Question Difficulty:

Hard

Question ID 9ec76b54

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9ec76b54

A right triangle has legs with lengths of **28** centimeters and **20** centimeters. What is the length of this triangle's hypotenuse, in centimeters?

- A. $8\sqrt{6}$
- B. $4\sqrt{74}$
- C. 48
- D. 1,184

ID: 9ec76b54 Answer

Correct Answer:

B

Rationale

Choice B is correct. The Pythagorean theorem states that in a right triangle, the sum of the squares of the lengths of the two legs is equal to the square of the length of the hypotenuse. It's given that the right triangle has legs with lengths of **28** centimeters and **20** centimeters. Let c represent the length of this triangle's hypotenuse, in centimeters. Therefore, by the Pythagorean theorem, $28^2 + 20^2 = c^2$, or $1,184 = c^2$. Taking the positive square root of both sides of this equation yields $\sqrt{1,184} = c$, or $4\sqrt{74} = c$. Therefore, the length of this triangle's hypotenuse, in centimeters, is $4\sqrt{74}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the square of the length of the triangle's hypotenuse.

Question Difficulty:

Medium

Question ID 6ab30ce3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6ab30ce3

Triangle ABC is similar to triangle DEF , where A corresponds to D and C corresponds to F . Angles C and F are right angles. If $\tan(A) = \sqrt{3}$ and $DF = 125$, what is the length of \overline{DE} ?

- A. $125\frac{\sqrt{3}}{3}$
- B. $125\frac{\sqrt{3}}{2}$
- C. $125\sqrt{3}$
- D. 250

ID: 6ab30ce3 Answer

Correct Answer:

D

Rationale

Choice D is correct. Corresponding angles in similar triangles have equal measures. It's given that triangle ABC is similar to triangle DEF , where A corresponds to D , so the measure of angle A is equal to the measure of angle D . Therefore, if $\tan(A) = \sqrt{3}$, then $\tan(D) = \sqrt{3}$. It's given that angles C and F are right angles, so triangles ABC and DEF are right triangles. The adjacent side of an acute angle in a right triangle is the side closest to the angle that is not the hypotenuse. It follows that the adjacent side of angle D is side DF . The opposite side of an acute angle in a right triangle is the side across from the acute angle. It follows that the opposite side of angle D is side EF . The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side. Therefore, $\tan(D) = \frac{EF}{DF}$. If $DF = 125$, the length of side EF can be found by substituting $\sqrt{3}$ for $\tan(D)$ and 125 for DF in the equation $\tan(D) = \frac{EF}{DF}$, which yields $\sqrt{3} = \frac{EF}{125}$. Multiplying both sides of this equation by 125 yields $125\sqrt{3} = EF$. Since the length of side EF is $\sqrt{3}$ times the length of side DF , it follows that triangle DEF is a special right triangle with angle measures 30° , 60° , and 90° . Therefore, the length of the hypotenuse, \overline{DE} , is 2 times the length of side DF , or $DE = 2(DF)$. Substituting 125 for DF in this equation yields $DE = 2(125)$, or $DE = 250$. Thus, if $\tan(A) = \sqrt{3}$ and $DF = 125$, the length of \overline{DE} is 250.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the length of \overline{EF} , not \overline{DE} .

Question Difficulty:

Hard

Question ID 379ffefb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 379ffefb

A right triangle has legs with lengths of **11** centimeters and **9** centimeters. What is the length of this triangle's hypotenuse, in centimeters?

- A. $\sqrt{40}$
- B. $\sqrt{202}$
- C. 20
- D. 202

ID: 379ffefb Answer

Correct Answer:

B

Rationale

Choice B is correct. The Pythagorean theorem states that for a right triangle, $c^2 = a^2 + b^2$, where c represents the length of the hypotenuse and a and b represent the lengths of the legs. It's given that a right triangle has legs with lengths of **11** centimeters and **9** centimeters. Substituting **11** for a and **9** for b in the formula $c^2 = a^2 + b^2$ yields $c^2 = 11^2 + 9^2$, which is equivalent to $c^2 = 121 + 81$, or $c^2 = 202$. Taking the square root of each side of this equation yields $c = \pm\sqrt{202}$. Since c represents a length, c must be positive. Therefore, the length of the triangle's hypotenuse, in centimeters, is $\sqrt{202}$.

Choice A is incorrect. This is the result of solving the equation $c^2 = 11(2) + 9(2)$, not $c^2 = 11^2 + 9^2$.

Choice C is incorrect. This is the result of solving the equation $c(2) = 11(2) + 9(2)$, not $c^2 = 11^2 + 9^2$.

Choice D is incorrect. This is the result of solving the equation $c = 11^2 + 9^2$, not $c^2 = 11^2 + 9^2$.

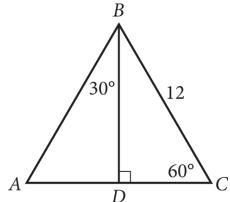
Question Difficulty:

Easy

Question ID bf8d843e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: bf8d843e



In $\triangle ABC$ above, what is the length of \overline{AD} ?

- A. 4
- B. 6
- C. $6\sqrt{2}$
- D. $6\sqrt{3}$

ID: bf8d843e Answer

Correct Answer:

B

Rationale

Choice B is correct. Triangles ADB and CDB are both $30^\circ - 60^\circ - 90^\circ$ triangles and share \overline{BD} . Therefore, triangles ADB and CDB are congruent by the angle-side-angle postulate. Using the properties of $30^\circ - 60^\circ - 90^\circ$ triangles, the length of \overline{AD} is half the length of hypotenuse \overline{AB} . Since the triangles are congruent, $AB = BC = 12$. So the length of \overline{AD} is $\frac{12}{2} = 6$.

Alternate approach: Since angle CBD has a measure of 30° , angle ABC must have a measure of 60° . It follows that triangle ABC is equilateral, so side AC also has length 12. It also follows that the altitude BD is also a median, and therefore the length of AD is half of the length of AC, which is 6.

Choice A is incorrect. If the length of \overline{AD} were 4, then the length of \overline{AB} would be 8. However, this is incorrect because \overline{AB} is congruent to \overline{BC} , which has a length of 12. Choices C and D are also incorrect. Following the same procedures as used to test choice A gives \overline{AB} a length of $12\sqrt{2}$ for choice C and $12\sqrt{3}$ for choice D. However, these results cannot be true because \overline{AB} is congruent to \overline{BC} , which has a length of 12.

Question Difficulty:

Medium

Question ID 7c25b0dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Geometry and Trigonometry	Right triangles and trigonometry	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 7c25b0dc

The length of a rectangle's diagonal is $3\sqrt{17}$, and the length of the rectangle's shorter side is 3. What is the length of the rectangle's longer side?

ID: 7c25b0dc Answer

Correct Answer:

12

Rationale

The correct answer is 12. The diagonal of a rectangle forms a right triangle, where the shorter side and the longer side of the rectangle are the legs of the triangle and the diagonal of the rectangle is the hypotenuse of the triangle. It's given that the length of the rectangle's diagonal is $3\sqrt{17}$ and the length of the rectangle's shorter side is 3. Thus, the length of the hypotenuse of the right triangle formed by the diagonal is $3\sqrt{17}$ and the length of one of the legs is 3. By the Pythagorean theorem, if a right triangle has a hypotenuse with length c and legs with lengths a and b , then $a^2 + b^2 = c^2$. Substituting $3\sqrt{17}$ for c and 3 for b in this equation yields $a^2 + (3)^2 = (3\sqrt{17})^2$, or $a^2 + 9 = 153$. Subtracting 9 from both sides of this equation yields $a^2 = 144$. Taking the square root of both sides of this equation yields $a = \pm\sqrt{144}$, or $a = \pm 12$. Since a represents a length, which must be positive, the value of a is 12. Thus, the length of the rectangle's longer side is 12.

Question Difficulty:

Hard

Question ID 1ea09200

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 1ea09200

A sample of 40 fourth-grade students was selected at random from a certain school. The 40 students completed a survey about the morning announcements, and 32 thought the announcements were helpful. Which of the following is the largest population to which the results of the survey can be applied?

- A. The 40 students who were surveyed
- B. All fourth-grade students at the school
- C. All students at the school
- D. All fourth-grade students in the county in which the school is located

ID: 1ea09200 Answer

Correct Answer:

B

Rationale

Choice B is correct. Selecting a sample of a reasonable size at random to use for a survey allows the results from that survey to be applied to the population from which the sample was selected, but not beyond this population. In this case, the population from which the sample was selected is all fourth-grade students at a certain school. Therefore, the results of the survey can be applied to all fourth-grade students at the school.

Choice A is incorrect. The results of the survey can be applied to the 40 students who were surveyed. However, this isn't the largest group to which the results of the survey can be applied. Choices C and D are incorrect. Since the sample was selected at random from among the fourth-grade students at a certain school, the results of the survey can't be applied to other students at the school or to other fourth-grade students who weren't represented in the survey results. Students in other grades in the school or other fourth-grade students in the country may feel differently about announcements than the fourth-grade students at the school.

Question Difficulty:

Hard

Question ID 37930b2a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 20%; background-color: #005a9f; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 37930b2a

Residents of a town were surveyed to determine whether they are satisfied with the concession stand at the local park. A random sample of 200 residents was selected. All 200 responded, and 87% said they are satisfied. Based on this information, which of the following statements must be true?

- I. Of all the town residents, 87% would say they are satisfied with the concession stand at the local park.
 - II. If another random sample of 200 residents were surveyed, 87% would say they are satisfied.
- A. Neither
- B. I only
- C. II only
- D. I and II

ID: 37930b2a Answer

Correct Answer:

A

Rationale

Choice A is correct. The purpose of surveying a random sample of residents is to approximate the percent of the town residents that are satisfied with the concession stand. The sample doesn't necessarily get the same result as surveying every resident of the town, nor would another sample necessarily have identical results. Therefore, although it's possible that either statement I or statement II could prove true by surveying every resident of the town, these statements cannot be proven true solely based on the results of the sample.

Choice B is incorrect because surveying a sample of the town residents may not have the same result as surveying all the town residents. Choices C and D are incorrect because surveying a different sample of residents could yield different results.

Question Difficulty:

Medium

Question ID b4f5a7ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b4f5a7ca

A survey was conducted using a sample of history professors selected at random from the California State Universities. The professors surveyed were asked to name the publishers of their current texts. What is the largest population to which the results of the survey can be generalized?

- A. All professors in the United States
- B. All history professors in the United States
- C. All history professors at all California State Universities
- D. All professors at all California State Universities

ID: b4f5a7ca Answer

Correct Answer:

C

Rationale

Choice C is correct. Selecting a sample at random when conducting a survey allows the results to be generalized to the population from which the sample was selected, but not beyond this population. In this situation, the population that the sample was selected from is history professors from the California State Universities. Therefore, the largest population to which the results of the survey can be generalized is all history professors at all California State Universities.

Choices A, B, and D are incorrect. Since the sample was selected at random from history professors from the California State Universities, the results of the survey can't be generalized to all professors in the United States, all history professors in the United States, or all professors at all California State Universities. All three of these populations may use different texts and therefore may name different publishers.

Question Difficulty:

Medium

Question ID 9bf4c545

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9bf4c545

The members of a city council wanted to assess the opinions of all city residents about converting an open field into a dog park. The council surveyed a sample of 500 city residents who own dogs. The survey showed that the majority of those sampled were in favor of the dog park. Which of the following is true about the city council's survey?

- A. It shows that the majority of city residents are in favor of the dog park.
- B. The survey sample should have included more residents who are dog owners.
- C. The survey sample should have consisted entirely of residents who do not own dogs.
- D. The survey sample is biased because it is not representative of all city residents.

ID: 9bf4c545 Answer

Correct Answer:

D

Rationale

Choice D is correct. The members of the city council wanted to assess opinions of all city residents. To gather an unbiased sample, the council should have used a random sampling design to select subjects from all city residents. The given survey introduced a sampling bias because the 500 city residents surveyed were all dog owners. This sample is not representative of all city residents because not all city residents are dog owners.

Choice A is incorrect because when the sampling method isn't random, there is no guarantee that the survey results will be reliable; hence, they cannot be generalized to the entire population. Choice B is incorrect because a larger sample of residents who are dog owners would not correct the sampling bias. Choice C is incorrect because a survey sample of entirely non-dog owners would likely have a biased opinion, just as a sample of dog owners would likely have a biased opinion.

Question Difficulty:

Easy

Question ID 7d68096f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 7d68096f

A trivia tournament organizer wanted to study the relationship between the number of points a team scores in a trivia round and the number of hours that a team practices each week. For the study, the organizer selected **55** teams at random from all trivia teams in a certain tournament. The table displays the information for the **40** teams in the sample that practiced for at least **3** hours per week.

Hours practiced	Number of points per round		
	6 to 13 points	14 or more points	Total
3 to 5 hours	6	4	10
More than 5 hours	4	26	30
Total	10	30	40

Which of the following is the largest population to which the results of the study can be generalized?

- A. All trivia teams in the tournament that scored **14** or more points in the round
- B. The **55** trivia teams in the sample
- C. The **40** trivia teams in the sample that practiced for at least **3** hours per week
- D. All trivia teams in the tournament

ID: 7d68096f Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the organizer selected **55** teams at random from all trivia teams in the tournament. A table is also given displaying the information for the **40** teams in the sample that practiced for at least **3** hours per week. Selecting a sample of a reasonable size at random to use for a survey allows the results from that survey to be applied to the population from which the sample was selected, but not beyond this population. Thus, only the sampling method information is necessary to determine the largest population to which the results of the study can be generalized. Since the organizer selected the sample at random from all trivia teams in the tournament, the largest population to which the results of the study can be generalized is all trivia teams in the tournament.

Choice A is incorrect. The sample was selected at random from all trivia teams in the tournament, not just from the teams that scored an average of **14** or more points per round.

Choice B is incorrect. If a study uses a sample selected at random from a population, the results of the study can be generalized to the population, not just the sample.

Choice C is incorrect. If a study uses a sample selected at random from a population, the results of the study can be generalized to the population, not just a subset of the sample.

Question Difficulty:

Hard

Question ID 7ce2830a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 7ce2830a

A psychologist designed and conducted a study to determine whether playing a certain educational game increases middle school students' accuracy in adding fractions. For the study, the psychologist chose a random sample of 35 students from all of the students at one of the middle schools in a large city. The psychologist found that students who played the game showed significant improvement in accuracy when adding fractions. What is the largest group to which the results of the study can be generalized?

- A. The 35 students in the sample
- B. All students at the school
- C. All middle school students in the city
- D. All students in the city

ID: 7ce2830a Answer

Correct Answer:

B

Rationale

Choice B is correct. The largest group to which the results of a study can be generalized is the population from which the random sample was chosen. In this case, the psychologist chose a random sample from all students at one particular middle school. Therefore, the largest group to which the results can be generalized is all the students at the school.

Choice A is incorrect because this isn't the largest group the results can be generalized to. Choices C and D are incorrect because these groups are larger than the population from which the random sample was chosen. Therefore, the sample isn't representative of these groups.

Question Difficulty:

Hard

Question ID 642519d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #006699; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 642519d7

A polling agency recently surveyed 1,000 adults who were selected at random from a large city and asked each of the adults, "Are you satisfied with the quality of air in the city?" Of those surveyed, 78 percent responded that they were satisfied with the quality of air in the city. Based on the results of the survey, which of the following statements must be true?

1. Of all adults in the city, 78 percent are satisfied with the quality of air in the city.
2. If another 1,000 adults selected at random from the city were surveyed, 78 percent of them would report they are satisfied with the quality of air in the city.
3. If 1,000 adults selected at random from a different city were surveyed, 78 percent of them would report they are satisfied with the quality of air in the city.

A. None

B. II only

C. I and II only

D. I and III only

ID: 642519d7 Answer

Correct Answer:

A

Rationale

Choice A is correct. Statement I need not be true. The fact that 78% of the 1,000 adults who were surveyed responded that they were satisfied with the air quality in the city does not mean that the exact same percentage of all adults in the city will be satisfied with the air quality in the city. Statement II need not be true because random samples, even when they are of the same size, are not necessarily identical with regard to percentages of people in them who have a certain opinion. Statement III need not be true for the same reason that statement II need not be true: results from different samples can vary. The variation may be even bigger for this sample since it would be selected from a different city. Therefore, none of the statements must be true.

Choices B, C, and D are incorrect because none of the statements must be true.

Question Difficulty:

Medium

Question ID 82dfb646

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 82dfb646

A market researcher selected 200 people at random from a group of people who indicated that they liked a certain book. The 200 people were shown a movie based on the book and then asked whether they liked or disliked the movie. Of those surveyed, 95% said they disliked the movie. Which of the following inferences can appropriately be drawn from this survey result?

- A. At least 95% of people who go see movies will dislike this movie.
- B. At least 95% of people who read books will dislike this movie.
- C. Most people who dislike this book will like this movie.
- D. Most people who like this book will dislike this movie.

ID: 82dfb646 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sample was selected from a group of people who indicated that they liked the book. It is inappropriate to generalize the result of the survey beyond the population from which the participants were selected. Choice D is the most appropriate inference from the survey results because it describes a conclusion about people who liked the book, and the results of the survey indicate that most people who like the book disliked the movie.

Choices A, B, and C are incorrect because none of these inferences can be drawn from the survey results. Choices A and B need not be true. The people surveyed all liked the book on which the movie was based, which is not necessarily true of all people who go see movies or all people who read books. Thus, the people surveyed are not representative of all people who go see movies or all people who read books. Therefore, the results of this survey cannot appropriately be extended to at least 95% of people who go see movies or to at least 95% of people who read books. Choice C need not be true because the sample includes only people who liked the book, and so the results do not extend to people who dislike the book.

Question Difficulty:

Easy

Question ID aa43b41f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: aa43b41f

Near the end of a US cable news show, the host invited viewers to respond to a poll on the show's website that asked, "Do you support the new federal policy discussed during the show?" At the end of the show, the host reported that 28% responded "Yes," and 70% responded "No." Which of the following best explains why the results are unlikely to represent the sentiments of the population of the United States?

- A. The percentages do not add up to 100%, so any possible conclusions from the poll are invalid.
- B. Those who responded to the poll were not a random sample of the population of the United States.
- C. There were not 50% "Yes" responses and 50% "No" responses.
- D. The show did not allow viewers enough time to respond to the poll.

ID: aa43b41f Answer

Correct Answer:

B

Rationale

Choice B is correct. In order for the poll results from a sample of a population to represent the entire population, the sample must be representative of the population. A sample that is randomly selected from a population is more likely than a sample of the type described to represent the population. In this case, the people who responded were people with access to cable television and websites, which aren't accessible to the entire population. Moreover, the people who responded also chose to watch the show and respond to the poll. The people who made these choices aren't representative of the entire population of the United States because they were not a random sample of the population of the United States.

Choices A, C, and D are incorrect because they present reasons unrelated to whether the sample is representative of the population of the United States.

Question Difficulty:

Hard

Question ID 4a422e3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Evaluating statistical claims: Observational studies and experiments	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 4a422e3e

To determine the mean number of children per household in a community, Tabitha surveyed 20 families at a playground. For the 20 families surveyed, the mean number of children per household was 2.4. Which of the following statements must be true?

- A. The mean number of children per household in the community is 2.4.
- B. A determination about the mean number of children per household in the community should not be made because the sample size is too small.
- C. The sampling method is flawed and may produce a biased estimate of the mean number of children per household in the community.
- D. The sampling method is not flawed and is likely to produce an unbiased estimate of the mean number of children per household in the community.

ID: 4a422e3e Answer

Correct Answer:

C

Rationale

Choice C is correct. In order to use a sample mean to estimate the mean for a population, the sample must be representative of the population (for example, a simple random sample). In this case, Tabitha surveyed 20 families in a playground. Families in the playground are more likely to have children than other households in the community. Therefore, the sample isn't representative of the population. Hence, the sampling method is flawed and may produce a biased estimate.

Choices A and D are incorrect because they incorrectly assume the sampling method is unbiased. Choice B is incorrect because a sample of size 20 could be large enough to make an estimate if the sample had been representative of all the families in the community.

Question Difficulty:

Hard

Question ID 90eed2e5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 90eed2e5

A city has 50 city council members. A reporter polled a random sample of 20 city council members and found that 6 of those polled supported a specific bill. Based on the sample, which of the following is the best estimate of the number of city council members in the city who support the bill?

- A. 6
- B. 9
- C. 15
- D. 30

ID: 90eed2e5 Answer

Rationale

Choice C is correct. Because a random sample of the city council was polled, the proportion of the sample who supported the bill is expected to be approximately equal to the proportion of the total city council who supports the bill. Since 6 of the 20 polled, or 30%, supported the bill, it can be estimated that 50×0.3 , or 15, city council members support the bill.

Choice A is incorrect. This is the number of city council members in the sample who supported the bill. Choice B is incorrect and may result from a computational error. Choice D is incorrect. This is the number of city council members in the sample of city council members who were not polled.

Question Difficulty:

Easy

Question ID 53d97af5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 53d97af5

A study was done on the weights of different types of fish in a pond. A random sample of fish were caught and marked in order to ensure that none were weighed more than once. The sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds. Which of the following conclusions is best supported by the sample data?

- A. The majority of all fish in the pond weigh less than 2 pounds.
- B. The average weight of all fish in the pond is approximately 2 pounds.
- C. Approximately 30% of all fish in the pond weigh more than 2 pounds.
- D. Approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

ID: 53d97af5 Answer

Correct Answer:

D

Rationale

Choice D is correct. The sample of 150 largemouth bass was selected at random from all the largemouth bass in the pond, and since 30% of the fish in the sample weighed more than 2 pounds, it can be concluded that approximately 30% of all largemouth bass in the pond weigh more than 2 pounds.

Choices A, B, and C are incorrect. Since the sample contained 150 largemouth bass, of which 30% weighed more than 2 pounds, this result can be generalized only to largemouth bass in the pond, not to all fish in the pond.

Question Difficulty:

Medium

Question ID f8f79e11

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: f8f79e11

A park ranger asked a random sample of visitors how far they hiked during their visit.

Based on the responses, the estimated mean was found to be 4.5 miles, with an associated margin of error of 0.5 miles. Which of the following is the best conclusion from these data?

- A. It is likely that all visitors hiked between 4 and 5 miles.
- B. It is likely that most visitors hiked exactly 4.5 miles.
- C. It is not possible that any visitor hiked less than 3 miles.
- D. It is plausible that the mean distance hiked for all visitors is between 4 and 5 miles.

ID: f8f79e11 Answer

Correct Answer:

D

Rationale

Choice D is correct. The given estimated mean has an associated margin of error because from sample data, the population mean can't be determined precisely. Rather, from the sample mean, an interval can be determined within which it's plausible that the population's mean is likely to lie. Since the estimated mean is 4.5 miles with an associated margin of error of 0.5 miles, it follows that between $4.5 - 0.5$ miles and $4.5 + 0.5$ miles, or between 4 and 5 miles, is plausibly the mean distance hiked for all visitors.

Choices A, B, and C are incorrect. Based on the estimated mean, no determination can be made about the number of miles hiked for all visitors to the park.

Question Difficulty:

Medium

Question ID 2c76bcce

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2c76bcce

A company designs and makes handbags. To estimate the mean weight of the handbags made by the company on a particular day, a sample of the handbags made by the company on that day was selected at random. Based on the sample, it is estimated that the mean weight of all handbags made by the company on that day is **27.8 ounces (oz)**, with an associated margin of error of **0.02 oz**. Based on this estimate and associated margin of error, which of the following is the most plausible conclusion?

- A. The mean weight of all handbags made by the company on that day is between **27.78 oz** and **27.82 oz**.
- B. The actual weights of all handbags made by the company on that day are between **27.78 oz** and **27.82 oz**.
- C. The actual weights of all handbags from the sample are between **27.78 oz** and **27.82 oz**.
- D. The mean weight of all handbags made by the company on that day is **27.8 oz**.

ID: 2c76bcce Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the estimated mean weight of all handbags made by the company on a particular day is **27.8 oz**, with an associated margin of error of **0.02 oz**. It follows that plausible values for the mean weight are between **(27.8 – 0.02) oz** and **(27.8 + 0.02) oz**. Therefore, the most plausible conclusion is that the mean weight of all handbags made by the company on that day is between **27.78 oz** and **27.82 oz**.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID e03f3477

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #005599; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: e03f3477

A sample consisting of **720** adults who own televisions was selected at random for a study. Based on the sample, it is estimated that **32%** of all adults who own televisions use their televisions to watch nature shows, with an associated margin of error of **3.41%**. Which of the following is the most plausible conclusion about all adults who own televisions?

- A. More than **35.41%** of all adults who own televisions use their televisions to watch nature shows.
- B. Between **28.59%** and **35.41%** of all adults who own televisions use their televisions to watch nature shows.
- C. Since the sample included adults who own televisions and not just those who use their televisions to watch nature shows, no conclusion can be made.
- D. Since the sample did not include all the people who watch nature shows, no conclusion can be made.

ID: e03f3477 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that based on a sample selected at random, it's estimated that **32%** of all adults who own televisions use their televisions to watch nature shows, with an associated margin of error of **3.41%**. Subtracting the margin of error from the estimate and adding the margin of error to the estimate gives an interval of plausible values for the true percentage of adults who own televisions who use their televisions to watch nature shows. This means it's plausible that between **32% – 3.41%**, or **28.59%**, and **32% + 3.41%**, or **35.41%**, of all adults who own televisions use their televisions to watch nature shows. Therefore, of the given choices, the most plausible conclusion is that between **28.59%** and **35.41%** of all adults who own televisions use their televisions to watch nature shows.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect. To make a plausible conclusion about all adults who own televisions, the sample must be selected at random from all adults who own televisions, not just those who use their televisions to watch nature shows.

Choice D is incorrect. Since the sample was selected at random from all adults who own televisions, a plausible conclusion can be made about all adults who own televisions.

Question Difficulty:

Medium

Question ID a2162ea1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: a2162ea1

A company fills boxes with approximately **23** pounds of oranges. To test the accuracy of the filling process, **344** boxes of oranges were selected at random and weighed. Based on the sample, it is estimated that the average weight of all boxes of oranges filled by the company in an **8**-hour period is **23.1** pounds, with an associated margin of error of **0.19** pounds. Which of the following is the best interpretation of this estimate?

- A. Plausible values for the average weight of all boxes of oranges filled by the company are between **22.91** pounds and **23.29** pounds.
- B. Plausible values for the average weight of all boxes of oranges filled by the company are less than **22.91** pounds or greater than **23.29** pounds.
- C. The average weight of all boxes of oranges filled by the company is less than **23.01** pounds.
- D. The average weight of all boxes of oranges filled by the company is greater than **23.01** pounds.

ID: a2162ea1 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the estimate for the average weight of all boxes of oranges filled by the company in an **8**-hour period is **23.1** pounds, with an associated margin of error of **0.19** pounds. It follows that plausible values for this average weight are between **23.1 – 0.19** pounds and **23.1 + 0.19** pounds. Therefore, plausible values for the average weight of all boxes of oranges filled by the company are between **22.91** pounds and **23.29** pounds.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 308084c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 308084c5

Sample	Percent in favor	Margin of error
A	52%	4.2%
B	48%	1.6%

The results of two random samples of votes for a proposition are shown above. The samples were selected from the same population, and the margins of error were calculated using the same method. Which of the following is the most appropriate reason that the margin of error for sample A is greater than the margin of error for sample B?

- A. Sample A had a smaller number of votes that could not be recorded.
- B. Sample A had a higher percent of favorable responses.
- C. Sample A had a larger sample size.
- D. Sample A had a smaller sample size.

ID: 308084c5 Answer

Correct Answer:

D

Rationale

Choice D is correct. Sample size is an appropriate reason for the margin of error to change. In general, a smaller sample size increases the margin of error because the sample may be less representative of the whole population.

Choice A is incorrect. The margin of error will depend on the size of the sample of recorded votes, not the number of votes that could not be recorded. In any case, the smaller number of votes that could not be recorded for sample A would tend to decrease, not increase, the comparative size of the margin of error. Choice B is incorrect. Since the percent in favor for sample A is the same distance from 50% as the percent in favor for sample B, the percent of favorable responses doesn't affect the comparative size of the margin of error for the two samples. Choice C is incorrect. If sample A had a larger margin of error than sample B, then sample A would tend to be less representative of the population. Therefore, sample A is not likely to have a larger sample size.

Question Difficulty:

Hard

Question ID f04d40b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: f04d40b2

From a population of **50,000** people, **1,000** were chosen at random and surveyed about a proposed piece of legislation. Based on the survey, it is estimated that **35%** of people in the population support the legislation, with an associated margin of error of **3%**. Based on these results, which of the following is a plausible value for the total number of people in the population who support the proposed legislation?

- A. **350**
- B. **650**
- C. **16,750**
- D. **31,750**

ID: f04d40b2 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that an estimated **35%** of people in the population support the legislation, with an associated margin of error of **3%**. Subtracting and adding the margin of error from the estimate gives an interval of plausible values for the true percentage of people in the population who support the legislation. Therefore, it's plausible that between **32%** and **38%** of people in this population support the legislation. The corresponding numbers of people represented by these percentages in the population can be calculated by multiplying the total population, **50,000**, by **0.32** and by **0.38**, which gives **50,000(0.32) = 16,000** and **50,000(0.38) = 19,000**, respectively. It follows that any value in the interval **16,000** to **19,000** is a plausible value for the total number of people in the population who support the proposed legislation. Of the choices given, only **16,750** is in this interval.

Choice A is incorrect. This is the number of people in the sample, rather than in the population, who support the legislation.

Choice B is incorrect. This is the number of people in the sample who do not support the legislation.

Choice D is incorrect. This is a plausible value for the total number of people in the population who do not support the proposed legislation.

Question Difficulty:

Medium

Question ID 9ba3e283

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 9ba3e283

In State X, Mr. Camp's eighth-grade class consisting of 26 students was surveyed and 34.6 percent of the students reported that they had at least two siblings. The average eighth-grade class size in the state is 26. If the students in Mr. Camp's class are representative of students in the state's eighth-grade classes and there are 1,800 eighth-grade classes in the state, which of the following best estimates the number of eighth-grade students in the state who have fewer than two siblings?

- A. 16,200
- B. 23,400
- C. 30,600
- D. 46,800

ID: 9ba3e283 Answer

Correct Answer:

C

Rationale

Choice C is correct. It is given that 34.6% of 26 students in Mr. Camp's class reported that they had at least two siblings. Since 34.6% of 26 is 8.996, there must have been 9 students in the class who reported having at least two siblings and 17 students who reported that they had fewer than two siblings. It is also given that the average eighth-grade class size in the state is 26 and that Mr. Camp's class is representative of all eighth-grade classes in the state. This means that in each eighth-grade class in the state there are about 17 students who have fewer than two siblings. Therefore, the best estimate of the number of eighth-grade students in the state who have fewer than two siblings is $17 \times (\text{number of eighth-grade classes in the state})$, or $17 \times 1,800 = 30,600$.

Choice A is incorrect because 16,200 is the best estimate for the number of eighth-grade students in the state who have at least, not fewer than, two siblings. Choice B is incorrect because 23,400 is half of the estimated total number of eighth-grade students in the state; however, since the students in Mr. Camp's class are representative of students in the eighth-grade classes in the state and more than half of the students in Mr. Camp's class have fewer than two siblings, more than half of the students in each eighth-grade class in the state have fewer than two siblings, too. Choice D is incorrect because 46,800 is the estimated total number of eighth-grade students in the state.

Question Difficulty:

Hard

Question ID 4096a482

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Inference from sample statistics and margin of error	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 4096a482

Based on a random sample from a population, a researcher estimated that the mean value of a certain variable for the population is **20.5**, with an associated margin of error of **1**. Which of the following is the most appropriate conclusion?

- A. It is plausible that the actual mean value of the variable for the population is between **19.5** and **21.5**.
- B. It is not possible that the mean value of the variable for the population is less than **19.5** or greater than **21.5**.
- C. Every value of the variable in the population is between **19.5** and **21.5**.
- D. The mean value of the variable for the population is **20.5**.

ID: 4096a482 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that based on a random sample from a population, the estimated mean value for a certain variable for the population is **20.5**, with an associated margin of error of **1**. This means that it is plausible that the actual mean value of the variable for the population is between **20.5 – 1** and **20.5 + 1**. Therefore, the most appropriate conclusion is that it is plausible that the actual mean value of the variable for the population is between **19.5** and **21.5**.

Choice B is incorrect. The estimated mean value and associated margin of error describe only plausible values, not all the possible values, for the actual mean value of the variable, so this is not an appropriate conclusion.

Choice C is incorrect. The estimated mean value and associated margin of error describe only plausible values for the actual mean value of the variable, not all the possible values of the variable, so this is not an appropriate conclusion.

Choice D is incorrect. Since **20.5** is the estimated mean value of the variable based on a random sample, the actual mean value of the variable may not be exactly **20.5**. Therefore, this is not an appropriate conclusion.

Question Difficulty:

Medium

Question ID 8736334b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 8736334b

Data set A: 72,73,73,76,76

Data set B: 61,64,74,85,x

Data set A and data set B each contain 5 numbers. If the mean of data set A is equal to the mean of data set B, what is the value of x ?

- A. 77
- B. 85
- C. 86
- D. 95

ID: 8736334b Answer

Correct Answer:

C

Rationale

Choice C is correct. The mean of a data set is found by dividing the sum of the values in the data set by the number of values in

the data set. Therefore, the mean of data set A is $\frac{72+73+73+76+76}{5}$, which simplifies to 74. The mean of data set B is represented by the equation $\frac{61+64+74+85+x}{5}$, or $\frac{284+x}{5}$. It's given that the mean of data set A is equal to the mean of data set B. Therefore, the equation $74 = \frac{284+x}{5}$ can be used to solve for x. Multiplying both sides of this equation by 5 yields $370 = 284 + x$. Subtracting 284 from both sides of this equation yields $86 = x$.

Choices A, B, and D are incorrect and may result from calculation errors.

Question Difficulty:

Easy

Question ID c88e0663

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: c88e0663

For a school fund-raiser, 10 students sold a total of 90 boxes of cookies. Which of the following can be calculated from this information?

- A. The average number of boxes sold per student
- B. The median number of boxes sold per student
- C. The greatest number of boxes sold by one student
- D. The least number of boxes sold by one student

ID: c88e0663 Answer

Correct Answer:

A

Rationale

Choice A is correct. The average can be found by dividing the total number of boxes sold by the number of students, which is

$$\frac{90}{10} = 9$$
.

Choices B, C, and D are incorrect. Each results from choosing measures that require the results of individual students, which are not given.

Question Difficulty:

Easy

Question ID 3f2ee20a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 25%; background-color: #005a99; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 3f2ee20a

The results of two independent surveys are shown in the table below.

Men's Height

Group	Sample size	Mean (centimeters)	Standard deviation (centimeters)
A	2,500	186	12.5
B	2,500	186	19.1

Which statement is true based on the table?

- A. The Group A data set was identical to the Group B data set.
- B. Group B contained the tallest participant.
- C. The heights of the men in Group B had a larger spread than the heights of the men in Group A.
- D. The median height of Group B is larger than the median height of Group A.

ID: 3f2ee20a Answer

Correct Answer:

C

Rationale

Choice C is correct. Standard deviation is a measure of spread, so data sets with larger standard deviations tend to have larger spread. The standard deviation of the heights of the men in Group B is larger than the standard deviation of the heights of the men in Group A. Therefore, the heights of the men in Group B had a larger spread than the heights of the men in Group A.

Choice A is incorrect. If two data sets are identical, they will have equivalent means and equivalent standard deviations. Since the two data sets have different standard deviations, they cannot be identical. Choice B is incorrect. Without knowing the maximum value for each data set, it's impossible to know which group contained the tallest participant. Choice D is incorrect. Since the means of the two groups are equivalent, the medians could also be the same or could be different, but it's impossible to tell from the given information.

Question Difficulty:

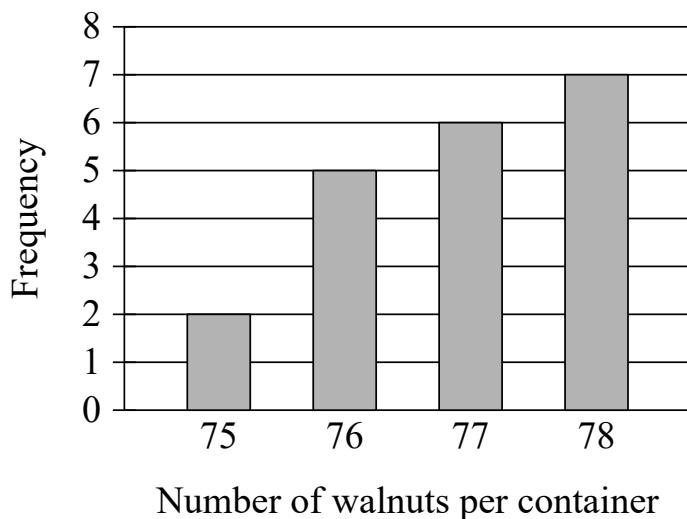
Medium

Question ID fe6a49d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 10%; background-color: #cccccc; height: 10px;"></div>

ID: fe6a49d6

The bar graph shows the distribution of the number of walnuts per container for 20 containers at a grocery store.



How many of these containers of walnuts contain exactly 78 walnuts?

- A. 2
- B. 7
- C. 20
- D. 78

ID: fe6a49d6 Answer

Correct Answer:

B

Rationale

Choice B is correct. The height of each bar in the graph shown represents the number of containers that contain the number of walnuts specified at the bottom of the bar. The bar for 78 walnuts has a height of 7. Therefore, 7 of these containers of walnuts contain exactly 78 walnuts.

Choice A is incorrect. This is the number of containers that contain exactly 75 walnuts, not 78 walnuts.

Choice C is incorrect. This is the total number of containers of walnuts represented in the bar graph, not the number that contain exactly 78 walnuts.

Choice D is incorrect. This is the number of walnuts in a container that contains exactly **78** walnuts, not the number of containers that contain exactly **78** walnuts.

Question Difficulty:

Easy

Question ID d0efc1dd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: d0efc1dd

15, 14, 18, 17, x

The mean and the median of the five numbers above are equal. Which of the following is NOT a possible value of x ?

- A. 6
- B. 11
- C. 16
- D. 21

ID: d0efc1dd Answer

Correct Answer:

A

Rationale

Choice A is correct. If x is 6, then the five numbers in the given list are 15, 14, 18, 17, 6. The mean of these five numbers is the sum

$$\frac{15+14+18+17+6}{5} = \frac{70}{5} = 14$$
 of all the values divided by the number of values, or

The median of these five numbers can be found by ordering the numbers from least to greatest and determining the middle value. When ordered from least to greatest, the numbers in the given list are 6, 14, 15, 17, 18, and the middle value is 15. Since the mean is 14 and the median is 15, the mean and median aren't equal when x is 6.

Choices B, C, and D are incorrect. If any of these values is substituted for x, the mean and median of the data set would be equal.

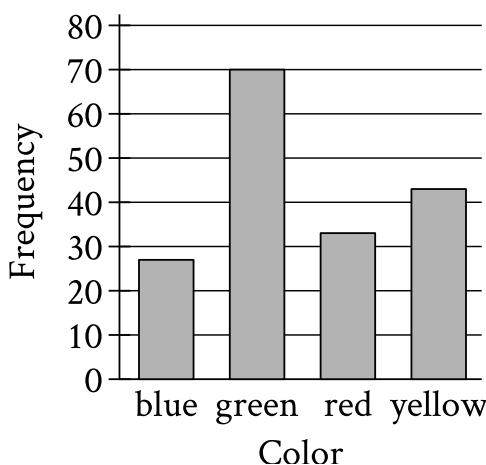
Question Difficulty:

Medium

Question ID 80f1f3a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 80f1f3a9



A data set consists of **173** colors. The bar graph shows the number of times each color appears in the data set. Which color appears **70** times?

- A. Blue
- B. Green
- C. Red
- D. Yellow

ID: 80f1f3a9 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that a data set consists of **173** colors and the bar graph shows the number of times each color appears in the data set. Therefore, for each color specified at the bottom of the bar, the frequency corresponds to the number of times that color appears in the data set. The color that appears **70** times in the data set has a frequency of **70** on the bar graph. Since the bar with a frequency of **70** corresponds to green, green is the color that appears **70** times.

Choice A is incorrect. The color blue appears about **27** times, not **70** times.

Choice C is incorrect. The color red appears about **33** times, not **70** times.

Choice D is incorrect. The color yellow appears about **43** times, not **70** times.

Question Difficulty:

Easy

Question ID 190be2fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 190be2fc

Data set A consists of **10** positive integers less than **60**. The list shown gives **9** of the integers from data set A.

43, 45, 44, 43, 38, 39, 40, 46, 40

The mean of these **9** integers is **42**. If the mean of data set A is an integer that is greater than **42**, what is the value of the largest integer from data set A?

ID: 190be2fc Answer

Correct Answer:

52

Rationale

The correct answer is **52**. The mean of a data set is calculated by dividing the sum of the data values by the number of values. It's given that data set A consists of **10** values, **9** of which are shown. Let x represent the **10th** data value in data set A, which isn't shown. The mean of data set A can be found using the expression $\frac{43+45+44+43+38+39+40+46+x}{10}$, or $\frac{378+x}{10}$. It's given that the mean of the **9** values shown is **42** and that the mean of all **10** numbers is greater than **42**. Consequently, the **10th** data value, x , is larger than **42**. It's also given that the data values in data set A are positive integers less than **60**. Thus, $42 < x < 60$. Finally, it's given that the mean of data set A is an integer. This means that the sum of the **10** data values, $378 + x$, is divisible by **10**. Thus, $378 + x$ must have a ones digit of **0**. It follows that x must have a ones digit of **2**. Since $42 < x < 60$ and x has a ones digit of **2**, the only possible value of x is **52**. Since **52** is larger than any of the integers shown, the largest integer from data set A is **52**.

Question Difficulty:

Hard

Question ID c178d4da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: c178d4da

Value	Data set A frequency	Data set B frequency
30	2	9
34	4	7
38	5	5
42	7	4
46	9	2

Data set A and data set B each consist of **27** values. The table shows the frequencies of the values for each data set. Which of the following statements best compares the means of the two data sets?

- A. The mean of data set A is greater than the mean of data set B.
- B. The mean of data set A is less than the mean of data set B.
- C. The mean of data set A is equal to the mean of data set B.
- D. There is not enough information to compare the means of the data sets.

ID: c178d4da Answer

Correct Answer:

A

Rationale

Choice A is correct. The mean value of a data set is the sum of the values of the data set divided by the number of values in the data set. When a data set is represented in a frequency table, the sum of the values in the data set is the sum of the products of each value and its frequency. For data set A, the sum of products of each value and its frequency is $30(2) + 34(4) + 38(5) + 42(7) + 46(9)$, or **1,094**. It's given that there are **27** values in data set A. Therefore, the mean of data set A is $\frac{1,094}{27}$, or approximately **40.52**. Similarly, the mean of data B is $\frac{958}{27}$, or approximately **35.48**. Therefore, the mean of data set A is greater than the mean of data set B.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 457d2f2c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 457d2f2c

A data set of 27 different numbers has a mean of 33 and a median of 33. A new data set is created by adding 7 to each number in the original data set that is greater than the median and subtracting 7 from each number in the original data set that is less than the median. Which of the following measures does NOT have the same value in both the original and new data sets?

- A. Median
- B. Mean
- C. Sum of the numbers
- D. Standard deviation

ID: 457d2f2c Answer

Correct Answer:

D

Rationale

Choice D is correct. When a data set has an odd number of elements, the median can be found by ordering the values from least to greatest and determining the middle value. Out of the 27 different numbers in this data set, 13 numbers are below the median, one number is exactly 33, and 13 numbers are above the median. When 7 is subtracted from each number below the median and added to each number above the median, the data spread out from the median. Since the median of this data set, 33, is equivalent to the mean of the data set, the data also spread out from the mean. Since standard deviation is a measure of how spread out the data are from the mean, a greater spread from the mean indicates an increased standard deviation.

Choice A is incorrect. All the numbers less than the median decrease and all the numbers greater than the median increase, but the median itself doesn't change. Choices B and C are incorrect. The mean of a data set is found by dividing the sum of the values by the number of values. The net change from subtracting 7 from 13 numbers and adding 7 to 13 numbers is zero. Therefore, neither the mean nor the sum of the numbers changes.

Question Difficulty:

Hard

Question ID c3d65f93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c3d65f93

Five *Eretmochelys imbricata*, a type of sea turtle, each have a nest. The table shows an original data set of the number of eggs that each turtle laid in its nest.

Nest	Number of eggs
A	149
B	144
C	148
D	136
E	139

A sixth nest with 121 eggs is added to create a new data set. Which of the following correctly compares the means of the two data sets?

- A. The mean of the original data set is greater than the mean of the new data set.
- B. The mean of the original data set is less than the mean of the new data set.
- C. The means of both data sets are equal.
- D. There is not enough information to compare the means.

ID: c3d65f93 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the table shows an original data set of 5 values. It's also given that a sixth value is added to create a new data set. The new data set consists of the 5 values in the original data set and one additional value, 121. Since the additional value, 121, is less than any value in the original data set, the mean of the original data set is greater than the mean of the new data set.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 35bec412

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 35bec412

73, 74, 75, 77, 79, 82, 84, 85, 91

What is the median of the data shown?

ID: 35bec412 Answer

Correct Answer:

79

Rationale

The correct answer is **79**. The median of a data set with an odd number of values is the middle value of the set when the values are ordered from least to greatest. Because the given data set consists of nine values that are ordered from least to greatest, the median is the fifth value in the data set. Therefore, the median of the data shown is **79**.

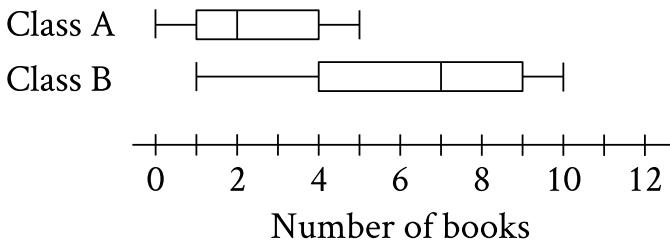
Question Difficulty:

Easy

Question ID 6c9444cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; height: 10px; background-color: #005a9f;"></div>

ID: 6c9444cd



The two box plots show the distribution of number of books read over the summer by the students in two different English classes. What is the positive difference between the ranges of number of books read over the summer for the two classes?

ID: 6c9444cd Answer

Correct Answer:

4

Rationale

The correct answer is **4**. It's given that the two boxplots show the distribution of number of books read over the summer by the students in two different English classes. In a boxplot, the first vertical line represents the minimum value of the data set and the last vertical line represents the maximum value of the data set. The range of a data set is the difference between its maximum value and its minimum value. In class A, the maximum number of books read is **5** and the minimum number of books read is **0**. The difference between those values is **5 – 0**, or **5**. Therefore, the range of the number of books read in class A is **5**. In class B, the maximum number of books read is **10** and the minimum number of books read is **1**. The difference between those values is **10 – 1**, or **9**. Therefore, the range of the number of books read in class B is **9**. To find the positive difference between the ranges of the number of books read for the two classes, the smaller range must be subtracted from the larger range. Therefore, the positive difference between the ranges of number of books read over the summer for the two classes is **9 – 5**, or **4**.

Question Difficulty:

Hard

Question ID 07f2829b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 07f2829b

International Tourist

Arrivals, in millions

Country	2012	2013
France	83.0	84.7
United States	66.7	69.8
Spain	57.5	60.7
China	57.7	55.7
Italy	46.4	47.7
Turkey	35.7	37.8
Germany	30.4	31.5
United Kingdom	26.3	32.2
Russia	24.7	28.4

The table above shows the number of international tourist arrivals, rounded to the nearest tenth of a million, to the top nine tourist destinations in both 2012 and 2013. Based on the information given in the table, how much greater, in millions, was the median number of international tourist arrivals to the top nine tourist destinations in 2013 than the median number in 2012, to the nearest tenth of a million?

ID: 07f2829b Answer

Rationale

The correct answer is 1.3. The median number of tourists is found by ordering the number of tourists from least to greatest and determining the middle value from this list. When the number of tourists in 2012 is ordered from least to greatest, the middle value, or the fifth number, is 46.4 million. When the number of tourists in 2013 is ordered from least to greatest, the middle value, or the fifth number, is 47.7 million. The difference between these two medians is $47.7 \text{ million} - 46.4 \text{ million} = 1.3 \text{ million}$. Note that 1.3 and 13/10 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

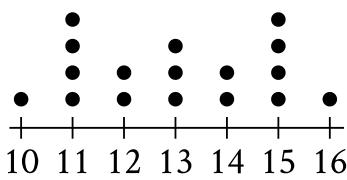
Question ID d65b9a87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

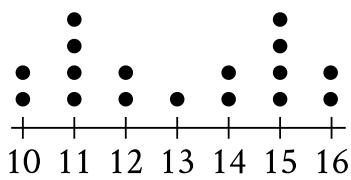
ID: d65b9a87

The dot plots represent the distributions of values in data sets A and B.

Data Set A



Data Set B



Which of the following statements must be true?

- I. The median of data set A is equal to the median of data set B.
 - II. The standard deviation of data set A is equal to the standard deviation of data set B.
- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: d65b9a87 Answer

Correct Answer:

A

Rationale

Choice A is correct. The median of a data set with an odd number of values that are in ascending or descending order is the middle value of the data set. Since the distribution of the values of both data set A and data set B form symmetric dot plots, and each data set has an odd number of values, it follows that the median is given by the middle value in each of the dot plots. Thus, the median of data set A is 13, and the median of data set B is 13. Therefore, statement I is true. Data set A and data set B have the same frequency for each of the values 11, 12, 14, and 15. Data set A has a frequency of 1 for values 10 and 16, whereas data set B has a frequency of 2 for values 10 and 16. Standard deviation is a measure of the spread of a data set; it is larger when there are more values further from the mean, and smaller when there are more values closer to the mean. Since both distributions are symmetric with an odd number of values, the mean of each data set is equal to its median. Thus, each data set has a mean of 13. Since more of the values in data set A are closer to 13 than data set B, it follows that data set A has a smaller standard deviation than data set B. Thus, statement II is false. Therefore, only statement I must be true.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:
Hard

Question ID 241f1db7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 241f1db7

Weight (pounds)	Frequency
13	12
14	8
15	5
16	7
17	9
18	10
19	13
20	7

The frequency table summarizes a data set of the weights, rounded to the nearest pound, of 71 tortoises. A weight of 39 pounds is added to the original data set, creating a new data set of the weights, rounded to the nearest pound, of 72 tortoises. Which statement best compares the mean and median of the new data set to the mean and median of the original data set?

- A. The mean of the new data set is greater than the mean of the original data set, and the median of the new data set is greater than the median of the original data set.
- B. The mean of the new data set is greater than the mean of the original data set, and the medians of the two data sets are equal.
- C. The mean of the new data set is less than the mean of the original data set, and the median of the new data set is less than the median of the original data set.
- D. The mean of the new data set is less than the mean of the original data set, and the medians of the two data sets are equal.

ID: 241f1db7 Answer

Correct Answer:

B

Rationale

Choice B is correct. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. The new data set consists of the weights of the 71 tortoises in the original data set and one additional weight, 39. Since the additional weight, 39, is greater than any of the values in the original data set, the mean of the new data set is greater than the mean of the original data set. If a data set contains an odd number of data values, the median is represented by the middle data value in the list when the data values are listed in ascending or descending order. Since the original data set consists of the weights of 71 tortoises and is in ascending order, the median of the original data set is represented by the middle value, or the 36th value. Based on the frequencies shown in the table, the 36th value in this data set is 17. If a data set contains an even

number of data values, the median is between the two middle data values when the values are listed in ascending or descending order. Since the new data set consists of the weights of **72** tortoises, the median of the new data set is between the **36th** and **37th** data values when the values are arranged in ascending order. To keep the data in ascending order, the additional value of **39** would be placed at the bottom of the frequency table with a frequency of **1**. Therefore, based on the frequencies in the table, the **36th** and **37th** values in the new data set are both **17**. It follows that the median of the new data set is **17**, which is the same as the median of the original data set. Therefore, the mean of the new data set is greater than the mean of the original data set, and the medians of the two data sets are equal.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

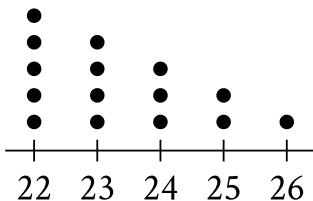
Hard

Question ID 578e26ae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 578e26ae

Data Set A



Data set A has 15 values and is represented by the dot plot shown. Data set B is created by adding 46 to each of the values in data set A. Which of the following correctly compares the medians and the ranges of data sets A and B?

- A. The median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.
- B. The median of data set B is greater than the median of data set A, and the range of data set B is greater than the range of data set A.
- C. The median of data set B is equal to the median of data set A, and the range of data set B is greater than the range of data set A.
- D. The median of data set B is equal to the median of data set A, and the range of data set B is equal to the range of data set A.

ID: 578e26ae Answer

Correct Answer:

A

Rationale

Choice A is correct. The median is the middle value in a data set when the data are arranged in order from least to greatest. Since there are 15 values in data set A, the median is the 8th value. The 8th value is 23, so the median of data set A is 23. The range is found by subtracting the minimum value in a data set from the maximum value. The minimum value in data set A is 22 and the maximum value is 26. Therefore, the range of data set A is $26 - 22$, or 4. It's given that data set B is created by adding 46 to each of the values in data set A. Therefore, the 8th value in data set B is $23 + 46$, or 69, so the median of data set B is 69. The minimum value in data set B is $22 + 46$, or 68, and the maximum value is $26 + 46$, or 72. Therefore, the range of data set B is $72 - 68$, or 4. Since the median of data set A is 23, and the median of data set B is 69, the median of data set B is greater than the median of data set A. Since the ranges of data sets A and B are both 4, the range of data set B is equal to the range of data set A.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID ecbdbe84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ecbdbe84

The table shown summarizes the number of employees at each of the **17** restaurants in a town.

Number of employees	Number of restaurants
2 to 7	2
8 to 13	4
14 to 19	2
20 to 25	7
26 to 31	2

Which of the following could be the median number of employees for the restaurants in this town?

- A. 2
- B. 9
- C. 15
- D. 21

ID: ecbdbe84 Answer

Correct Answer:

D

Rationale

Choice D is correct. If a data set contains an odd number of data values, the median is represented by the middle data value in the list when the data values are listed in ascending or descending order. Since the numbers of employees are given as ranges of values rather than specific values, it's only possible to determine the range in which the median falls, rather than the exact median. Since there are **17** restaurants included in the data set and the numbers of employees are listed in ascending order, it follows that the median number of employees will be represented by the ninth restaurant in the list. Since the first **2** restaurants each have **2** to **7** employees, numbers of employees in the **2** to **7** range would be represented by the first and second restaurants in the list. The next **4** restaurants each have **8** to **13** employees. Therefore, numbers of employees in the **8** to **13** range will be represented by the third through sixth restaurants in the list. The next **2** restaurants each have **14** to **19** employees. Therefore, numbers of employees in the **14** to **19** range will be represented by the seventh and eighth restaurants in the list. Since the next **7** restaurants each have **20** to **25** employees, numbers of employees in the **20** to **25** range will be represented by the ninth through fifteenth restaurants in the list. This means that the ninth restaurant in the list, which has the median number of employees for the restaurants in this town, has a number of employees in the **20** to **25** range. Of the given choices, the only number of employees in the **20** to **25** range is **21**.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the position of the median in the list, not the value of the median.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

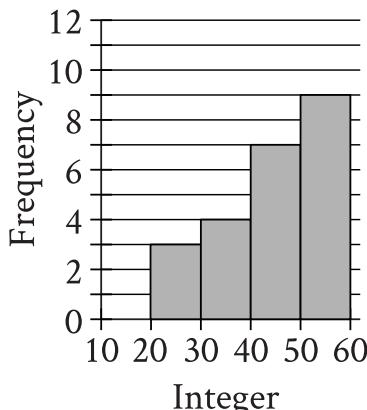
Hard

Question ID f8a322d9

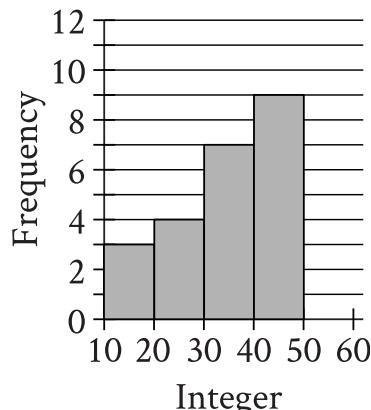
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: f8a322d9

Data Set A



Data Set B



Two data sets of **23** integers each are summarized in the histograms shown. For each of the histograms, the first interval represents the frequency of integers greater than or equal to **10**, but less than **20**. The second interval represents the frequency of integers greater than or equal to **20**, but less than **30**, and so on. What is the smallest possible difference between the mean of data set A and the mean of data set B?

- A. 0
- B. 1
- C. 10
- D. 23

ID: f8a322d9 Answer

Correct Answer:

B

Rationale

Choice B is correct. The histograms shown have the same shape, but data set A contains values between **20** and **60** and data set B contains values between **10** and **50**. Thus, the mean of data set A is greater than the mean of data set B. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is the difference between the smallest possible mean of data set A and the greatest possible mean of data set B. In data set A, since there are **3** integers in the interval greater than or equal to **20** but less than **30**, **4** integers greater than or equal to **30** but less than **40**, **7** integers greater than or equal to **40** but less than **50**, and **9** integers greater than or equal to **50** but less than **60**, the smallest possible mean for data set A is $\frac{(3 \cdot 20) + (4 \cdot 30) + (7 \cdot 40) + (9 \cdot 50)}{23}$. In data set B, since there are **3** integers greater than or equal to **10** but less than **20**, **4** integers greater than or equal to **20** but less than **30**, **7** integers greater than or equal to **30** but less than **40**, and **9** integers greater than or equal to **40** but less than **50**, the largest possible mean for data set B is $\frac{(3 \cdot 19) + (4 \cdot 29) + (7 \cdot 39) + (9 \cdot 49)}{23}$. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is $\frac{(3 \cdot 20) + (4 \cdot 30) + (7 \cdot 40) + (9 \cdot 50)}{23} - \frac{(3 \cdot 19) + (4 \cdot 29) + (7 \cdot 39) + (9 \cdot 49)}{23}$, which is equivalent to $\frac{(3 \cdot 20) - (3 \cdot 19) + (4 \cdot 30) - (4 \cdot 29) + (7 \cdot 40) - (7 \cdot 39) + (9 \cdot 50) - (9 \cdot 49)}{23}$. This expression can be rewritten as

$\frac{3(20-19)+4(30-29)+7(40-39)+9(50-49)}{23}$, or $\frac{23}{23}$, which is equal to 1. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is 1.

Choice A is incorrect. This is the smallest possible difference between the ranges, not the means, of the data sets.

Choice C is incorrect. This is the difference between the greatest possible mean, not the smallest possible mean, of data set A and the greatest possible mean of data set B.

Choice D is incorrect. This is the smallest possible difference between the sum of the values in data set A and the sum of the values in data set B, not the smallest possible difference between the means.

Question Difficulty:

Hard

Question ID 12dae628

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 12dae628

2, 9, 14, 23, 32

What is the mean of the data shown?

- A. 14
- B. 16
- C. 17
- D. 32

ID: 12dae628 Answer

Correct Answer:

B

Rationale

Choice B is correct. The mean of a set of data values is the sum of all the data values divided by the number of data values in the set. The sum of the data values shown is $2 + 9 + 14 + 23 + 32$, or 80. Since there are 5 data values in the set, the mean of the data shown is $\frac{80}{5}$, or 16.

Choice A is incorrect. This is the median, not the mean, of the data shown.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the maximum, not the mean, of the data shown.

Question Difficulty:

Easy

Question ID 1142af44

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1142af44

Value	Frequency
1	a
2	$2a$
3	$3a$
4	$2a$
5	a

The frequency distribution above summarizes a set of data, where a is a positive integer. How much greater is the mean of the set of data than the median?

- A. 0
- B. 1
- C. 2
- D. 3

ID: 1142af44 Answer

Correct Answer:

A

Rationale

Choice A is correct. Since the frequencies of values less than the middle value, 3, are the same as the frequencies of the values greater than 3, the set of data has a symmetric distribution. When a set of data has a symmetric distribution, the mean and median values are equal. Therefore, the mean is 0 greater than the median.

Choices B, C, and D are incorrect and may result from misinterpreting the set of data.

Question Difficulty:

Hard

Question ID 1e8ccffd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 60%;"><div style="width: 100%;"></div></div>

ID: 1e8ccffd

The mean score of 8 players in a basketball game was 14.5 points. If the highest individual score is removed, the mean score of the remaining 7 players becomes 12 points. What was the highest score?

- A. 20
- B. 24
- C. 32
- D. 36

ID: 1e8ccffd Answer

Correct Answer:

C

Rationale

Choice C is correct. If the mean score of 8 players is 14.5, then the total of all 8 scores is $14.5 \times 8 = 116$. If the mean of 7 scores is 12, then the total of all 7 scores is $12 \times 7 = 84$. Since the set of 7 scores was made by removing the highest score of the set of 8 scores, then the difference between the total of all 8 scores and the total of all 7 scores is equal to the removed score: $116 - 84 = 32$.

Choice A is incorrect because if 20 is removed from the group of 8 scores, then the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 20}{7}$

is approximately 13.71, not 12. Choice B is incorrect because if 24 is removed from the group of 8 scores, then

$$\frac{(14.5 \times 8) - 24}{7}$$

the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 24}{7}$ is approximately 13.14, not 12. Choice D is incorrect because if 36

$$\frac{(14.5 \times 8) - 36}{7}$$

is removed from the group of 8 scores, then the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 36}{7}$ or approximately 11.43, not 12.

Question Difficulty:

Hard

Question ID a29e89fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a7a; height: 10px;"></div> <div style="width: 25%; background-color: #005a7a; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a29e89fc

The list gives the mass, in grams, of **5** alpine marmots.

4,010; 4,010; 3,030; 4,050; 3,050

What is the mean mass, in grams, of these **5** alpine marmots?

ID: a29e89fc Answer

Correct Answer:

3630

Rationale

The correct answer is **3,630**. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. The sum of the masses, in grams, of these alpine marmots is $4,010 + 4,010 + 3,030 + 4,050 + 3,050$, or 18,150 grams. The number of alpine marmots in the data set is **5**. Therefore, the mean mass, in grams, of these **5** alpine marmots is $\frac{18,150}{5}$, or **3,630**.

Question Difficulty:

Medium

Question ID ea95087d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: ea95087d

Type of store	Average number of employees
Warehouse store	365
Department store	213
Supermarket	130

For a certain region, the table shows the average number of store employees in **2016** by type of store. Based on the table, how much greater was the average number of store employees in warehouse stores than in supermarkets?

- A. 83
- B. 152
- C. 235
- D. 495

ID: ea95087d Answer

Correct Answer:

C

Rationale

Choice C is correct. The table shows that for a certain region in **2016**, the average number of store employees in warehouse stores was **365** and the average number of store employees in supermarkets was **130**. Subtracting **130** from **365** yields **365 – 130**, or **235**. Therefore, the average number of store employees was **235** greater in warehouse stores than in supermarkets.

Choice A is incorrect. For this region in **2016**, this is how much greater the average number of store employees was in department stores than in supermarkets.

Choice B is incorrect. For this region in **2016**, this is how much greater the average number of store employees was in warehouse stores than in department stores.

Choice D is incorrect. For this region in **2016**, this is the sum of the average number of store employees in warehouse stores and in supermarkets.

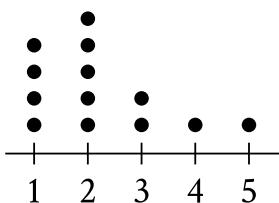
Question Difficulty:

Easy

Question ID e7d48c8a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div>

ID: e7d48c8a



Number of bursts

The dot plot represents a data set of the number of bursts for 13 eruptions of a steam vent. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 eruptions, which of the following measures will be greater for the new data set than for the original data set?

- I. The median number of bursts
 - II. The mean number of bursts
- A. I and II
- B. I only
- C. II only
- D. Neither I nor II

ID: e7d48c8a Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the dot plot represents a data set of the number of bursts for 13 eruptions of a steam vent. The median of a data set with an odd number of elements is the middle element when the elements are in numerical order. For 13 elements in numerical order, this is the 7th element. For this data set, the first 4 elements have a value of 1, and the next 5 elements have a value of 2. Thus, the 7th element in the ordered data set is 2 and the median number of bursts for the original data set is 2. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 eruptions, the median of the new data set will be between the 7th and 8th elements in the ordered set, which will also be 2. Therefore, the median number of bursts for the new data set will be the same as the median number of bursts for the original data set. The mean number of bursts for the original data set is found by adding the values of all 13 elements and dividing that sum by the number of elements, 13. Since the data is shown in a dot plot, the sum of the values of the elements can be found by multiplying each element's value by its frequency: $1(4) + 2(5) + 3(2) + 4(1) + 5(1)$, or 29. Therefore, the mean number of bursts for the original data set is $\frac{29}{13}$. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 bursts, the mean number of bursts for the new data set is $\frac{29+11}{14}$, or $\frac{40}{14}$. Since $\frac{40}{14} > \frac{29}{13}$, the mean number of bursts for the new data set is greater than the mean number of bursts for the original data set. Therefore, of the median number of bursts and the mean number of bursts, only the mean number of bursts is greater for the new data set than for the original data set.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 7b65bb28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7b65bb28

Station 1	Station 2	Station 3	Station 4	Station 5
\$3.699	\$3.609	\$3.729	\$3.679	\$3.729

In the table above, Melissa recorded the price of one gallon of regular gas from five different local gas stations on the same day. What is the median of the gas prices Melissa recorded?

- A. \$3.679
- B. \$3.689
- C. \$3.699
- D. \$3.729

ID: 7b65bb28 Answer

Correct Answer:

C

Rationale

Choice C is correct. The median of a data set is the middle value when the data is in ascending or descending order. In ascending order, the gas prices are \$3.609, \$3.679, \$3.699, \$3.729, and \$3.729. The middle number of this list is 3.699, so it follows that \$3.699 is the median gas price.

Choice A is incorrect. When the gas prices are listed in ascending order, this value isn't the middle number. Choice B is incorrect. This value represents the mean gas price. Choice D is incorrect. This value represents both the mode and the maximum gas price.

Question Difficulty:

Medium

Question ID be00d896

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: be00d896

For which of the following data sets is the mean greater than the median?

- A. 5, 5, 5, 5, 5, 5, 5, 5, 5
- B. 0, 10, 20, 30, 40, 50, 60, 70, 80
- C. 2, 4, 8, 16, 32, 64, 128, 256, 512
- D. 7, 107, 107, 207, 207, 207, 307, 307, 307

ID: be00d896 Answer

Correct Answer:

C

Rationale

Choice C is correct. If the values in a data set are ordered from least to greatest, the median of the data set will be the middle value. Since each data set in the choices is ordered and contains exactly 9 data values, the 5th value in each is the median. It follows that the median of the data set in choice C is 32. The sum of the positive differences between 32 and each of the values that are less than 32 is significantly smaller than the sum of the positive differences between 32 and each of the values that are greater than 32. If 32 were the mean, these sums would have been equal to each other. Therefore, the mean of this data set must be greater than 32. This can also be confirmed by calculating the mean as the sum of the values divided by the number of values

$$\frac{2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512}{9} = 113\frac{5}{9}$$

in the data set:

Choices A and B are incorrect. Each of the data sets in these choices is symmetric with respect to its median, so the mean and the median for each of these choices are equivalent. Choice D is incorrect. The median of this data set is 207. Since the sum of the positive differences between 207 and each of the values less than 207 is greater than the sum of the positive differences between 207 and each value greater than 207 in this data set, the mean must be less than the median.

Question Difficulty:

Medium

Question ID 560fab82

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 560fab82

The table shows the frequency of values in a data set.

Value	Frequency
19	7
21	1
23	7
25	4

What is the minimum value of the data set?

ID: 560fab82 Answer

Correct Answer:

19

Rationale

The correct answer is **19**. The minimum value of a data set is the least value in the data set. The frequency refers to the number of times a value occurs. The given table shows that for this data set, the value **19** occurs **7** times, the value **21** occurs **1** time, the value **23** occurs **7** times, and the value **25** occurs **4** times. Therefore, of the values **19, 21, 23**, and **25** given in the data set, the minimum value of the data set is **19**.

Question Difficulty:

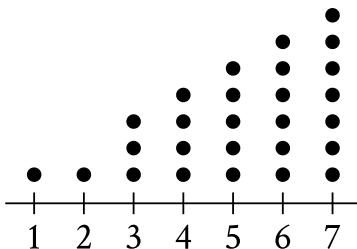
Medium

Question ID d94018fd

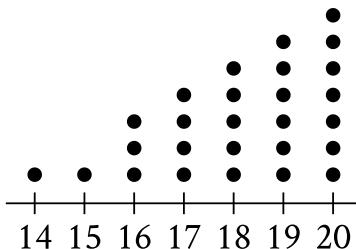
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d94018fd

Class A



Class B



Each of the dot plots shown represents the number of glue sticks brought in by each student for two classes, class A and class B.

Which statement best compares the standard deviations of the numbers of glue sticks brought in by each student for these two classes?

- A. The standard deviation of the number of glue sticks brought in by each student for class A is less than the standard deviation of the number of glue sticks brought in by each student for class B.
- B. The standard deviation of the number of glue sticks brought in by each student for class A is equal to the standard deviation of the number of glue sticks brought in by each student for class B.
- C. The standard deviation of the number of glue sticks brought in by each student for class A is greater than the standard deviation of the number of glue sticks brought in by each student for class B.
- D. There is not enough information to compare these standard deviations.

ID: d94018fd Answer

Correct Answer:

B

Rationale

Choice B is correct. Standard deviation is a measure of the spread of a data set from its mean. The dot plot for class A and the dot plot for class B have the same shape. Thus, the frequency distributions for both class A and class B are the same. Since both class A and class B have the same frequency distribution of glue sticks brought in by each student, it follows that both class A and class B have the same spread of the number of glue sticks brought in by each student from their respective means. Therefore, the standard deviation of the number of glue sticks brought in by each student for class A is equal to the standard deviation of the number of glue sticks brought in by each student for class B.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 4b09f783

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 4b09f783

A list of **10** data values is shown.

6, 8, 16, 4, 17, 26, 8, 5, 5, 5

What is the mean of these data?

ID: 4b09f783 Answer

Correct Answer:

10

Rationale

The correct answer is **10**. The mean of a data set is calculated by dividing the sum of the data values by the number of data values in the data set. For this data set, the mean can be calculated as $\frac{6+8+16+4+17+26+8+5+5+5}{10}$, which is equivalent to $\frac{100}{10}$, or **10**.

Question Difficulty:

Easy

Question ID bfa8a85c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: bfa8a85c

6, 6, 8, 8, 8, 10, 21

Which of the following lists represents a data set that has the same median as the data set shown?

- A. 4, 6, 6, 6, 8, 8
- B. 6, 6, 8, 8, 10, 10
- C. 6, 8, 10, 10, 10, 12
- D. 8, 8, 10, 10, 21, 21

ID: bfa8a85c Answer

Correct Answer:

B

Rationale

Choice B is correct. If a data set contains an odd number of data values, the median is represented by the middle data value in the list when the data values are listed in ascending or descending order. Since the data set shown has 7 data values and is in ascending order, it follows that the median is the fourth data value in the list, or 8. If a data set contains an even number of data values, the median is between the two middle data values when the values are listed in ascending or descending order. Since each of the choices consists of a data set with 6 data values in ascending order, it follows that the median is between the third and fourth data value. The third and fourth data values in choice B are 8 and 8. Thus, choice B represents a data set with a median of 8. Since the median of the data set shown is 8 and choice B represents a data set with a median of 8, it follows that choice B represents a data set that has the same median as the data set shown.

Choice A is incorrect. This list represents a data set with a median of 6, not 8.

Choice C is incorrect. This list represents a data set with a median of 10, not 8.

Choice D is incorrect. This list represents a data set with a median of 10, not 8.

Question Difficulty:

Easy

Question ID e635aede

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e635aede

In 2008, Zinah earned 14% more than in 2007, and in 2009 Zinah earned 4% more than in 2008. If Zinah earned y times as much in 2009 as in 2007, what is the value of y ?

- A. 0.5600
- B. 1.0056
- C. 1.1800
- D. 1.1856

ID: e635aede Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that in 2008 Zinah earned 14% more than in 2007. Let h represent the amount Zinah earned in 2007 and let j represent the amount that Zinah earned in 2008. This situation can be represented by the equation $j = (1 + \frac{14}{100})h$, or $j = 1.14h$. It's also given that in 2009 Zinah earned 4% more than in 2008. Let k represent the amount Zinah earned in 2009. This situation can be represented by the equation $k = (1 + \frac{4}{100})j$, or $k = 1.04j$. Substituting $1.14h$ for j in the equation $k = 1.04j$ yields $k = (1.04)(1.14h)$, or $k = 1.1856h$. If Zinah earned y times as much in 2009 as in 2007, then the value of y is 1.1856.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 67c0200a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 67c0200a

The number a is 70% less than the positive number b . The number c is 80% greater than a . The number c is how many times b ?

ID: 67c0200a Answer

Correct Answer:

.54, 27/50

Rationale

The correct answer is .54. It's given that the number a is 70% less than the positive number b . Therefore, $a = (1 - \frac{70}{100})b$, which is equivalent to $a = (1 - 0.70)b$, or $a = 0.30b$. It's also given that the number c is 80% greater than a . Therefore, $c = (1 + \frac{80}{100})a$, which is equivalent to $c = (1 + 0.80)a$, or $c = 1.80a$. Since $a = 0.30b$, substituting $0.30b$ for a in the equation $c = 1.80a$ yields $c = 1.80(0.30b)$, or $c = 0.54b$. Thus, c is 0.54 times b . Note that .54 and 27/50 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 40e7a1a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div> <div style="width: 30%; background-color: #005a9f; height: 10px;"></div>

ID: 40e7a1a9

210 is $p\%$ greater than 30. What is the value of p ?

ID: 40e7a1a9 Answer

Correct Answer:

600

Rationale

The correct answer is 600. It's given that 210 is $p\%$ greater than 30. It follows that $210 = (1 + \frac{p}{100})(30)$. Dividing both sides of this equation by 30 yields $7 = 1 + \frac{p}{100}$. Subtracting 1 from both sides of this equation yields $6 = \frac{p}{100}$. Multiplying both sides of this equation by 100 yields $p = 600$. Therefore, the value of p is 600.

Question Difficulty:

Hard

Question ID 709e04de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 709e04de

The value of z is 1.13 times 100. The value of z is what percent greater than 100?

- A. 11.3
- B. 13
- C. 130
- D. 213

ID: 709e04de Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the value of z is 1.13 times 100. This can be written as $z = (1.13)(100)$, which is equivalent to $z = (1 + 0.13)(100)$, or $z = (1 + \frac{13}{100})(100)$. It follows that the value of z is 100% of 100 plus 13% of 100. Therefore, the value of z is 13% greater than 100.

Choice A is incorrect. This gives a value of z that is 1.113, not 1.13, times 100.

Choice C is incorrect. This gives a value of z that is 2.30, not 1.13, times 100.

Choice D is incorrect. This gives a value of z that is 3.13, not 1.13, times 100.

Question Difficulty:

Medium

Question ID 949cd96b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 949cd96b

The length of the base of a certain parallelogram is **89%** of the height of the parallelogram. Which expression represents the length of the base of the parallelogram, where h is the height of the parallelogram?

- A. $89h$
- B. $0.089h$
- C. $8.9h$
- D. $0.89h$

ID: 949cd96b Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the length of the base of the parallelogram is **89%** of the height of the parallelogram. Since h is the height of the parallelogram, it follows that the length of the base of the parallelogram can be represented by the expression $\frac{89}{100}h$, or $0.89h$.

Choice A is incorrect. This expression represents **8,900%**, not **89%**, of the height of the parallelogram.

Choice B is incorrect. This expression represents **8.9%**, not **89%**, of the height of the parallelogram.

Choice C is incorrect. This expression represents **890%**, not **89%**, of the height of the parallelogram.

Question Difficulty:

Easy

Question ID 28c6bd8c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: 28c6bd8c

Where Do People Get Most of Their Medical Information?

Source	Percent of those surveyed
Doctor	63%
Internet	13%
Magazines/brochures	9%
Pharmacy	6%
Television	2%
Other/none of the above	7%

The table above shows a summary of 1,200 responses to a survey question. Based on the table, how many of those surveyed get most of their medical information from either a doctor or the Internet?

- A. 865
- B. 887
- C. 912
- D. 926

ID: 28c6bd8c Answer

Correct Answer:

C

Rationale

Choice C is correct. According to the table, 63% of survey respondents get most of their medical information from a doctor and 13% get most of their medical information from the Internet. Therefore, 76% of the 1,200 survey respondents get their information from either a doctor or the Internet, and 76% of 1,200 is 912.

Choices A, B, and D are incorrect. According to the table, 76% of survey respondents get their information from either a doctor or the Internet. Choice A is incorrect because 865 is about 72% (the percent of survey respondents who get most of their medical information from a doctor or from magazines/brochures), not 76%, of 1,200. Choice B is incorrect because 887 is about 74%, not 76%, of 1,200. Choice D is incorrect because 926 is about 77%, not 76%, of 1,200.

Question Difficulty:

Easy

Question ID 3a6ed720

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3a6ed720

Of 900,000 beads, 828,000 are silver. What percentage of the beads are silver?

- A. 8%
- B. 36%
- C. 72%
- D. 92%

ID: 3a6ed720 Answer

Correct Answer:

D

Rationale

Choice D is correct. The proportion of the beads that are silver can be written as $\frac{828,000}{900,000}$, or 0.92. Therefore, the percentage of the beads that are silver is 0.92(100), or 92%.

Choice A is incorrect. This is the percentage of the beads that are not silver.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 284303f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 284303f1

There are **250** trees in a park. Of these trees, **6%** are birch trees. How many birch trees are in the park?

- A. **6**
- B. **15**
- C. **75**
- D. **244**

ID: 284303f1 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that there are **250** trees in a park and of these trees, **6%** are birch trees. The number of birch trees in the park can be calculated by multiplying the number of trees in the park by $\frac{6}{100}$. Therefore, the number of birch trees in the park is $250 \left(\frac{6}{100} \right)$, or **15**.

Choice A is incorrect. This is the percentage of trees in the park that are birch trees, not the number of birch trees in the park.

Choice C is incorrect. This is **30%**, not **6%**, of **250**.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID ba61d95f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: ba61d95f

The population of Greenville increased by 7% from 2015 to 2016. If the 2016 population is k times the 2015 population, what is the value of k ?

- A. 0.07
- B. 0.7
- C. 1.07
- D. 1.7

ID: ba61d95f Answer

Correct Answer:

C

Rationale

Choice C is correct. Let x be the 2015 population of Greenville. It's given that the population increased by 7% from 2015 to 2016. The increase in population can be written as $(0.07)x$. The 2016 population of Greenville is given as the sum of the 2015 population of Greenville and the increase in population from 2015 to 2016. This can be rewritten as $x + (0.07)x$, or $1.07x$. Therefore, the value of k is 1.07.

Choice A is incorrect. This is the percent, represented as a decimal, that the population increased from 2015 to 2016, not the value of k .

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the value of k if the population increased by 70%, not 7%, from 2015 to 2016.

Question Difficulty:

Medium

Question ID 8cbf1415

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 8cbf1415

In a group, **40%** of the items are red. Of all the red items in the group, **30%** also have stripes. What percentage of the items in the group are red with stripes?

- A. **10%**
- B. **12%**
- C. **70%**
- D. **75%**

ID: 8cbf1415 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that in a group, **40%** of the items are red. It follows that the number of red items in the group can be represented by **$0.4x$** , where **x** represents the total number of items in the group. It's also given that of all the red items in the group, **30%** also have stripes. It follows that the number of items in the group that are red and have stripes can be represented by **$0.3(0.4x)$** , or **$0.12x$** . The expression **$0.12x$** represents **12%** of **x** . Since **x** represents the total number of items in the group, it follows that **12%** of the items in the group are red and have stripes.

Choice A is incorrect and may result from subtracting **30%** from **40%** rather than calculating **30%** of **40%**.

Choice C is incorrect and may result from adding **30%** and **40%** rather than calculating **30%** of **40%**.

Choice D is incorrect and may result from calculating the percentage that **30%** is of **40%** rather than calculating **30%** of **40%**.

Question Difficulty:

Medium

Question ID 96a45430

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 96a45430

A number n is increased 6%. If the result is 318, what is the value of n ?

- A. 199
- B. 299
- C. 300
- D. 337

ID: 96a45430 Answer

Correct Answer:

C

Rationale

Choice C is correct. The decimal equivalent of 6% is 0.06. Since increasing the number n by 6% yields the number 318, this situation can be represented by the equation $n(1 + 0.06) = 318$, or $n(1.06) = 318$. Dividing both sides of this equation by 1.06 yields $n = 300$.

Choice A is incorrect. This is the result when n is increased by 60%, not by 6%. Choice B is incorrect. This is the approximate result of decreasing 318 by 6%. Choice D is incorrect. This is the approximate result of increasing 318 by 6%.

Question Difficulty:

Medium

Question ID 5267c3c7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5267c3c7

The result of increasing the quantity x by 400% is 60. What is the value of x ?

- A. 12
- B. 15
- C. 240
- D. 340

ID: 5267c3c7 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the result of increasing the quantity x by 400% is 60. This can be written as $x + (\frac{400}{100})x = 60$, which is equivalent to $x + 4x = 60$, or $5x = 60$. Dividing each side of this equation by 5 yields $x = 12$. Therefore, the value of x is 12.

Choice B is incorrect. The result of increasing the quantity 15 by 400% is 75, not 60.

Choice C is incorrect. The result of increasing the quantity 240 by 400% is 1,200, not 60.

Choice D is incorrect. The result of increasing the quantity 340 by 400% is 1,700, not 60.

Question Difficulty:

Hard

Question ID b2f6f17d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #006699; height: 10px;"></div> <div style="width: 60%; background-color: #CCCCCC; height: 10px;"></div>

ID: b2f6f17d

A customer's monthly water bill was \$75.74. Due to a rate increase, her monthly bill is now \$79.86. To the nearest tenth of a percent, by what percent did the amount of the customer's water bill increase?

- A. 4.1%
- B. 5.1%
- C. 5.2%
- D. 5.4%

ID: b2f6f17d Answer

Correct Answer:

D

Rationale

Choice D is correct. To find the percent increase of the customer's water bill, the absolute increase of the bill, in dollars, is divided by the original amount of the bill, and the result is multiplied by 100%, as follows: $\frac{79.86 - 75.74}{75.74} \approx 0.054$; $0.054 \times 100\% = 5.4\%$.

Choice A is incorrect. This choice is the difference $79.86 - 75.74$ rounded to the nearest tenth, which is the (absolute) increase of the bill's amount, not its percent increase. Choice B is incorrect and may be the result of some calculation errors. Choice C is incorrect and is the result of dividing the difference between the two bill amounts by the new bill amount instead of the original bill amount.

Question Difficulty:

Medium

Question ID 9c44f828

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9c44f828

There are a total of **840** seats in a school auditorium. During an assembly, students occupied **50%** of the seats in the auditorium. How many seats did the students occupy during this assembly?

- A. **25**
- B. **50**
- C. **420**
- D. **790**

ID: 9c44f828 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that during an assembly, students occupied **50%** of the **840** seats in the school auditorium. Therefore, the number of seats that the students occupied during this assembly can be calculated by multiplying the number of seats in the school auditorium by $\frac{50}{100}$. Thus, the students occupied $840 \left(\frac{50}{100} \right)$, or **420**, seats during this assembly.

Choice A is incorrect. This is approximately **3%**, not **50%**, of **840**.

Choice B is incorrect. This is approximately **6%**, not **50%**, of **840**.

Choice D is incorrect. This is approximately **94%**, not **50%**, of **840**.

Question Difficulty:

Easy

Question ID c256b723

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c256b723

The amount of Hanna's bill for a food order was \$50. Hanna gave a tip of 20% of the amount of the bill. What is the amount, in dollars, of the tip Hanna gave?

ID: c256b723 Answer

Correct Answer:

10

Rationale

The correct answer is 10. It's given that the amount of Hanna's food order was \$50 and that Hanna gave a tip of 20% of the amount of the bill. 20% of 50 can be calculated as $(\frac{20}{100})(50)$, which yields $\frac{1000}{100}$, or 10. Therefore, the amount, in dollars, of the tip Hanna gave is 10.

Question Difficulty:

Medium

Question ID 273b7f37

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 273b7f37

Isabel grows potatoes in her garden. This year, she harvested **760** potatoes and saved **10%** of them to plant next year. How many of the harvested potatoes did Isabel save to plant next year?

- A. **66**
- B. **76**
- C. **84**
- D. **86**

ID: 273b7f37 Answer

Correct Answer:

B

Rationale

Choice B is correct. The number of harvested potatoes Isabel saved to plant next year can be calculated by multiplying the total number of potatoes Isabel harvested, **760**, by the proportion of potatoes she saved. Since she saved **10%** of the potatoes she harvested, the proportion of potatoes she saved is $\frac{10}{100}$, or **0.1**. Multiplying **760** by this proportion gives $760(0.1)$, or **76**, potatoes that she saved to plant next year.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 7ed0d098

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7ed0d098

Lani spent 15% of her 8-hour workday in meetings. How many minutes of her workday did she spend in meetings?

- A. 1.2
- B. 15
- C. 48
- D. 72

ID: 7ed0d098 Answer

Correct Answer:

D

Rationale

Choice D is correct. There are 60 minutes in one hour, so an 8-hour workday has $(60)(8) = 480$ minutes. To calculate 15% of 480, multiply 0.15 by 480: $(0.15)(480) = 72$. Therefore, Lani spent 72 minutes of her workday in meetings.

Choice A is incorrect because 1.2 is 15% of 8, which gives the time Lani spent of her workday in meetings in hours, not minutes. Choices B and C are incorrect and may be the result of computation errors.

Question Difficulty:

Easy

Question ID 20845d36

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 20845d36

The number a is 70% less than the positive number b . The number c is 60% greater than a . The number c is how many times b ?

ID: 20845d36 Answer

Correct Answer:

.48, 12/25

Rationale

The correct answer is .48. It's given that the number a is 70% less than the positive number b . Therefore, $a = (1 - \frac{70}{100})b$, which is equivalent to $a = (1 - 0.70)b$, or $a = 0.30b$. It's also given that the number c is 60% greater than a . Therefore, $c = (1 + \frac{60}{100})a$, which is equivalent to $c = (1 + 0.60)a$, or $c = 1.60a$. Since $a = 0.30b$, substituting $0.30b$ for a in the equation $c = 1.60a$ yields $c = 1.60(0.30b)$, or $c = 0.48b$. Thus, c is 0.48 times b . Note that .48 and 12/25 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 86684ce9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 86684ce9

The result of increasing the quantity x by 1,800% is 684. What is the value of x ?

- A. 12,996
- B. 12,312
- C. 38
- D. 36

ID: 86684ce9 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the result of increasing the quantity x by 1,800% is 684. It follows that $x + \left(\frac{1,800}{100}\right)x = 684$, which is equivalent to $x + 18x = 684$, or $19x = 684$. Dividing each side of this equation by 19 yields $x = 36$. Therefore, the value of x is 36.

Choice A is incorrect. The result of increasing the quantity 12,996 by 1,800% is 246,924, not 684.

Choice B is incorrect. The result of increasing the quantity 12,312 by 1,800% is 233,928, not 684.

Choice C is incorrect. The result of increasing the quantity 38 by 1,800% is 722, not 684.

Question Difficulty:

Hard

Question ID 623dbebb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 623dbebb

A reseller buys certain books for a purchase price of **5.00** dollars each and then marks them each for sale at a consumer price that is **270%** of the purchase price. After **4** months, any remaining books not yet sold are marked at a discounted price that is **70%** off the consumer price. What is the discounted price of each of the remaining books, in dollars?

ID: 623dbebb Answer

Correct Answer:

4.05, 81/20

Rationale

The correct answer is **4.05**. It's given that the purchase price for certain books is **5.00** dollars each. It's also given that each book is marked for sale at a consumer price that is **270%** of the purchase price. Since the consumer price is **270%** of the purchase price of **5.00** dollars, it follows that the consumer price is $(2.7)(5.00)$, or **13.50**, dollars. It's given that after **4** months, any remaining books are discounted at **70%** off the consumer price. Thus, the discount amount is $(0.7)(13.50)$, or **9.45**, dollars. Subtracting the discount amount from the consumer price gives the discounted price of each of the remaining books:

$13.50 - 9.45 = 4.05$. Note that 4.05 and 81/20 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 2afd3cec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2afd3cec

After **20%** of the original number of marbles in a group were removed from the group, **360** marbles remained in the group. How many marbles were removed from the group?

- A. **72**
- B. **90**
- C. **450**
- D. **1,800**

ID: 2afd3cec Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that **20%** of the original number of marbles were removed from the group. Let x represent the original number of marbles in the group. It follows that $\frac{20}{100}x$, or $0.20x$, marbles were removed from the group. Therefore, $x - 0.20x$ marbles remained in the group. It's also given that **360** marbles remained in the group. Thus, $x - 0.20x = 360$, or $0.80x = 360$. Dividing both sides of this equation by **0.80** yields $x = 450$. Substituting **450** for x in the expression $0.20x$ yields $0.20(450)$, or **90**. Therefore, **90** marbles were removed from the group.

Choice A is incorrect. This is **20%** of the remaining number of marbles.

Choice C is incorrect. This is the original number of marbles, not the number of marbles that were removed.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 2e92cc21

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2e92cc21

The number a is 110% greater than the number b . The number b is 90% less than 47. What is the value of a ?

ID: 2e92cc21 Answer

Correct Answer:

9.87, 987/100

Rationale

The correct answer is 9.87. It's given that the number a is 110% greater than the number b . It follows that $a = (1 + \frac{110}{100})b$, or $a = 2.1b$. It's also given that the number b is 90% less than 47. It follows that $b = (1 - \frac{90}{100})(47)$, or $b = 0.1(47)$, which yields $b = 4.7$. Substituting 4.7 for b in the equation $a = 2.1b$ yields $a = 2.1(4.7)$, which is equivalent to $a = 9.87$. Therefore, the value of a is 9.87.

Question Difficulty:

Hard

Question ID 7f84b136

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 7f84b136

The table summarizes the number of objects in each group.

Group	Number of objects
A	375
B	54
C	690
D	81
Total	1,200

The number of objects in group C is $p\%$ of the number of objects in group A. What is the value of p ?

ID: 7f84b136 Answer

Correct Answer:

184

Rationale

The correct answer is 184. It's given in the table that there are 375 objects in group A and 690 objects in group C. It's also given that the number of objects in group C is $p\%$ of the number of objects in group A. Therefore, 690 is $p\%$ of 375, which can be represented by $690 = \left(\frac{p}{100}\right)(375)$, or $690 = 3.75p$. Dividing both sides of this equation by 3.75 yields $184 = p$. Therefore, the value of p is 184.

Question Difficulty:

Medium

Question ID 77cf4fa6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 77cf4fa6

There are **170** blocks in a container. Of these blocks, **10%** are green. How many blocks in the container are green?

ID: 77cf4fa6 Answer

Correct Answer:

17

Rationale

The correct answer is **17**. It's given that there are **170** blocks in a container, and of these blocks, **10%** are green. Since **10%** can be rewritten as $\frac{10}{100}$, or **0.1**, the number of green blocks in the container is **0.1(170)**, or **17**.

Question Difficulty:

Easy

Question ID 2d31caae

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #0056b3;"></div> <div style="width: 30%; background-color: #e0e0e0;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 2d31caae

Call Ratings

	1 Star	2 Stars	3 Stars	4 Stars	Total
Employee A	16	49	72	8	145
Employee B	4	10	22	34	70
Employee C	8	56	45	16	125
Employee D	22	42	84	12	160
Total	50	157	223	70	500

A supervisor at a call center reviewed 500 calls taken by four employees and rated the employees' performance on each call on a scale from 1 star to 4 stars. The ratings for each employee are shown in the table above. According to the table, to the nearest whole percent, what percent of Employee A's calls received a rating of 1 star?

- A. 3%
- B. 11%
- C. 16%
- D. 32%

ID: 2d31caae Answer

Correct Answer:

B

Rationale

Choice B is correct. The percent of Employee A's calls that received a rating of 1 star is the number of Employee A's 1-star calls divided by the total number of Employee A's calls. This quotient, $\frac{16}{145}$, is approximately equal to 0.1103, or 11.03%. To the nearest whole percent, this is 11%.

Choice A is incorrect. This is the percent of all calls taken by Employee A that received a rating of 1 star. Choice C is incorrect and may result from a conceptual error. For example, 16 is the number, not the percent, of calls taken by Employee A that received a rating of 1 star. Choice D is incorrect. This is the percent of all calls that received a rating of 1 star that were taken by Employee A.

Question Difficulty:

Easy

Question ID ba0e23b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ba0e23b0

140 is $p\%$ greater than 10. What is the value of p ?

- A. 1,400
- B. 1,300
- C. 140
- D. 130

ID: ba0e23b0 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that 140 is $p\%$ greater than 10. It follows that $140 = 10 + \left(\frac{p}{100}\right)10$, which is equivalent to $140 = 10 + \frac{10}{100}p$, or $140 = 10 + 0.1p$. Subtracting 10 from each side of this equation yields $130 = 0.1p$. Dividing each side of this equation by 0.1 yields $1,300 = p$, or $p = 1,300$.

Choice A is incorrect. This would be the value of p if 140 were $p\%$ of 10, not $p\%$ greater than 10.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 194ae3b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 194ae3b1

There were approximately 113,000 occupational therapy jobs in the United States in 2012. The Bureau of Labor Statistics has projected that this number will increase by 29% from 2012 to 2022. Of the following, which is closest to the number of occupational therapy jobs the bureau has projected for the United States in 2022?

- A. 115,900
- B. 116,300
- C. 142,000
- D. 145,800

ID: 194ae3b1 Answer

Correct Answer:

D

Rationale

Choice D is correct. The decimal equivalent of 29% is 0.29. It's given that the 113,000 occupational therapy jobs in the United States in 2012 are projected to increase by 29% by 2022. Increasing 113,000 by 29% can be expressed as $(113,000)(1 + 0.29)$, or $(113,000)(1.29)$. Evaluating this expression yields 145,770. The closest number is 145,800 in choice D.

Choice A is incorrect and may result from increasing 113,000 by 2,900 instead of by 29%. Choice B is incorrect and may result from increasing 113,000 by 2.9% instead of by 29%. Choice C is incorrect and may result from increasing 113,000 by 29,000 instead of by 29%.

Question Difficulty:

Easy

Question ID a8fabad0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: a8fabad0

A waiter receives tips from each customer. On average, the tip is 15% of the customer's bill. At this rate, which of the following is closest to the tip the waiter can expect when a customer has a bill that is \$78.20?

- A. \$8.00
- B. \$10.00
- C. \$12.00
- D. \$14.00

ID: a8fabad0 Answer

Correct Answer:

C

Rationale

Choice C is correct. If the bill is \$78.20, 15% of the bill can be found by multiplying 78.20 by the decimal conversion of 15%, $78.20 \times 0.15 = \$11.73$. The exact amount \$11.73 is closest in value to \$12.00.

Choices A, B, and D are incorrect and may be the result of errors when calculating 15% of the total \$78.20.

Question Difficulty:

Easy

Question ID 8c5dbd3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8c5dbd3e

The number w is 110% greater than the number z . The number z is 55% less than 50. What is the value of w ?

ID: 8c5dbd3e Answer

Correct Answer:

189/4, 47.25

Rationale

The correct answer is 47.25. It's given that the number w is 110% greater than the number z . It follows that $w = (1 + \frac{110}{100})z$, or $w = 2.1z$. It's also given that the number z is 55% less than 50. It follows that $z = (1 - \frac{55}{100})(50)$, or $z = 0.45(50)$, which yields $z = 22.5$. Substituting 22.5 for z in the equation $w = 2.1z$ yields $w = 2.1(22.5)$, which is equivalent to $w = 47.25$. Therefore, the value of w is 47.25. Note that 47.25 and 189/4 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 94c65646

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Percentages	<div style="width: 20%; background-color: #005a9f;"></div> <div style="width: 20%; background-color: #005a9f;"></div> <div style="width: 60%; background-color: #e0e0e0;"></div>

ID: 94c65646

432 is 96% of what number?

ID: 94c65646 Answer

Correct Answer:

450

Rationale

The correct answer is 450. Let x represent the number that 432 is 96% of. This can be written as $(\frac{96}{100})x = 432$, or $0.96x = 432$. Dividing both sides of this equation by 0.96 yields $x = 450$. Therefore, 432 is 96% of 450.

Question Difficulty:

Medium

Question ID 0301c5dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 0301c5dc

The table below shows the number of state parks in a certain state that contain camping facilities and bicycle paths.

	Has bicycle paths	Does not have bicycle paths
Has camping facilities	20	5
Does not have camping facilities	8	4

If one of these state parks is selected at random, what is the probability that it has camping facilities but does not have bicycle paths?

- A. $\frac{5}{37}$
- B. $\frac{5}{25}$
- C. $\frac{8}{28}$
- D. $\frac{5}{9}$

ID: 0301c5dc Answer

Correct Answer:

A

Rationale

Choice A is correct. The total number of state parks in the state is $20 + 5 + 8 + 4 = 37$. According to the table, 5 of these have camping facilities but not bicycle paths. Therefore, if a state park is selected at random, the probability that it has camping facilities but not bicycle paths is $\frac{5}{37}$.

Choice B is incorrect. This is the probability that a state park selected at random from the state parks with camping facilities does not have bicycle paths. Choice C is incorrect. This is the probability that a state park selected at random from the state parks with bicycle paths does not have camping facilities. Choice D is incorrect. This is the probability that a state park selected at random from the state parks without bicycle paths does have camping facilities.

Question Difficulty:

Medium

Question ID 0ae37ff3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0ae37ff3

In a bag, there are **7** red, **4** white, **33** blue, and **33** yellow cubes. If one of these cubes is selected at random, what is the probability of selecting a cube that is neither blue nor yellow?

- A. $\frac{6}{7}$
- B. $\frac{7}{11}$
- C. $\frac{1}{3}$
- D. $\frac{1}{7}$

ID: 0ae37ff3 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that there are **7** red, **4** white, **33** blue, and **33** yellow cubes in the bag. Therefore, there are a total of **7 + 4 + 33 + 33**, or **77**, cubes in the bag. If the cube is neither blue nor yellow, then it must be either red or white. Therefore, the probability of selecting a cube that is neither blue nor yellow is equivalent to the probability of selecting a cube that is either red or white. If one of these cubes is selected at random, the probability of selecting a cube that is either red or white is equal to the sum of the number of red cubes and white cubes divided by the total number of cubes in the bag. There are **7** red cubes, **4** white cubes, and **77** total cubes in the bag. Therefore, the probability of selecting a red or white cube is $\frac{7+4}{77}$, which is equivalent to $\frac{11}{77}$, or $\frac{1}{7}$. Thus, if one cube is selected at random, the probability of selecting a cube that is neither blue nor yellow is $\frac{1}{7}$.

Choice A is incorrect. This is the probability of selecting a cube that is either blue or yellow, rather than the probability of selecting a cube that is neither blue nor yellow.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID 47624288

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 47624288

The table gives the distribution of votes for a new school mascot and grade level for 80 students.

Mascot	Grade level			
	Sixth	Seventh	Eighth	Total
Badger	4	9	9	22
Lion	9	2	9	20
Longhorn	4	6	4	14
Tiger	6	9	9	24
Total	23	26	31	80

If one of these students is selected at random, what is the probability of selecting a student whose vote for new mascot was for a lion?

- A. $\frac{1}{9}$
- B. $\frac{1}{5}$
- C. $\frac{1}{4}$
- D. $\frac{2}{3}$

ID: 47624288 Answer

Correct Answer:

C

Rationale

Choice C is correct. If one of these students is selected at random, the probability of selecting a student whose vote for the new mascot was for a lion is given by the number of votes for a lion divided by the total number of votes. The given table indicates that the number of votes for a lion is 20 votes, and the total number of votes is 80 votes. The table gives the distribution of votes for 80 students, and the table shows a total of 80 votes were counted. It follows that each of the 80 students voted exactly once. Thus, the probability of selecting a student whose vote for the new mascot was for a lion is $\frac{20}{80}$, or $\frac{1}{4}$.

Choice A is incorrect and may result from conceptual or computational errors.

Choice B is incorrect and may result from conceptual or computational errors.

Choice D is incorrect and may result from conceptual or computational errors.

Question Difficulty:

Easy

Question ID e438ec3f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e438ec3f

A grove has **6** rows of birch trees and **5** rows of maple trees. Each row of birch trees has **8** trees **20** feet or taller and **6** trees shorter than **20** feet. Each row of maple trees has **9** trees **20** feet or taller and **7** trees shorter than **20** feet. A tree from one of these rows will be selected at random. What is the probability of selecting a maple tree, given that the tree is **20** feet or taller?

- A. $\frac{9}{164}$
- B. $\frac{3}{10}$
- C. $\frac{15}{31}$
- D. $\frac{9}{17}$

ID: e438ec3f Answer

Correct Answer:

C

Rationale

Choice C is correct. If a tree from one of these rows is selected at random, the probability of selecting a maple tree, given that the tree is **20** feet or taller, is equal to the number of maple trees that are **20** feet or taller divided by the total number of trees that are **20** feet or taller. It's given that there are **6** rows of birch trees, and each row of birch trees has **8** trees that are **20** feet or taller. This means that there are a total of **6(8)**, or **48**, birch trees that are **20** feet or taller. It's given that there are **5** rows of maple trees, and each row of maple trees has **9** trees that are **20** feet or taller. This means that there are a total of **5(9)**, or **45**, maple trees that are **20** feet or taller. It follows that there are a total of **48 + 45**, or **93**, trees that are **20** feet or taller. Therefore, the probability of selecting a maple tree, given that the tree is **20** feet or taller, is $\frac{45}{93}$, or $\frac{15}{31}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID 60caadfd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 60caadfd

Each rock in a collection of **70** rocks was classified as either igneous, metamorphic, or sedimentary, as shown in the frequency table.

Classification	Frequency
igneous	10
metamorphic	33
sedimentary	27

If one of these rocks is selected at random, what is the probability of selecting a rock that is igneous?

- A. $\frac{10}{27}$
- B. $\frac{10}{33}$
- C. $\frac{10}{60}$
- D. $\frac{10}{70}$

ID: 60caadfd Answer

Correct Answer:

D

Rationale

Choice D is correct. If one of the rocks in the collection is selected at random, the probability of selecting a rock that is igneous is equal to the number of igneous rocks in the collection divided by the total number of rocks in the collection. According to the table, there are **10** igneous rocks in the collection, and it's given that there's a total of **70** rocks in the collection. Therefore, if one of the rocks in the collection is selected at random, the probability of selecting a rock that is igneous is $\frac{10}{70}$.

Choice A is incorrect. This is the number of igneous rocks in the collection divided by the number of sedimentary rocks in the collection, not divided by the total number of rocks in the collection.

Choice B is incorrect. This is the number of igneous rocks in the collection divided by the number of metamorphic rocks in the collection, not divided by the total number of rocks in the collection.

Choice C is incorrect. This is the number of igneous rocks in the collection divided by the number of rocks in the collection that aren't igneous, not divided by the total number of rocks in the collection.

Question Difficulty:

Easy

Question ID e5b5fbdd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: e5b5fbdd

Of the 8 planets in our solar system, 4 are considered rocky. If a student randomly selects 1 of those 8 planets as a topic for a report, what is the probability that the selected planet will be rocky?

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. 2

ID: e5b5fbdd Answer

Correct Answer:

C

Rationale

Choice C is correct. If one of these planets is selected at random, the probability that the selected planet will be rocky is calculated by dividing the number of planets that are considered rocky by the total number of planets. It's given that 4 of the 8 total planets

are considered rocky. Therefore, the probability that the selected planet will be rocky is $\frac{4}{8}$, which is equivalent to $\frac{1}{2}$.

Choices A and B are incorrect. These represent the probability if 1 of the 8 planets was considered rocky (choice A) and if 2 of the 8 planets were considered rocky (choice B). Choice D is incorrect and may result from dividing the total number of planets by the number of planets that are considered rocky.

Question Difficulty:

Easy

Question ID 1fc4f47b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 1fc4f47b

At a movie theater, there are a total of **350** customers. Each customer is located in either theater A, theater B, or theater C. If one of these customers is selected at random, the probability of selecting a customer who is located in theater A is **0.48**, and the probability of selecting a customer who is located in theater B is **0.24**. How many customers are located in theater C?

- A. **28**
- B. **40**
- C. **84**
- D. **98**

ID: 1fc4f47b Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that at a movie theater, there are a total of **350** customers and that each customer is located in either theater A, theater B, or theater C. If the probability of selecting a customer in theater A is **0.48**, then $(0.48)(350)$, or **168**, customers are located in theater A. If the probability of selecting a customer in theater B is **0.24**, then $(0.24)(350)$, or **84**, customers are located in theater B. It follows that there are **168 + 84**, or **252**, customers in theater A and theater B. Therefore, there are **350 – 252**, or **98**, customers in theater C.

Choice A is incorrect. This is the percent, not the number, of the customers that are located in theater C.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the number of customers that are located in theater B, not theater C.

Question Difficulty:

Medium

Question ID 2905ded0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2905ded0

	Live east of the river	Live west of the river	Total
Less than 40 years old	17	11	28
At least 40 years old	18	89	107
Total	35	100	135

The table summarizes members of a local organization by age and whether they live east or west of the river. If a member of the organization is selected at random, what is the probability that the selected member is at least **40** years old?

- A. $\frac{28}{135}$
- B. $\frac{35}{135}$
- C. $\frac{100}{135}$
- D. $\frac{107}{135}$

ID: 2905ded0 Answer

Correct Answer:

D

Rationale

Choice D is correct. If a member of the organization is selected at random, the probability that the selected member is at least **40** years old is equal to the number of members who are at least **40** years old divided by the total number of members. According to the table, there are a total of **135** members of the organization, and **107** of these members are at least **40** years old. Therefore, the probability that the selected member is at least **40** years old is $\frac{107}{135}$.

Choice A is incorrect. This is the probability that the selected member is less than **40** years old.

Choice B is incorrect. This is the probability that the selected member lives east of the river.

Choice C is incorrect. This is the probability that the selected member lives west of the river.

Question Difficulty:

Easy

Question ID 2df8f293

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 2df8f293

Each vertex of a **14**-sided polygon is labeled with one of the **14** letters **A** through **N**, with a different letter at each vertex. If one vertex is selected at random, what is the probability that the letter **D** will be at the selected vertex? (Express your answer as a decimal or fraction, not as a percent.)

ID: 2df8f293 Answer

Correct Answer:

.0714, 1/14

Rationale

The correct answer is $\frac{1}{14}$. If one vertex of the polygon is selected at random, the probability that the letter **D** will be at the selected vertex is equal to the number of vertices labeled with the letter **D** divided by the total number of vertices. It's given that each vertex is labeled with one of the **14** letters **A** through **N**, with a different letter at each vertex. It follows that there is **1** vertex labeled with the letter **D**. It's also given that the polygon is **14**-sided. It follows that there are a total of **14** vertices. Thus, the probability that the letter **D** will be at the selected vertex is $\frac{1}{14}$. Note that 1/14, .0714, and 0.071 are examples of ways to enter a correct answer.

Question Difficulty:

Medium

Question ID ec7b0eb8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 75%; background-color: #e0e0e0;"></div>

ID: ec7b0eb8

Texting behavior	Talks on cell phone daily	Does not talk on cell phone daily	Total
Light	110	146	256
Medium	139	164	303
Heavy	166	74	240
Total	415	384	799

In a study of cell phone use, 799 randomly selected US teens were asked how often they talked on a cell phone and about their texting behavior. The data are summarized in the table above. If one of the 799 teens surveyed is selected at random, what is the probability that the teen talks on a cell phone daily?

A. $\frac{1}{799}$

B. $\frac{415}{799}$

C. $\frac{384}{415}$

D. $\frac{384}{799}$

ID: ec7b0eb8 Answer

Correct Answer:

B

Rationale

Choice B is correct. If one of the teens surveyed is selected at random, the probability that the teen talks on a cell phone daily is equal to the quotient of the total number of teens who reported that they talk on a cell phone daily, 415, and the total number of

teens surveyed, 799. Therefore, this probability is equal to $\frac{415}{799}$.

Choice A is incorrect. This fraction represents the probability of selecting at random any one of the 799 teens surveyed. Choice C is incorrect and may result from conceptual errors. Choice D is incorrect. This fraction represents the probability of selecting at random one of the 799 teens surveyed who doesn't talk on a cell phone daily.

Question Difficulty:
Easy

Question ID 79201024

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 79201024

A band with **45** members has **11** members who play saxophone. If one band member is selected at random, what is the probability of selecting a band member who plays saxophone?

- A. $\frac{1}{45}$
- B. $\frac{11}{45}$
- C. $\frac{34}{45}$
- D. $\frac{45}{45}$

ID: 79201024 Answer

Correct Answer:

B

Rationale

Choice B is correct. The probability of an event occurring is the ratio of the number of favorable outcomes to the total number of possible outcomes. It's given that there are **45** band members, which is the total number of possible outcomes. It's also given that there are **11** band members who play saxophone. Therefore, the number of favorable outcomes is **11**. Thus, the probability of selecting a band member who plays saxophone is $\frac{11}{45}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the probability of selecting a band member who does not play saxophone.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 585de39a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 585de39a

On May 10, 2015, there were 83 million Internet subscribers in Nigeria. The major Internet providers were MTN, Globacom, Airtel, Etisalat, and Visafone. By September 30, 2015, the number of Internet subscribers in Nigeria had increased to 97 million. If an Internet subscriber in Nigeria on September 30, 2015, is selected at random, the probability that the person selected was an MTN subscriber is 0.43. There were p million MTN subscribers in Nigeria on September 30, 2015. To the nearest integer, what is the value of p ?

ID: 585de39a Answer

Rationale

The correct answer is 42. It's given that in Nigeria on September 30, 2015, the probability of selecting an MTN subscriber from all Internet subscribers is 0.43, that there were p million, or $p(1,000,000)$, MTN subscribers, and that there were 97 million, or 97,000,000, Internet subscribers. The probability of selecting an MTN subscriber from all Internet subscribers can be found by dividing the number of MTN subscribers by the total number of Internet subscribers. Therefore, the equation

$$\frac{p(1,000,000)}{97,000,000} = 0.43$$

can be used to solve for p . Dividing 1,000,000 from the numerator and denominator of the expression on the left-hand side yields $\frac{p}{97} = 0.43$. Multiplying both sides of this equation by 97 yields $p = (0.43)(97) = 41.71$, which, to the nearest integer, is 42.

Question Difficulty:

Hard

Question ID 12dbe3de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 12dbe3de

A store received a shipment of 1,000 MP3 players, 4 of which were defective. If an MP3 player is randomly selected from this shipment, what is the probability that it is defective?

- A. 0.004
- B. 0.04
- C. 0.4
- D. 4

ID: 12dbe3de Answer

Correct Answer:

A

Rationale

Choice A is correct. The probability of randomly selecting a defective MP3 player from the shipment is equal to the number of defective MP3 players divided by the total number of MP3 players in the shipment. Therefore, the probability is $\frac{4}{1,000}$, which is equivalent to 0.004.

Choice B is incorrect because 0.04 represents 4 defective MP3 players out of 100 rather than out of 1,000. Choice C is incorrect because 0.4 represents 4 defective MP3 players out of 10 rather than out of 1,000. Choice D is incorrect. This is the number of defective MP3 players in the shipment.

Question Difficulty:

Easy

Question ID 912cd125

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 912cd125

For a science project, Anka recorded whether it rained each weekday and weekend day for 12 weeks. Her results are summarized in the table below.

Weekday and Weekend Day Rain for 12 Weeks

	Rain	No rain	Total
Number of weekdays	12	48	60
Number of weekend days	8	16	24
Total	20	64	84

If one of the days on which there was no rain is selected at random, what is the probability the day was a weekend day?

A. $\frac{4}{21}$

B. $\frac{1}{4}$

C. $\frac{2}{3}$

D. $\frac{3}{4}$

ID: 912cd125 Answer

Correct Answer:

B

Rationale

Choice B is correct. There were 64 days with no rain. It was a weekend day for 16 of those 64 days. So 16 out of 64 of the days with no rain were weekend days. Because the day is selected at random, each day has an equal chance of being selected, so the

probability is $\frac{16}{64} = \frac{1}{4}$.

Choice A is incorrect. It is the probability that a day selected at random from any one of the days during the 12 weeks is a weekend day with no rain. Choice C is incorrect. It is the probability that a day selected at random from the weekend days has no rain.

Choice D is incorrect. It is the probability that a day selected at random from the days with no rain is a weekday.

Question Difficulty:

Medium

Question ID 6a715bed

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 6a715bed

The table summarizes the distribution of age and assigned group for **90** participants in a study.

	0–9 years	10–19 years	20+ years	Total
Group A	7	14	9	30
Group B	6	4	20	30
Group C	17	12	1	30
Total	30	30	30	90

One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least **10** years of age? (Express your answer as a decimal or fraction, not as a percent.)

ID: 6a715bed Answer

Correct Answer:

.3833, 23/60

Rationale

The correct answer is $\frac{23}{60}$. It's given that one of the participants will be selected at random. The probability of selecting a participant from group A given that the participant is at least **10** years of age is the number of participants in group A who are at least **10** years of age divided by the total number of participants who are at least **10** years of age. The table shows that in group A, there are **14** participants who are **10–19** years of age and **9** participants who are **20+** years of age. Therefore, there are **14 + 9**, or **23**, participants in group A who are at least **10** years of age. The table also shows that there are a total of **30** participants who are **10–19** years of age and **30** participants who are **20+** years of age. Therefore, there are a total of **30 + 30**, or **60**, participants who are at least **10** years of age. It follows that the probability of selecting a participant from group A given that the participant is at least **10** years of age is $\frac{23}{60}$. Note that $23/60$, .3833, and 0.383 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 30db8f77

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 30db8f77

At a conference, there are a total of **275** attendees. Each attendee is assigned to either group A, group B, or group C. If one of these attendees is selected at random, the probability of selecting an attendee who is assigned to group A is **0.44** and the probability of selecting an attendee who is assigned to group B is **0.24**. How many attendees are assigned to group C?

ID: 30db8f77 Answer

Correct Answer:

88

Rationale

The correct answer is **88**. It's given that there are a total of **275** attendees and each attendee is assigned to either group A, group B, or group C. It's also given that if one of these attendees is selected at random, the probability of selecting an attendee who is assigned to group A is **0.44** and the probability of selecting an attendee who is assigned to group B is **0.24**. It follows that there are **0.44(275)**, or **121**, attendees who are assigned to group A and **0.24(275)**, or **66**, attendees who are assigned to group B. The number of attendees who are assigned to group C is the number of attendees who are not assigned to group A or group B. In other words, the number of attendees who are assigned to group C is the total number of attendees minus the number of attendees who are assigned to group A and group B. Therefore, the number of attendees who are assigned to group C is **275 – 121 – 66**, or **88**.

Question Difficulty:

Medium

Question ID 2a08d878

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2a08d878

There are n nonfiction books and 12 fiction books on a bookshelf. If one of these books is selected at random, what is the probability of selecting a nonfiction book, in terms of n ?

- A. $\frac{n}{12}$
- B. $\frac{n}{n+12}$
- C. $\frac{12}{n}$
- D. $\frac{12}{n+12}$

ID: 2a08d878 Answer

Correct Answer:

B

Rationale

Choice B is correct. Since there are n nonfiction and 12 fiction books on the bookshelf, $n + 12$ represents the total number of books. If one of these books is selected at random, the probability of selecting a nonfiction book is equivalent to the number of nonfiction books divided by the total number of books. Therefore, the probability of selecting a nonfiction book, in terms of n , is $\frac{n}{n+12}$.

Choice A is incorrect. This expression represents the number of nonfiction books divided by the number of fiction books. Choice C is incorrect. This expression represents the number of fiction books divided by the number of nonfiction books. Choice D is incorrect. This expression represents the probability of selecting a fiction book.

Question Difficulty:

Easy

Question ID 38a9ac45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 38a9ac45

If 1,200 customers register for new accounts at a social media website every day, what fraction of the first 60,000 new accounts are registered in the first 5 days?

A. $\frac{1}{5}$

B. $\frac{1}{10}$

C. $\frac{1}{12}$

D. $\frac{1}{50}$

ID: 38a9ac45 Answer

Correct Answer:

B

Rationale

Choice B is correct. If 1,200 customers register for new accounts every day, then $(1,200)(5) = 6,000$ customers registered for new accounts in the first 5 days. Therefore, of the first 60,000 new accounts that were registered, $\frac{6,000}{60,000}$, or $\frac{1}{10}$, were registered in the first 5 days.

Choice A is incorrect. The fraction $\frac{1}{5}$ represents the fraction of accounts registered in 1 of the first 5 days. Choice C is incorrect

and may result from conceptual or computation errors. Choice D is incorrect. The fraction $\frac{1}{50}$ represents the fraction of the first 60,000 accounts that were registered in 1 day.

Question Difficulty:

Medium

Question ID a478f9f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: a478f9f5

Each of 157 gemstones can be classified as one of three classifications, as shown in the frequency table.

Classification	Frequency
color X	119
color Y	3
color Z	35

If one of the gemstones is selected at random, what is the probability of selecting a gemstone of color Y?

- A. $\frac{3}{157}$
- B. $\frac{35}{157}$
- C. $\frac{119}{157}$
- D. $\frac{154}{157}$

ID: a478f9f5 Answer

Correct Answer:

A

Rationale

Choice A is correct. If one of the gemstones is selected at random, the probability of selecting a gemstone of color Y is equal to the number of gemstones of color Y divided by the total number of gemstones. According to the table, there are 3 gemstones of color Y, and it's given that the total number of gemstones is 157. Therefore, if one of the gemstones is selected at random, the probability of selecting a gemstone of color Y is $\frac{3}{157}$.

Choice B is incorrect. This is the probability of selecting a gemstone of color Z.

Choice C is incorrect. This is the probability of selecting a gemstone of color X.

Choice D is incorrect. This is the probability of selecting a gemstone that's not of color Y.

Question Difficulty:

Easy

Question ID dae79de4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: dae79de4

	1 visit	2 or more visits	Total
Less than 40 years old	15	15	30
At least 40 years old	20	85	105
Total	35	100	135

The table summarizes customers who visited a car dealership in the last month by age and number of visits they made to the dealership. If a customer from the last month is selected at random, what is the probability that the selected customer is at least 40 years old?

- A. $\frac{30}{135}$
- B. $\frac{35}{135}$
- C. $\frac{100}{135}$
- D. $\frac{105}{135}$

ID: dae79de4 Answer

Correct Answer:

D

Rationale

Choice D is correct. Based on the table, there are a total of 135 customers who visited the car dealership in the last month, and 105 of these customers are at least 40 years old. If a customer from the last month is selected at random, the probability that the selected customer is at least 40 years old is equal to the number of customers who are at least 40 years old divided by the total number of customers. Therefore, the probability that the selected customer is at least 40 years old is $\frac{105}{135}$.

Choice A is incorrect. This is the probability that the selected customer is less than 40 years old.

Choice B is incorrect. This is the probability that the selected customer visited the dealership 1 time in the last month.

Choice C is incorrect. This is the probability that the selected customer visited the dealership 2 or more times in the last month.

Question Difficulty:

Easy

Question ID b6569d0e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b6569d0e

United States
Presidents
from 1789 to
2015

Ages	Number
40–44	2
45–49	7
50–54	13
55–59	11
60–64	7
65–69	3

The table above gives the number of United States presidents from 1789 to 2015 whose age at the time they first took office is within the interval listed. Of those presidents who were at least 50 years old when they first took office, what fraction were at least 60 years old?

A. $\frac{10}{43}$

B. $\frac{10}{34}$

C. $\frac{10}{24}$

D. $\frac{25}{34}$

ID: b6569d0e Answer

Correct Answer:

B

Rationale

Choice B is correct. The sample space is restricted to the presidents who were at least 50 years old when they first took office. Therefore, the sum of the values in the final four rows of the table, $13 + 11 + 7 + 3 = 34$, is the total number of presidents in the

sample space. The number of presidents who were at least 60 years old is the sum of the values in the final two rows of the table: $7 + 3 = 10$. Thus, the fraction of the 34 presidents who were at least 50 years old when they first took office who were at least 60 years old is $\frac{10}{34}$.

Choice A is incorrect. This is the fraction of all presidents in the table who were at least 60 years old when they first took office. Choice C is incorrect and may result from treating the number of presidents who were between 50 and 59 years old when they first took office, instead of the number of presidents who were at least 50 years old, as the sample space. Choice D is incorrect and may result from a calculation error.

Question Difficulty:

Medium

Question ID 5dc386fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5dc386fb

The table below shows the distribution of US states according to whether they have a state-level sales tax and a state-level income tax.

2013 State-Level Taxes

	State sales tax	No state sales tax
State income tax	39	4
No state income tax	6	1

To the nearest tenth of a percent, what percent of states with a state-level sales tax do not have a state-level income tax?

- A. 6.0%
- B. 12.0%
- C. 13.3%
- D. 14.0%

ID: 5dc386fb Answer

Correct Answer:

C

Rationale

Choice C is correct. The sum of the number of states with a state-level sales tax is $39 + 6 = 45$. Of these states, 6 don't have a state-level income tax. Therefore, $\frac{6}{45} = 0.1333\dots$, or about 13.3%, of states with a state-level sales tax don't have a state-level income tax.

Choice A is incorrect. This is the number of states that have a state-level sales tax and no state-level income tax. Choice B is incorrect. This is the percent of states that have a state-level sales tax and no state-level income tax. Choice D is incorrect. This is the percent of states that have no state-level income tax.

Question Difficulty:

Hard

Question ID 014c47ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #005a9f; height: 10px;"></div>

ID: 014c47ab

	Site A	Site B	Total
Tulip	35	15	50
Daffodil	31	21	52
Total	66	36	102

The table shows the distribution of two types of flowers at two different sites. If a flower represented in the table is selected at random, what is the probability of selecting a flower from site A, given that the flower is a tulip? (Express your answer as a decimal or fraction, not as a percent.)

ID: 014c47ab Answer

Correct Answer:

0.7, 7/10

Rationale

The correct answer is $\frac{35}{50}$. Based on the table, there are a total of 50 tulips, and 35 of these tulips are from site A. The probability of selecting at random a flower from site A, given that the flower is a tulip, is equal to the number of tulips from site A divided by the total number of tulips, which can be written as $\frac{35}{50}$, or $\frac{7}{10}$. Note that 35/50, 7/10, and .7 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 1b8e412e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 1b8e412e

$-11, -9, 26$

A data set of three numbers is shown. If a number from this data set is selected at random, what is the probability of selecting a positive number?

- A. 0
- B. $\frac{1}{3}$
- C. $\frac{2}{3}$
- D. 1

ID: 1b8e412e Answer

Correct Answer:

B

Rationale

Choice B is correct. The probability of selecting a positive number is the number of positive numbers in the data set divided by the total number of numbers in the data set. There is 1 positive number in this data set. There are 3 total numbers in this data set. Thus, if a number from this data set is selected at random, the probability of selecting a positive number is $\frac{1}{3}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the probability of selecting a negative number from this data set.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 89f20d9e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 89f20d9e

The table summarizes the distribution of age and assigned group for **90** participants in a study.

	0–9 years	10–19 years	20+ years	Total
Group A	5	17	8	30
Group B	6	8	16	30
Group C	19	5	6	30
Total	30	30	30	90

One of these participants will be selected at random. What is the probability of selecting a participant from group A, given that the participant is at least **10** years of age?

- A. $\frac{5}{18}$
- B. $\frac{5}{12}$
- C. $\frac{17}{30}$
- D. $\frac{5}{6}$

ID: 89f20d9e Answer

Correct Answer:

B

Rationale

Choice B is correct. Since the participant will be selected at random, the probability of selecting a participant from group A, given that the participant is at least **10** years of age, is equal to the number of participants from group A who are at least **10** years of age divided by the total number of participants who are at least **10** years of age. Based on the table, in group A, there are **17** participants who are **10–19** years of age and **8** participants who are **20+** years of age. Therefore, there are a total of **17 + 8**, or **25**, participants in group A who are at least **10** years of age. Based on the table, of the total number of participants, there are **30** participants who are **10–19** years of age and **30** participants who are **20+** years of age. Therefore, a total of **30 + 30**, or **60**, of the participants are at least **10** years of age. Thus, the probability of selecting a participant from group A, given that the participant is at least **10** years of age, is $\frac{25}{60}$, or $\frac{5}{12}$.

Choice A is incorrect. This is the number of participants from group A who are at least **10** years of age divided by the total number of participants, rather than divided by the number of participants who are at least **10** years of age.

Choice C is incorrect. This is the probability of randomly selecting a participant from group A, given that the participant is **10–19** years of age, rather than given that the participant is at least **10** years of age.

Choice D is incorrect. This is the probability of randomly selecting a participant who is at least **10** years of age, given that the participant is in group A.

Question Difficulty:
Hard

Question ID b8150b17

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: b8150b17

For a particular machine that produces beads, **29** out of every **100** beads it produces have a defect. A bead produced by the machine will be selected at random. What is the probability of selecting a bead that has a defect?

- A. $\frac{1}{2,900}$
- B. $\frac{1}{29}$
- C. $\frac{29}{100}$
- D. $\frac{29}{10}$

ID: b8150b17 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that **29** out of every **100** beads that the machine produces have a defect. It follows that if the machine produces k beads, then the number of beads that have a defect is $\frac{29}{100}k$, for some constant k . If a bead produced by the machine will be selected at random, the probability of selecting a bead that has a defect is given by the number of beads with a defect, $\frac{29}{100}k$, divided by the number of beads produced by the machine, k . Therefore, the probability of selecting a bead that has a defect is $\frac{\frac{29}{100}k}{k}$, or $\frac{29}{100}$.

Choice A is incorrect and may result from conceptual or computational errors.

Choice B is incorrect and may result from conceptual or computational errors.

Choice D is incorrect and may result from conceptual or computational errors.

Question Difficulty:

Easy

Question ID 1dcea480

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 1dcea480

A bag contains a total of 60 marbles. A marble is to be chosen at random from the bag. If the probability that a blue marble will be chosen is 0.35, how many marbles in the bag are blue?

- A. 21
- B. 25
- C. 35
- D. 39

ID: 1dcea480 Answer

Rationale

Choice A is correct. Multiplying the number of marbles in the bag by the probability of selecting a blue marble gives the number of blue marbles in the bag. Since the bag contains a total of 60 marbles and the probability that a blue marble will be selected from the bag is 0.35, there are a total of $(0.35)(60) = 21$ blue marbles in the bag.

Choice B is incorrect and may result from subtracting 35 from 60. Choice C is incorrect. This would be the number of blue marbles in the bag if there were a total of 100 marbles, not 60 marbles. Choice D is incorrect. This is the number of marbles in the bag that aren't blue.

Question Difficulty:

Easy

Question ID c943acba

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c943acba

On a street with **7** houses, **2** houses are blue. If a house from this street is selected at random, what is the probability of selecting a house that is blue?

- A. $\frac{1}{7}$
- B. $\frac{2}{7}$
- C. $\frac{5}{7}$
- D. $\frac{7}{7}$

ID: c943acba Answer

Correct Answer:

B

Rationale

Choice B is correct. If a house from the street is selected at random, the probability of selecting a house that is blue is equal to the number of houses on the street that are blue divided by the total number of houses on the street. Since there are **2** blue houses on a street with **7** total houses, the probability of selecting a house that is blue from this street is $\frac{2}{7}$.

Choice A is incorrect. This is the probability of selecting a house that is blue from a street on which **1** of the **7** houses is blue.

Choice C is incorrect. This is the probability of selecting a house that is not blue from this street.

Choice D is incorrect. This is the probability of selecting a house that is blue from a street on which all the houses are blue.

Question Difficulty:

Easy

Question ID a3384df0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: a3384df0

Penguin Exhibit			
Type of penguin	Male	Female	Total
Chinstrap	41	59	100
Emperor	8	27	35
Gentoo	49	54	103
Macaroni	42	40	82
Total	140	180	320

The number of penguins in a zoo exhibit, sorted by gender and type of penguin, is shown in the table above. Which type of penguin has a female population that is the

closest to being $\frac{1}{3}$ of the total female penguin population in the exhibit?

- A. Chinstrap
- B. Emperor
- C. Gentoo
- D. Macaroni

ID: a3384df0 Answer

Correct Answer:

A

Rationale

Choice A is correct. It is given that there are 180 female penguins in the exhibit. Therefore, $\frac{1}{3}$ of the female penguins is $\frac{1}{3} \times 180 = 60$ penguins. According to the table, there are 59 female chinstrap penguins, 27 female emperor penguins, 54 female gentoo penguins, and 40 female macaroni penguins. So the female chinstrap penguin population is the closest to 60, or $\frac{1}{3}$ of the total female population in the exhibit.

Choices B, C, and D are incorrect and may result from reading data from the table incorrectly. Since the total female penguin population is 180, $\frac{1}{3}$ of the total female penguin population is 60. The numbers of female emperor (27), female gentoo (54), and female macaroni (40) penguins are not as close to 60 as the number of female chinstrap penguins (59).

Question Difficulty:

Medium

Question ID 0a99e5bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Probability and conditional probability	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0a99e5bb

-13, 4, 23

A data set of three numbers is shown. If a number from this data set is selected at random, what is the probability of selecting a negative number?

- A. 0
- B. $\frac{1}{3}$
- C. $\frac{2}{3}$
- D. 1

ID: 0a99e5bb Answer

Correct Answer:

B

Rationale

Choice B is correct. If a number from the data set is selected at random, the probability of selecting a negative number is the count of negative numbers in the data set divided by the total count of numbers in the data set. It's given that a data set of three numbers is shown. It follows that the total count of numbers in the data set is 3. In the data set shown, -13 is the only negative number. It follows that the count of negative numbers in the data set is 1. Therefore, if a number from the data set is selected at random, the probability of selecting a negative number is $\frac{1}{3}$.

Choice A is incorrect. This is the probability of selecting a negative number from a data set that doesn't contain any negative numbers.

Choice C is incorrect. This is the probability of selecting a positive number, not a negative number, from the data set.

Choice D is incorrect. This is the probability of selecting a negative number from a data set that contains only negative numbers.

Question Difficulty:

Easy

Question ID e9841407

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e9841407

Shaquan has 7 red cards and 28 blue cards. What is the ratio of red cards to blue cards that Shaquan has?

- A. 1 to 4
- B. 4 to 1
- C. 1 to 7
- D. 7 to 1

ID: e9841407 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that Shaquan has 7 red cards and 28 blue cards. Therefore, the ratio of red cards to blue cards that Shaquan has is 7 to 28. This ratio can be reduced by dividing both parts of the ratio by 7, which yields the ratio 1 to 4.

Choice B is incorrect. This is the ratio of blue cards to red cards that Shaquan has. Choice C is incorrect and may result from a calculation error when reducing the ratio. Choice D is incorrect. This may result from finding the ratio of blue cards to red cards, or 28 to 7, and then making a calculation error when reducing the ratio.

Question Difficulty:

Easy

Question ID 1b403590

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1b403590

An object has a mass of **168** grams and a volume of **24** cubic centimeters. What is the density, in grams per cubic centimeter, of the object?

- A. **7**
- B. **144**
- C. **192**
- D. **4,032**

ID: 1b403590 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that the object has a mass of **168** grams and a volume of **24** cubic centimeters. Dividing the mass, in grams, of the object by the volume, in cubic centimeters, of the object gives the density, in grams per cubic centimeter, of the object. It follows that the density of the object is $\frac{168 \text{ grams}}{24 \text{ cubic centimeters}}$, which is equivalent to $\frac{168}{24}$ grams per cubic centimeter, or **7** grams per cubic centimeter.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID c81499e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c81499e1

A giant armadillo has a mass of **39** kilograms. What is the giant armadillo's mass in **grams**? (**1 kilogram = 1,000 grams**)

ID: c81499e1 Answer

Correct Answer:

39000

Rationale

The correct answer is **39,000**. It's given that the giant armadillo has a mass of **39** kilograms. Since **1** kilogram is equal to **1,000** grams, **39** kilograms is equal to **39 kilograms** $\left(\frac{1,000 \text{ grams}}{1 \text{ kilogram}}\right)$, or **39,000** grams. Therefore, the giant armadillo's mass, in grams, is **39,000**.

Question Difficulty:

Easy

Question ID 0700a2d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0700a2d5

How many yards are equivalent to **77** rods? (**5.5 yards = 1 rod**)

ID: 0700a2d5 Answer

Correct Answer:

423.5, 847/2

Rationale

The correct answer is **423.5**. It's given that **5.5 yards = 1 rod**. Therefore, **77** rods is equivalent to $(77 \text{ rods}) \left(\frac{5.5 \text{ yards}}{1 \text{ rod}} \right)$, or **423.5** yards. Note that 423.5 and 847/2 are examples of ways to enter a correct answer.

Question Difficulty:

Easy

Question ID 3638f413

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 3638f413

Jeremy deposited x dollars in his investment account on January 1, 2001. The amount of money in the account doubled each year until Jeremy had 480 dollars in his investment account on January 1, 2005. What is the value of x ?

ID: 3638f413 Answer

Rationale

The correct answer is 30. The situation can be represented by the equation $x(2^4) = 480$, where the 2 represents the fact that the amount of money in the account doubled each year and the 4 represents the fact that there are 4 years between January 1, 2001, and January 1, 2005. Simplifying $x(2^4) = 480$ gives $16x = 480$. Therefore, $x = 30$.

Question Difficulty:

Hard

Question ID 445dd032

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 445dd032

Tanya earns \$13.50 per hour at her part-time job. When she works z hours, she earns $13.50z$ dollars. Which of the following expressions gives the amount, in dollars, Tanya will earn if she works $3z$ hours?

- A. $3(13.50z)$
- B. $3 + 13.50z$
- C. $3z + 13.50z$
- D. $13.50(z + 3)$

ID: 445dd032 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that when Tanya works z hours, she earns $13.50z$ dollars. Since her hourly rate is constant, if she works 3 times as many hours, or $3z$ hours, she will earn 3 times as many dollars, or $3(13.50z)$.

Choice B is incorrect. This expression represents adding 3 dollars to the $13.50z$ dollars Tanya will earn. Choice C is incorrect. This expression can be rewritten as $16.50z$, which implies that Tanya earns \$16.50 per hour, not \$13.50. Choice D is incorrect. This expression adds 3 to the number of hours Tanya works, rather than multiplying the hours she works by 3.

Question Difficulty:

Medium

Question ID fe1ec415

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: fe1ec415

A cherry pitting machine pits **12** pounds of cherries in **3** minutes. At this rate, how many minutes does it take the machine to pit **96** pounds of cherries?

- A. **8**
- B. **15**
- C. **24**
- D. **36**

ID: fe1ec415 Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the cherry pitting machine pits **12** pounds of cherries in **3** minutes. This rate can be written as $\frac{12 \text{ pounds of cherries}}{3 \text{ minutes}}$. If the number of minutes it takes the machine to pit **96** pounds of cherries is represented by x , the value of x can be calculated by solving the equation $\frac{12 \text{ pounds of cherries}}{3 \text{ minutes}} = \frac{96 \text{ pounds of cherries}}{x \text{ minutes}}$, which can be rewritten as $\frac{12}{3} = \frac{96}{x}$, or $4 = \frac{96}{x}$. Multiplying each side of this equation by x yields $4x = 96$. Dividing each side of this equation by 4 yields $x = 24$. Therefore, it takes the machine **24** minutes to pit **96** pounds of cherries.

Choice A is incorrect. This is the number of minutes it takes the machine to pit **32**, not **96**, pounds of cherries.

Choice B is incorrect. This is the number of minutes it takes the machine to pit **60**, not **96**, pounds of cherries.

Choice D is incorrect. This is the number of minutes it takes the machine to pit **144**, not **96**, pounds of cherries.

Question Difficulty:

Easy

Question ID ba62b0b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: ba62b0b0

A kangaroo has a mass of **28** kilograms. What is the kangaroo's mass, in grams? (**1 kilogram = 1,000 grams**)

- A. **28,000**
- B. **1,028**
- C. **972**
- D. **784**

ID: ba62b0b0 Answer

Correct Answer:

A

Rationale

Choice A is correct. It's given that a kangaroo has a mass of **28** kilograms and that **1** kilogram is equal to **1,000** grams. Therefore, the kangaroo's mass, in grams, is **28 kilograms** $\left(\frac{1,000 \text{ grams}}{1 \text{ kilogram}} \right)$, which is equivalent to **28,000** grams.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

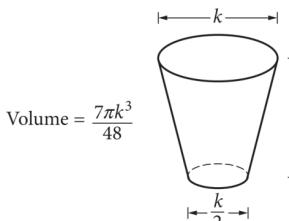
Question Difficulty:

Easy

Question ID 939c46d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 939c46d1



The glass pictured above can hold a maximum volume of 473 cubic centimeters, which is approximately 16 fluid ounces. Jenny has a pitcher that contains 1 gallon of water. How many times could Jenny completely fill the glass with 1 gallon of water?

(1 gallon = 128 fluid ounces)

- A. 16
- B. 8
- C. 4
- D. 3

ID: 939c46d1 Answer

Correct Answer:

B

Rationale

Choice A is correct. It is given that the volume of the glass is approximately 16 fluid ounces. If Jenny has 1 gallon of water, which is 128 fluid ounces, she could fill the glass $\frac{128}{16} = 8$ times.

Choice A is incorrect because Jenny would need 16×16 fluid ounces = 256 fluid ounces, or 2 gallons, of water to fill the glass 16 times. Choice C is incorrect because Jenny would need only 4×16 fluid ounces = 64 fluid ounces of water to fill the glass 4 times. Choice D is incorrect because Jenny would need only 3×16 fluid ounces = 48 fluid ounces to fill the glass 3 times.

Question Difficulty:

Medium

Question ID 7cd1c6db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7cd1c6db

An object travels at a constant speed of **12** centimeters per second. At this speed, what is the time, in seconds, that it would take for the object to travel **108** centimeters?

- A. **9**
- B. **96**
- C. **120**
- D. **972**

ID: 7cd1c6db Answer

Correct Answer:

A

Rationale

Choice A is correct. If the object travels **108** centimeters at a speed of **12** centimeters per second, the time of travel can be determined by dividing the total distance by the speed. This results in $\frac{108 \text{ centimeters}}{12 \text{ centimeters/second}}$, which is **9** seconds.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 8637294f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8637294f

If $\frac{4a}{b} = 6.7$ and $\frac{a}{bn} = 26.8$, what is the value of n ?

ID: 8637294f Answer

Correct Answer:

.0625, 1/16

Rationale

The correct answer is .0625. It's given that $\frac{4a}{b} = 6.7$ and $\frac{a}{bn} = 26.8$. The equation $\frac{4a}{b} = 6.7$ can be rewritten as $(4)\left(\frac{a}{b}\right) = 6.7$. Dividing both sides of this equation by 4 yields $\frac{a}{b} = 1.675$. The equation $\frac{a}{bn} = 26.8$ can be rewritten as $\left(\frac{a}{b}\right)\left(\frac{1}{n}\right) = 26.8$. Substituting 1.675 for $\frac{a}{b}$ in this equation yields $(1.675)\left(\frac{1}{n}\right) = 26.8$, or $\frac{1.675}{n} = 26.8$. Multiplying both sides of this equation by n yields $1.675 = 26.8n$. Dividing both sides of this equation by 26.8 yields $n = 0.0625$. Therefore, the value of n is 0.0625.

Note that .0625, 0.062, 0.063, and 1/16 are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 24ad9dcb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 24ad9dcb

The weight of an object on Venus is approximately $\frac{9}{10}$ of its weight on Earth. The weight of an object on Jupiter is approximately $\frac{23}{10}$ of its weight on Earth. If an object weighs 100 pounds on Earth, approximately how many more pounds does it weigh on Jupiter than it weighs on Venus?

- A. 90
- B. 111
- C. 140
- D. 230

ID: 24ad9dcb Answer

Correct Answer:

C

Rationale

Choice C is correct. The weight of an object on Venus is approximately $\frac{9}{10}$ of its weight on Earth. If an object weighs 100 pounds on Earth, then the object's weight on Venus is approximately $\frac{9}{10} (100) = 90$ pounds. The same object's weight on Jupiter is approximately $\frac{23}{10}$ of its weight on Earth; therefore, the object weighs approximately $\frac{23}{10} (100) = 230$ pounds on Jupiter. The difference between the object's weight on Jupiter and the object's weight on Venus is approximately $230 - 90 = 140$ pounds. Therefore, an object that weighs 100 pounds on Earth weighs 140 more pounds on Jupiter than it weighs on Venus.

Choice A is incorrect because it is the weight, in pounds, of the object on Venus. Choice B is incorrect because it is the weight, in pounds, of an object on Earth if it weighs 100 pounds on Venus. Choice D is incorrect because it is the weight, in pounds, of the object on Jupiter.

Question Difficulty:

Easy

Question ID e21d10a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e21d10a7

One of a planet's moons orbits the planet every **252** days. A second moon orbits the planet every **287** days. How many more days does it take the second moon to orbit the planet **29** times than it takes the first moon to orbit the planet **29** times?

ID: e21d10a7 Answer

Correct Answer:

1015

Rationale

The correct answer is **1,015**. It's given that the first moon orbits the planet every **252** days. Therefore, it takes the first moon **252(29)**, or **7,308**, days to orbit the planet **29** times. It's also given that the second moon orbits the planet every **287** days. Therefore, it takes the second moon **287(29)**, or **8,323**, days to orbit the planet **29** times. Since it takes the first moon **7,308** days and the second moon **8,323** days, it takes the second moon **$8,323 - 7,308$, or 1,015**, more days than it takes the first moon to orbit the planet **29** times.

Question Difficulty:

Medium

Question ID 7d721177

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7d721177

The density of a certain type of wood is **353** kilograms per cubic meter. A sample of this type of wood is in the shape of a cube and has a mass of **345** kilograms. To the nearest hundredth of a meter, what is the length of one edge of this sample?

- A. **0.98**
- B. **0.99**
- C. **1.01**
- D. **1.02**

ID: 7d721177 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the density of a certain type of wood is **353** kilograms per cubic meter (kg/m^3), and a sample of this type of wood has a mass of **345 kg**. Let x represent the volume, in m^3 , of the sample. It follows that the relationship between the density, mass, and volume of this sample can be written

as $\frac{353 \text{ kg}}{1 \text{ m}^3} = \frac{345 \text{ kg}}{x \text{ m}^3}$, or $353 = \frac{345}{x}$. Multiplying both sides of this equation by x yields $353x = 345$. Dividing both sides of this equation by **353** yields $x = \frac{345}{353}$. Therefore, the volume of this sample is $\frac{345}{353} \text{ m}^3$. Since it's given that the sample of this type of wood is a cube, it follows that the length of one edge of this sample can be found using the volume formula for a cube, $V = s^3$, where V represents the volume, in m^3 , and s represents the length, in m, of one edge of the cube. Substituting $\frac{345}{353}$ for V in this formula yields $\frac{345}{353} = s^3$. Taking the cube root of both sides of this equation yields $\sqrt[3]{\frac{345}{353}} = s$, or $s \approx 0.99$. Therefore, the length of one edge of this sample to the nearest hundredth of a meter is **0.99**.

Choices A, C, and D are incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Hard

Question ID d0d9ede4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: d0d9ede4

How many feet are equivalent to **34** yards? (**1 yard = 3 feet**)

ID: d0d9ede4 Answer

Correct Answer:

102

Rationale

The correct answer is **102**. It's given that **1** yard is equivalent to **3** feet. Therefore, **34** yards is equivalent to $(34 \text{ yards}) \left(\frac{3 \text{ feet}}{1 \text{ yard}} \right)$, or **102** feet.

Question Difficulty:

Easy

Question ID 1d945139

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1d945139

The total mass, in kilograms, of r identical objects is t . Which expression represents the total mass, in kilograms, of $146r$ of these objects?

- A. $146 - t$
- B. $146 + t$
- C. $\frac{t}{146}$
- D. $146t$

ID: 1d945139 Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that the total mass, in kilograms, of r identical objects is t . To obtain the expression $146r$, r is multiplied by 146 . Therefore, to find the total mass, in kilograms, of $146r$ of these objects, t must also be multiplied by 146 . The result of multiplying t by 146 is the expression $146t$. Therefore, the total mass, in kilograms, of $146r$ of these objects, is $146t$.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty:

Medium

Question ID 06a152cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 06a152cd

To make a bakery's signature chocolate muffins, a baker needs 2.5 ounces of chocolate for each muffin. How many pounds of chocolate are needed to make 48 signature chocolate muffins? (1 pound = 16 ounces)

- A. 7.5
- B. 10
- C. 50.5
- D. 120

ID: 06a152cd Answer

Correct Answer:

A

Rationale

Choice A is correct. If 2.5 ounces of chocolate are needed for each muffin, then the number of ounces of chocolate needed to make 48 muffins is $48 \times 2.5 = 120$ ounces. Since 1 pound = 16 ounces, the number of pounds that is equivalent to 120 ounces is $\frac{120}{16} = 7.5$ pounds. Therefore, 7.5 pounds of chocolate are needed to make the 48 muffins.

Choice B is incorrect. If 10 pounds of chocolate were needed to make 48 muffins, then the total number of ounces of chocolate needed would be $10 \times 16 = 160$ ounces. The number of ounces of chocolate per muffin would then be $\frac{160}{48} = 3.33$ ounces per muffin, not 2.5 ounces per muffin. Choices C and D are also incorrect. Following the same procedures as used to test choice B gives 16.8 ounces per muffin for choice C and 40 ounces per muffin for choice D, not 2.5 ounces per muffin. Therefore, 50.5 and 120 pounds cannot be the number of pounds needed to make 48 signature chocolate muffins.

Question Difficulty:

Easy

Question ID 8917ce38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 30%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 8917ce38

Which of the following speeds is equivalent to 90 kilometers per hour? (1 kilometer = 1,000 meters)

- A. 25 meters per second
- B. 32 meters per second
- C. 250 meters per second
- D. 324 meters per second

ID: 8917ce38 Answer

Correct Answer:

A

Rationale

Choice A is correct. Since 1 kilometer is equal to 1,000 meters, it follows that 90 kilometers is equal to $90(1,000) = 90,000$ meters. Since 1 hour is equal to 60 minutes and 1 minute is equal to 60 seconds, it follows that 1 hour is equal to $60(60) = 3,600$

seconds. Now $\frac{90 \text{ kilometers}}{1 \text{ hour}}$ is equal to $\frac{90,000 \text{ meters}}{3,600 \text{ seconds}}$, which reduces to $\frac{25 \text{ meters}}{1 \text{ second}}$ or 25 meters per second.

Choices B, C, and D are incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Medium

Question ID ec787383

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a7f;"></div> <div style="width: 25%; background-color: #005a7f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ec787383

A distance of **61** furlongs is equivalent to how many feet? (**1 furlong = 220 yards and 1 yard = 3 feet**)

ID: ec787383 Answer

Correct Answer:

40260

Rationale

The correct answer is **40,260**. It's given that **1 furlong = 220 yards** and **1 yard = 3 feet**. It follows that a distance of **61** furlongs is equivalent to $(61 \text{ furlongs}) \left(\frac{220 \text{ yards}}{1 \text{ furlong}} \right) \left(\frac{3 \text{ feet}}{1 \text{ yard}} \right)$, or **40,260** feet.

Question Difficulty:

Medium

Question ID 7e6c745f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 7e6c745f

Food	Protein	Cost
1 large egg	6 grams	\$0.36
1 cup of milk	8 grams	\$0.24

The table above shows the amount of protein in two foods and the cost of each food.

Based on the table, what is the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk?

- A. 1 : 2
- B. 2 : 3
- C. 3 : 4
- D. 2 : 1

ID: 7e6c745f Answer

Correct Answer:

D

Rationale

Choice D is correct. The cost per gram of protein in 1 large egg is $\$0.36 \div 6 = \0.06 . The cost per gram of protein in 1 cup of milk is $\$0.24 \div 8 = \0.03 . It follows that the ratio of the cost per gram of protein in a large egg to the cost per gram of protein in a cup of milk is 0.06:0.03, which can be rewritten as 2:1.

Choice A is incorrect and may result from finding the ratio of the cost per gram of protein in a cup of milk to the cost per gram of protein in a large egg (the reciprocal of the ratio specified in the question). Choices B and C are incorrect and may result from incorrectly calculating the unit rates or from errors made when simplifying the ratio.

Question Difficulty:

Medium

Question ID 85b33aa8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 85b33aa8

A fish swam a distance of 5,104 yards. How far did the fish swim, in miles? (1 mile = 1,760 yards)

- A. 0.3
- B. 2.9
- C. 3,344
- D. 6,864

ID: 85b33aa8 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the fish swam 5,104 yards and that 1 mile is equal to 1,760 yards. Therefore, the fish swam $5,104 \text{ yards} \left(\frac{1 \text{ mile}}{1,760 \text{ yards}} \right)$, which is equivalent to $\frac{5,104}{1,760}$ miles, or 2.9 miles.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 873d2838

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 873d2838

The population density of Cedar County is **230** people per square mile. The county has a population of **85,100** people. What is the area, in square miles, of Cedar County?

ID: 873d2838 Answer

Correct Answer:

370

Rationale

The correct answer is **370**. It's given that the population density of Cedar County is **230** people per square mile and the county has a population of **85,100** people. Based on the population density, it follows that the area of Cedar County is $(85,100 \text{ people}) \left(\frac{1 \text{ square mile}}{230 \text{ people}} \right)$, or **370** square miles.

Question Difficulty:

Medium

Question ID 2cdefcb1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2cdefcb1

What length, in centimeters, is equivalent to a length of **51** meters? (**1 meter = 100 centimeters**)

- A. 0.051
- B. 0.51
- C. 5,100
- D. 51,000

ID: 2cdefcb1 Answer

Correct Answer:

C

Rationale

Choice C is correct. Since **1** meter is equal to **100** centimeters, **51** meters is equal to **51 meters** ($\frac{100 \text{ centimeters}}{1 \text{ meter}}$), or **5,100** centimeters.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from dividing, rather than multiplying, **51** by **100**.

Choice D is incorrect. This is the length, in millimeters rather than centimeters, that is equivalent to a length of **51** meters.

Question Difficulty:

Easy

Question ID c7c6445f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: c7c6445f

A certain town has an area of **4.36** square miles. What is the area, in square yards, of this town? (**1 mile = 1,760 yards**)

- A. **404**
- B. **7,674**
- C. **710,459**
- D. **13,505,536**

ID: c7c6445f Answer

Correct Answer:

D

Rationale

Choice D is correct. Since the number of yards in 1 mile is **1,760**, the number of square yards in 1 square mile is $(1,760)(1,760) = 3,097,600$. Therefore, if the area of the town is **4.36** square miles, it is $4.36(3,097,600) = 13,505,536$, in square yards.

Choice A is incorrect and may result from dividing the number of yards in a mile by the square mileage of the town.

Choice B is incorrect and may result from multiplying the number of yards in a mile by the square mileage of the town.

Choice C is incorrect and may result from dividing the number of square yards in a square mile by the square mileage of the town.

Question Difficulty:

Hard

Question ID 73ddfdac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 73ddfdac

A distance of **112** furlongs is equivalent to how many feet? (**1 furlong = 220 yards and 1 yard = 3 feet**)

ID: 73ddfdac Answer

Correct Answer:

73920

Rationale

The correct answer is **73,920**. It's given that **1 furlong = 220 yards** and **1 yard = 3 feet**. It follows that a distance of **112** furlongs is equivalent to $(112 \text{ furlongs}) \left(\frac{220 \text{ yards}}{1 \text{ furlong}} \right) \left(\frac{3 \text{ feet}}{1 \text{ yard}} \right)$, or **73,920** feet.

Question Difficulty:

Medium

Question ID 61b87506

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 61b87506

For the values j and k , the ratio of j to k is 11 to 12. If j is multiplied by 17, what is k multiplied by in order to maintain the same ratio?

ID: 61b87506 Answer

Correct Answer:

17

Rationale

The correct answer is 17. If one value is multiplied by a number, then the other value must be multiplied by the same number in order to maintain the same ratio. It's given that j is multiplied by 17. Therefore, in order to maintain the same ratio, k must also be multiplied by 17.

Question Difficulty:

Medium

Question ID 3ac09984

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3ac09984

Marta has 7,500 pesos she will convert to US dollars using a currency exchange service. At this time, the currency exchange rate is 1 peso = 0.075 US dollars. The exchange service will charge Marta a 2% fee on the converted US dollar amount. How many US dollars will Marta receive from the currency exchange after the 2% fee is applied?

- A. \$551.25
- B. \$562.50
- C. \$5,625.00
- D. \$98,000.00

ID: 3ac09984 Answer

Correct Answer:

A

Rationale

Choice A is correct. At the exchange rate of 1 peso = 0.075 US dollars, 7,500 pesos would be converted to $7,500 \times 0.075 = \$562.50$. However, since Maria pays a 2% fee on the converted US dollar amount, she receives only $(100 - 2)\%$, or 98%, of the converted US dollars, and $562.50 \times 0.98 = \$551.25$.

Choice B is incorrect. This is the number of US dollars Maria would receive if the exchange service did not charge a 2% fee. Choice C is incorrect and may result from a decimal point error made when calculating the conversion to US dollars and from not assessing the 2% fee. Choice D is incorrect and may result from reversing the units of the exchange rate.

Question Difficulty:

Easy

Question ID 61f61789

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: 61f61789

To study the moisture content in a group of trees, samples from the trunk of each tree were taken from **25** trees and cut in the shape of a cube. The length of the edge of one of these cubes is **2.00** centimeters. If this cube has a mass of **2.56** grams, what is the density of this cube, in grams per cubic centimeter?

ID: 61f61789 Answer

Correct Answer:

0.32, 8/25

Rationale

The correct answer is **.32**. The volume of a cube is given by the formula $V = s^3$, where s is the length of an edge of the cube. It's given that each edge of the cube has a length of **2.00** centimeters. Substituting **2.00** centimeters for s in the formula $V = s^3$ yields $V = (2.00 \text{ centimeters})^3$, or $V = 8.00$ cubic centimeters. It's given that the cube has a mass of **2.56** grams. Dividing the mass, in grams, of the cube by the volume, in cubic centimeters, of the cube gives its density, in grams per cubic centimeters. Therefore, the density of the cube is $\frac{2.56 \text{ grams}}{8.00 \text{ cubic centimeters}}$, or **.32** grams per cubic centimeter. Note that **.32** and **8/25** are examples of ways to enter a correct answer.

Question Difficulty:

Hard

Question ID 5154615f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5154615f

To study fluctuations in composition, samples of pumice were taken from **29** locations and cut in the shape of a cube. The length of the edge of one of these cubes is **3.000** centimeters. This cube has a density of **0.230** grams per cubic centimeter. What is the mass of this cube, in grams?

ID: 5154615f Answer

Correct Answer:

6.21

Rationale

The correct answer is **6.21**. It's given that the samples of pumice were cut in the shape of a cube. It's also given that the length of the edge of one of these cubes is **3.000** centimeters. Therefore, the volume of this cube is $(3.000 \text{ centimeters})^3$, or **27** cubic centimeters. Since the density of this cube is **0.230** grams per cubic centimeter, it follows that the mass of this cube is $\left(\frac{0.230 \text{ grams}}{1 \text{ cubic centimeter}}\right)(27 \text{ cubic centimeters})$, or **6.21** grams.

Question Difficulty:

Hard

Question ID eb672707

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Ratios, rates, proportional relationships, and units	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: eb672707

How many tablespoons are equivalent to **14** teaspoons? (**3** teaspoons = **1** tablespoon)

ID: eb672707 Answer

Correct Answer:

14/3, 4.666, 4.667

Rationale

The correct answer is $\frac{14}{3}$. It's given that **3** teaspoons is equivalent to **1** tablespoon. Therefore, **14** teaspoons is equivalent to $(14 \text{ teaspoons}) \left(\frac{1 \text{ tablespoon}}{3 \text{ teaspoons}} \right)$, or $\frac{14}{3}$ tablespoons. Note that 14/3, 4.666, and 4.667 are examples of ways to enter a correct answer.

Question Difficulty:

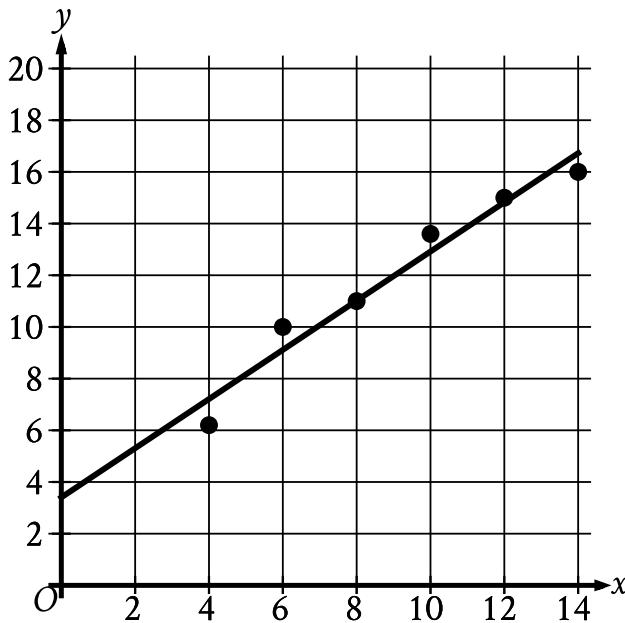
Medium

Question ID c5ee6ac0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c5ee6ac0

The scatterplot shows the relationship between two variables, x and y . A line of best fit is also shown.



Which of the following equations best represents the line of best fit shown?

- A. $y = x + 3.4$
- B. $y = x - 3.4$
- C. $y = -x + 3.4$
- D. $y = -x - 3.4$

ID: c5ee6ac0 Answer

Correct Answer:

A

Rationale

Choice A is correct. The line of best fit shown has a positive slope and intersects the y -axis at a positive y -value. The graph of an equation of the form $y = mx + b$, where m and b are constants, has a slope of m and intersects the y -axis at a y -value of b . Of the given choices, only $y = x + 3.4$ represents a line that has a positive slope, 1, and intersects the y -axis at a positive y -value, 3.4.

Choice B is incorrect. This equation represents a line that intersects the y -axis at a negative y -value, not a positive y -value.

Choice C is incorrect. This equation represents a line that has a negative slope, not a positive slope.

Choice D is incorrect. This equation represents a line that has a negative slope, not a positive slope, and intersects the y -axis at a negative y -value, not a positive y -value.

Question Difficulty:

Easy

Question ID 43744269

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 43744269

An airplane descends from an altitude of **9,500** feet to **5,000** feet at a constant rate of **400** feet per minute. What type of function best models the relationship between the descending airplane's altitude and time?

- A. Decreasing exponential
- B. Decreasing linear
- C. Increasing exponential
- D. Increasing linear

ID: 43744269 Answer

Correct Answer:

B

Rationale

Choice B is correct. It's given that the airplane descends at a constant rate of **400 feet per minute**. Since the altitude decreases by a constant amount during each fixed time period, the relationship between the airplane's altitude and time is linear. Since the airplane descends from an altitude of **9,500 feet** to **5,000 feet**, the airplane's altitude is decreasing with time. Thus, the relationship is best modeled by a decreasing linear function.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

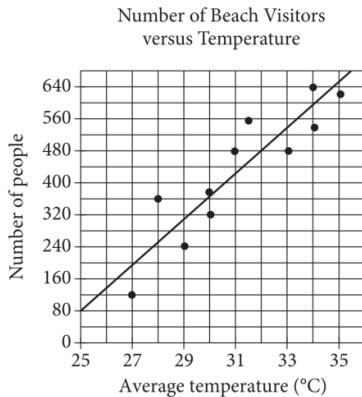
Question Difficulty:

Easy

Question ID d0430601

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: d0430601



Each dot in the scatterplot above represents the temperature and the number of people who visited a beach in Lagos, Nigeria, on one of eleven different days. The line of best fit for the data is also shown. The line of best fit for the data has a slope of approximately 57. According to this estimate, how many additional people per day are predicted to visit the beach for each 5°C increase in average temperature?

ID: d0430601 Answer

Rationale

The correct answer is 285. The number of people predicted to visit the beach each day is represented by the y-values of the line of best fit, and the average temperature, in degrees Celsius ($^{\circ}\text{C}$), is represented by the x-values. Since the slope of the line of best fit is approximately 57, the y-value, or the number of people predicted to visit the beach each day, increases by 57 for every x-value increase of 1, or every 1°C increase in average temperature. Therefore, an increase of 5°C in average temperature corresponds to a y-value increase of $57(5) = 285$ additional people per day predicted to visit the beach.

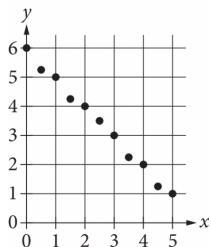
Question Difficulty:

Hard

Question ID 9296553d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 9296553d



Which of the following could be an equation for a line of best fit for the data in the scatterplot?

- A. $y = -x + 6$
- B. $y = -x - 6$
- C. $y = 6x + 1$
- D. $y = 6x - 1$

ID: 9296553d Answer

Correct Answer:

A

Rationale

Choice A is correct. A line of best fit for the data in a scatterplot is a line that follows the trend of the data with approximately half the data points above and half the data points below the line. Based on the given data, a line of best fit will have a positive y-intercept on or near the point $(0, 6)$ and a negative slope. All of the choices are in slope-intercept form $y = mx + b$, where m is the slope and b is the y-coordinate of the y-intercept. Only choice A is an equation of a line with a positive y-intercept at $(0, 6)$ and a negative slope, -1 .

Choice B is incorrect. This equation is for a line that has a negative y-intercept, not a positive y-intercept. Choices C and D are incorrect and may result from one or more sign errors and from switching the values of the y-intercept and the slope in the equation.

Question Difficulty:

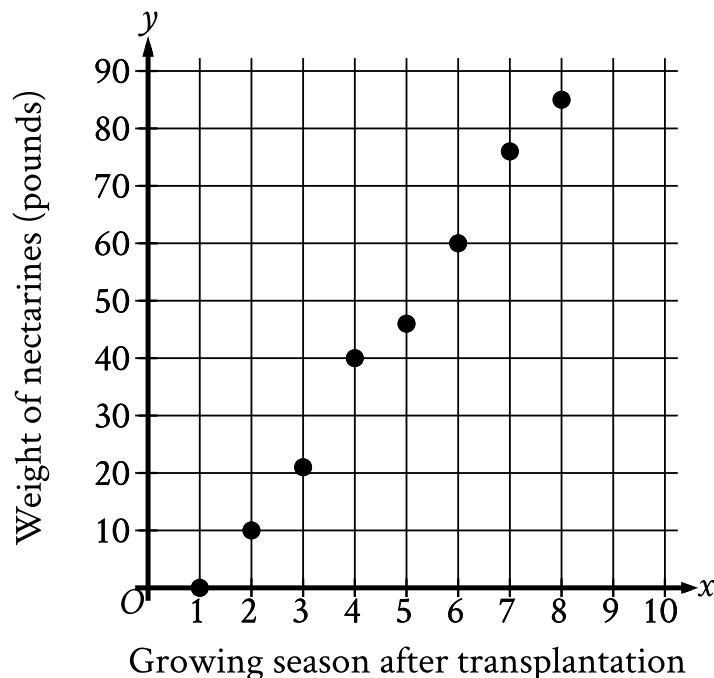
Easy

Question ID b58dbf88

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: b58dbf88

An orchard owner recorded the weight, in pounds, of all nectarines that grew on a dwarf nectarine tree during each growing season after the tree's transplantation. The scatterplot shows this weight, in pounds, for each growing season after the tree's transplantation.



What was the weight, to the nearest pound, of all nectarines that grew on the tree during the **4th** growing season after the tree's transplantation?

ID: b58dbf88 Answer

Correct Answer:

40

Rationale

The correct answer is **40**. For each data point on the scatterplot, the x -value represents the growing season after transplantation and the y -value represents the weight, in pounds, of all nectarines that grew on the tree during the season. The scatterplot shows a data point at $(4, 40)$. It follows that during the **4th** growing season after the tree's transplantation, **40** pounds of nectarines grew on the tree.

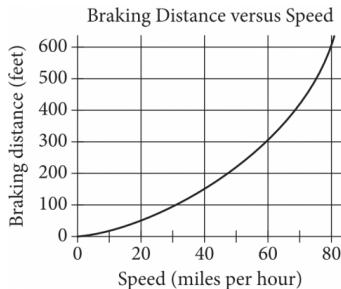
Question Difficulty:

Easy

Question ID d6121490

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d6121490



The graph above shows the relationship between the speed of a particular car, in miles per hour, and its corresponding braking distance, in feet. Approximately how many feet greater will the car's braking distance be when the car is traveling at 50 miles per hour than when the car is traveling at 30 miles per hour?

- A. 75
- B. 125
- C. 175
- D. 250

ID: d6121490 Answer

Correct Answer:

B

Rationale

Choice B is correct. According to the graph, when the car is traveling at 50 miles per hour, the braking distance is approximately 225 feet, and when the car is traveling at 30 miles per hour, the braking distance is approximately 100 feet. The difference between these braking distances is $225 - 100$, or 125 feet.

Choice A is incorrect and may result from finding the braking distance for 20 miles per hour, the difference between the given speeds. Choice C is incorrect and may result from subtracting the speed from the braking distance at 50 miles per hour. Choice D is incorrect and may result from finding the difference in the braking distances at 60 and 20 miles per hour.

Question Difficulty:

Easy

Question ID ab7740a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: ab7740a8

In which of the following tables is the relationship between the values of x and their corresponding y -values nonlinear?

A.

x	1	2	3	4
y	8	11	14	17

B.

x	1	2	3	4
y	4	8	12	16

C.

x	1	2	3	4
y	8	13	18	23

D.

x	1	2	3	4
y	6	12	24	48

ID: ab7740a8 Answer

Correct Answer:

D

Rationale

Choice D is correct. The relationship between the values of x and their corresponding y -values is nonlinear if the rate of change between these pairs of values isn't constant. The table for choice D gives four pairs of values: $(1,6)$, $(2,12)$, $(3,24)$, and $(4,48)$.

Finding the rate of change, or slope, between $(1,6)$ and $(2,12)$ by using the slope formula, $\frac{y_2 - y_1}{x_2 - x_1}$, yields $\frac{12 - 6}{2 - 1}$, or 6. Finding

the rate of change between $(2,12)$ and $(3,24)$ yields $\frac{24 - 12}{3 - 2}$, or 12. Finding the rate of change between $(3,24)$ and $(4,48)$ yields $\frac{48 - 24}{4 - 3}$

, or 24. Since the rate of change isn't constant for these pairs of values, this table shows a nonlinear relationship.

Choices A, B, and C are incorrect. The rate of change between the values of x and their corresponding y -values in each of these tables is constant, being 3, 4, and 5, respectively. Therefore, each of these tables shows a linear relationship.

Question Difficulty:

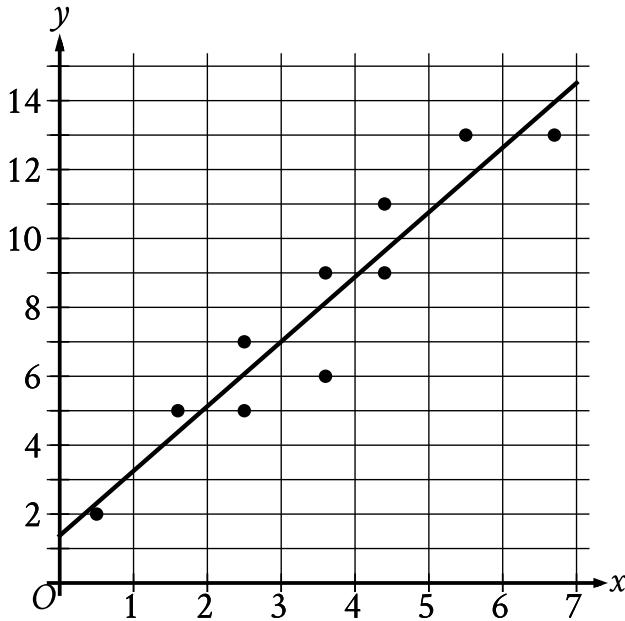
Medium

Question ID 90ba8f98

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #005599; height: 10px;"></div> <div style="width: 60%; background-color: #CCCCCC; height: 10px;"></div>

ID: 90ba8f98

In the given scatterplot, a line of best fit for the data is shown.



Which of the following is closest to the slope of the line of best fit shown?

- A. 0
- B. $\frac{1}{2}$
- C. 1
- D. 2

ID: 90ba8f98 Answer

Correct Answer:

D

Rationale

Choice D is correct. A line in the xy -plane that passes through the points (x_1, y_1) and (x_2, y_2) has a slope of $\frac{y_2 - y_1}{x_2 - x_1}$. The line of best fit shown passes approximately through the points $(1, 3.3)$ and $(7, 14.5)$. It follows that the slope of this best fit line is approximately $\frac{14.5 - 3.3}{7 - 1}$, which is equivalent to $\frac{11.2}{6}$, or approximately 1.87 . Therefore, of the given choices, 2 is closest to the slope of the line of best fit shown.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

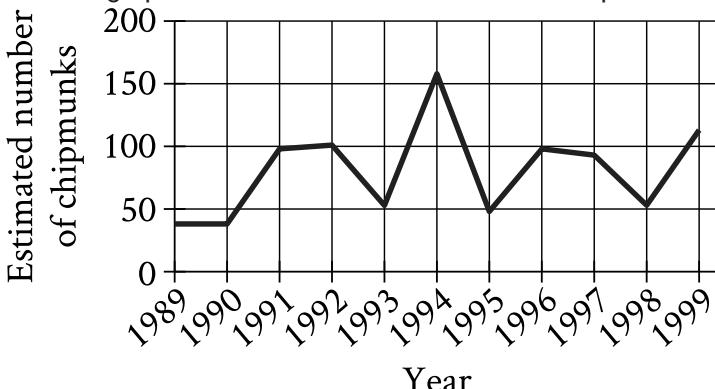
Medium

Question ID 2e511919

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2e511919

The line graph shows the estimated number of chipmunks in a state park on April 1 of each year from 1989 to 1999.



Based on the line graph, in which year was the estimated number of chipmunks in the state park the greatest?

- A. 1989
- B. 1994
- C. 1995
- D. 1998

ID: 2e511919 Answer

Correct Answer:

B

Rationale

Choice B is correct. For the given line graph, the estimated number of chipmunks is represented on the vertical axis. The greatest estimated number of chipmunks in the state park is indicated by the greatest height in the line graph. This height is achieved when the year is 1994.

Choice A is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

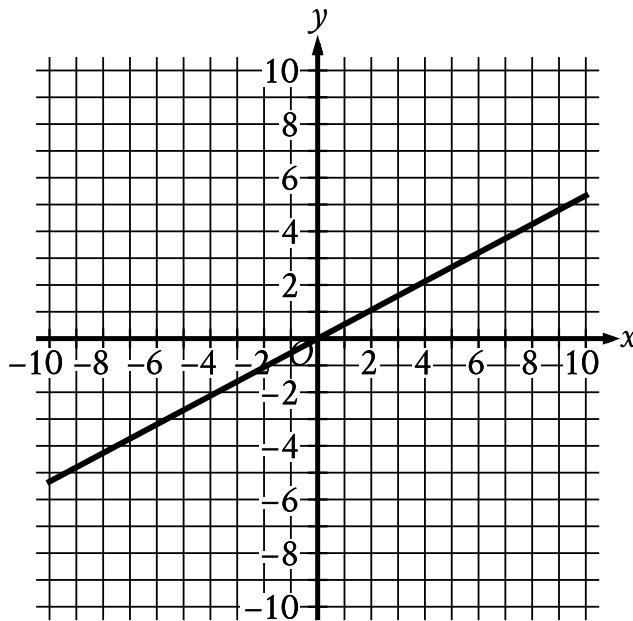
Easy

Question ID c141366d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c141366d

The graph of function f is shown, where $y = f(x)$.



Which of the following describes function f ?

- A. Increasing linear
- B. Decreasing linear
- C. Increasing exponential
- D. Decreasing exponential

ID: c141366d Answer

Correct Answer:

A

Rationale

Choice A is correct. The graph of function f shows that as x increases, $f(x)$ also increases, which means $f(x)$ is an increasing function. The graph of f is a line, which indicates a constant rate of change. A function that has a constant rate of change is a linear function. Therefore, function f can be described as increasing linear.

Choice B is incorrect. For a decreasing function, as x increases, $f(x)$ decreases, rather than increases.

Choice C is incorrect. The graph of an exponential function isn't a line.

Choice D is incorrect. For a decreasing function, as x increases, $f(x)$ decreases, rather than increases, and the graph of an exponential function isn't a line.

Question Difficulty:

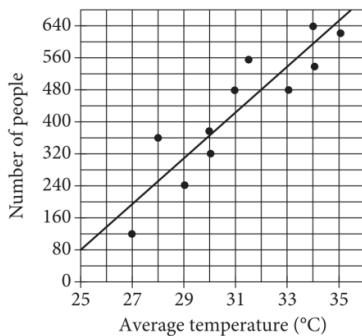
Easy

Question ID 8156d446

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002060; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8156d446

Number of Beach Visitors versus Temperature



Each dot in the scatterplot above represents the temperature and the number of people who visited a beach in Lagos, Nigeria, on one of eleven different days. The line of best fit for the data is also shown. According to the line of best fit, what is the number of people, rounded to the nearest 10, predicted to visit this beach on a day with an average temperature of 32°C?

ID: 8156d446 Answer

Rationale

The correct answer is 480. An average temperature of 32°C corresponds to the value 32 on the x-axis. On the line of best fit, an x-value of 32 corresponds to a y-value of 480. The values on the y-axis correspond to the number of people predicted to visit this beach. Therefore, 480 people are predicted to visit this beach on a day with an average temperature of 32°C .

Question Difficulty:

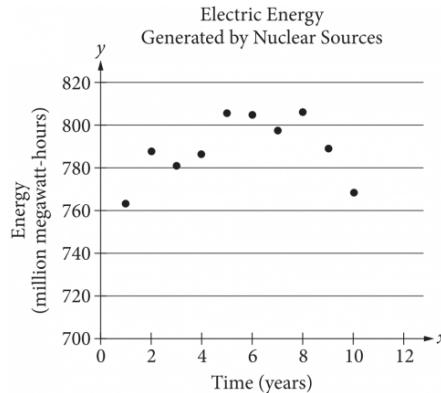
Easy

Question ID e821a26d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div> <div style="width: 100px; height: 10px; background-color: #005a9f;"></div>

ID: e821a26d

The scatterplot below shows the amount of electric energy generated, in millions of megawatt-hours, by nuclear sources over a 10-year period.



Of the following equations, which best models the data in the scatterplot?

- A. $y = 1.674x^2 + 19.76x - 745.73$
- B. $y = -1.674x^2 - 19.76x - 745.73$
- C. $y = 1.674x^2 + 19.76x + 745.73$
- D. $y = -1.674x^2 + 19.76x + 745.73$

ID: e821a26d Answer

Correct Answer:

D

Rationale

Choice D is correct. The data in the scatterplot roughly fall in the shape of a downward-opening parabola; therefore, the coefficient for the x^2 term must be negative. Based on the location of the data points, the y-intercept of the parabola should be somewhere between 740 and 760. Therefore, of the equations given, the best model is $y = -1.674x^2 + 19.76x + 745.73$.

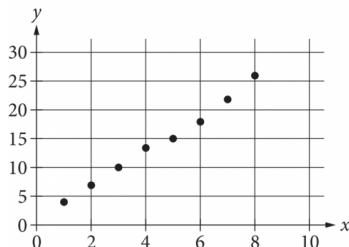
Choices A and C are incorrect. The positive coefficient of the x^2 term means that these equations each define upward-opening parabolas, whereas a parabola that fits the data in the scatterplot must open downward. Choice B is incorrect because it defines a parabola with a y-intercept that has a negative y-coordinate, whereas a parabola that fits the data in the scatterplot must have a y-intercept with a positive y-coordinate.

Question Difficulty:
Hard

Question ID 9eb896c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9eb896c5



Which of the following could be the equation for a line of best fit for the data shown in the scatterplot above?

- A. $y = 3x + 0.8$
- B. $y = 0.8x + 3$
- C. $y = -0.8x + 3$
- D. $y = -3x + 0.8$

ID: 9eb896c5 Answer

Correct Answer:

A

Rationale

Choice A is correct. The data show a strong linear relationship between x and y . The line of best fit for a set of data is a linear equation that minimizes the distances from the data points to the line. An equation for the line of best fit can be written in slope-intercept form, $y = mx + b$, where m is the slope of the graph of the line and b is the y -coordinate of the y -intercept of the graph.

Since, for the data shown, the y -values increase as the x -values increase, the slope of a line of best fit must be positive. The data

shown lie almost in a line, so the slope can be roughly estimated using the formula for slope, $m = \frac{y_2 - y_1}{x_2 - x_1}$. The leftmost and

rightmost data points have coordinates of about $(1, 4)$ and $(8, 26)$, so the slope is approximately $\frac{26 - 4}{8 - 1} = \frac{22}{7}$, which is a little greater than 3. Extension of the line to the left would intersect the y -axis at about $(0, 1)$. Only choice A represents a line with a slope close to 3 and a y -intercept close to $(0, 1)$.

Choice B is incorrect and may result from switching the slope and y -intercept. The line with a y -intercept of $(0, 3)$ and a slope of 0.8 is farther from the data points than the line with a slope of 3 and a y -intercept of $(0, 0.8)$. Choices C and D are incorrect. They represent lines with negative slopes, not positive slopes.

Question Difficulty:

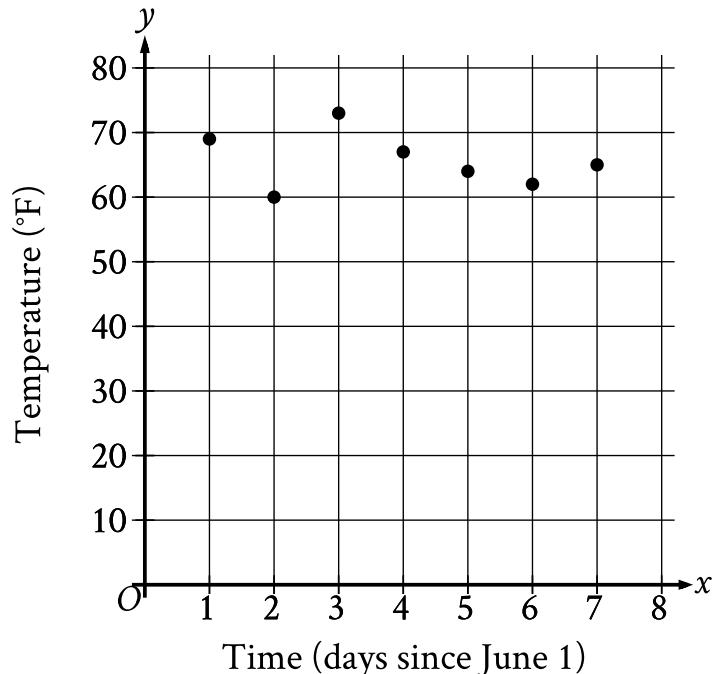
Medium

Question ID d112bc9d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: d112bc9d

The scatterplot shows the temperature y , in $^{\circ}\text{F}$, recorded by a meteorologist at various times x , in days since June 1.



During which of the following time periods did the greatest increase in recorded temperature take place?

- A. From $x = 6$ to $x = 7$
- B. From $x = 5$ to $x = 6$
- C. From $x = 2$ to $x = 3$
- D. From $x = 1$ to $x = 2$

ID: d112bc9d Answer

Correct Answer:

C

Rationale

Choice C is correct. The scatterplot shows that there was an increase in recorded temperature from $x = 2$ to $x = 3$ and from $x = 6$ to $x = 7$. When $x = 2$, the recorded temperature was approximately 60°F and when $x = 3$, the recorded temperature was greater than 70°F . This means that the increase in recorded temperature from $x = 2$ to $x = 3$ was greater than $(70 - 60)^{\circ}\text{F}$, or 10°F . When $x = 6$, the recorded temperature was greater than 60°F and when $x = 7$, the recorded temperature was less than 70°F . This means that the increase in recorded temperature from $x = 6$ to $x = 7$ was less than $(70 - 60)^{\circ}\text{F}$, or 10°F . It follows that the greatest increase in recorded temperature took place from $x = 2$ to $x = 3$.

Choice A is incorrect. The increase in recorded temperature from $x = 6$ to $x = 7$ was less than the increase in recorded temperature from $x = 2$ to $x = 3$.

Choice B is incorrect. From $x = 5$ to $x = 6$, a decrease, not an increase, in recorded temperature took place.

Choice D is incorrect. From $x = 1$ to $x = 2$, a decrease, not an increase, in recorded temperature took place.

Question Difficulty:

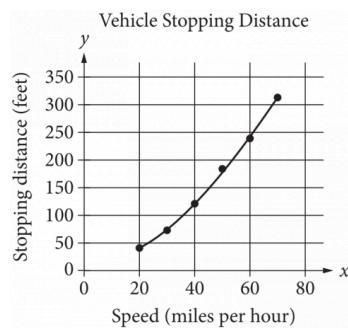
Easy

Question ID 5c24c861

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 5c24c861

A study was done to determine a new car's stopping distance when it was traveling at different speeds. The study was done on a dry road with good surface conditions. The results are shown below, along with the graph of a quadratic function that models the data.



According to the model, which of the following is the best estimate for the stopping distance, in feet, if the vehicle was traveling 55 miles per hour?

- A. 25
- B. 30
- C. 210
- D. 250

ID: 5c24c861 Answer

Correct Answer:

C

Rationale

Correct Answer Rationale

Choice C is correct. According to the model, the stopping distance, in feet, of a vehicle traveling 55 miles per hour is about 200 feet. Of the choices given, the best estimate of the stopping distance for a car traveling 55 miles per hour is 210 feet.

Incorrect Answer Rationale

Choices A, B, and D are incorrect and may be the result of incorrectly reading the given quadratic model. The corresponding x-values to the y-values of 25 and 30 are not part of the model. The corresponding x-value to a y-value of 250 is approximately 60 mph, not 55 mph.

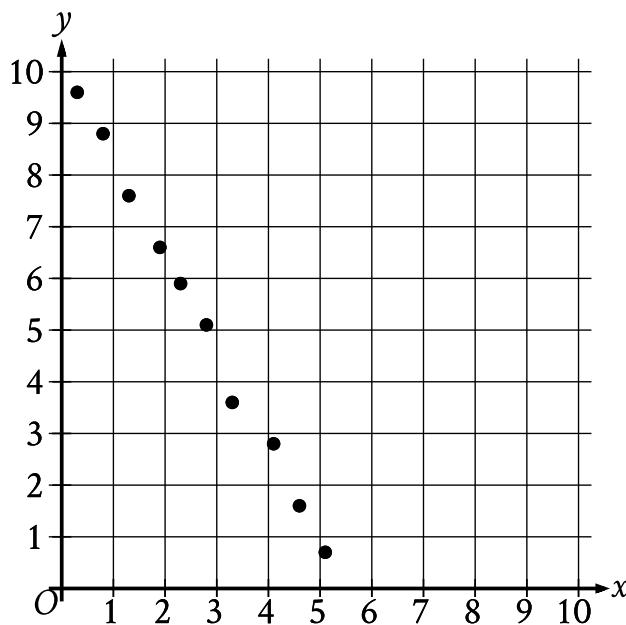
Question Difficulty:

Easy

Question ID 5f3ee607

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 5f3ee607



Which of the following equations is the most appropriate linear model for the data shown in the scatterplot?

- A. $y = -1.9x - 10.1$
- B. $y = -1.9x + 10.1$
- C. $y = 1.9x - 10.1$
- D. $y = 1.9x + 10.1$

ID: 5f3ee607 Answer

Correct Answer:

B

Rationale

Choice B is correct. The equation representing a linear model can be written in the form $y = a + bx$, or $y = bx + a$, where b is the slope of the graph of the model and $(0, a)$ is the y -intercept of the graph of the model. The scatterplot shows that as the x -values of the data points increase, the y -values of the data points decrease, which means the graph of an appropriate linear model has a negative slope. Therefore, $b < 0$. The scatterplot also shows that the data points are close to the y -axis at a positive value of y . Therefore, the y -intercept of the graph of an appropriate linear model has a positive y -coordinate, which means $a > 0$. Of the given choices, only choice B, $y = -1.9x + 10.1$, has a negative value for b , the slope, and a positive value for a , the y -coordinate of the y -intercept.

Choice A is incorrect. The graph of this model has a y -intercept with a negative y -coordinate, not a positive y -coordinate.

Choice C is incorrect. The graph of this model has a positive slope, not a negative slope, and a y -intercept with a negative y -coordinate, not a positive y -coordinate.

Choice D is incorrect. The graph of this model has a positive slope, not a negative slope.

Question Difficulty:

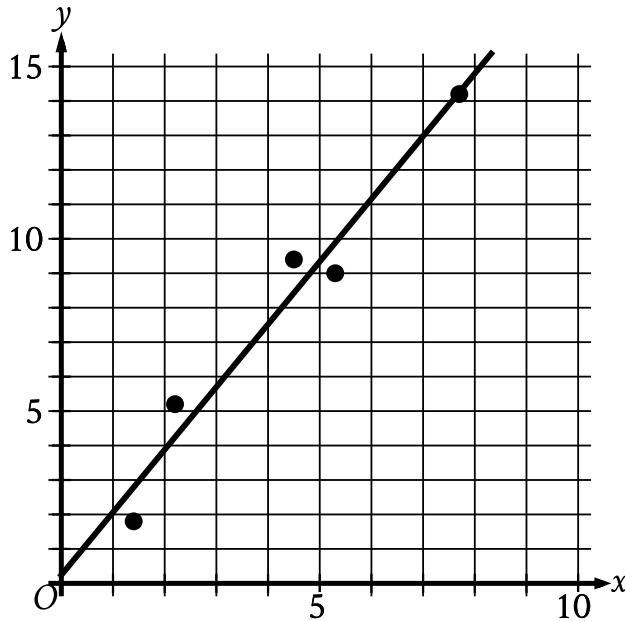
Easy

Question ID 4cc05491

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4cc05491

In the given scatterplot, a line of best fit for the data is shown.



Which of the following is closest to the slope of the line of best fit shown?

- A. 0.2
- B. 0.7
- C. 1.8
- D. 2.6

ID: 4cc05491 Answer

Correct Answer:

C

Rationale

Choice C is correct. A line in the xy -plane that passes through points (x_1, y_1) and (x_2, y_2) has a slope of $\frac{y_2 - y_1}{x_2 - x_1}$. The line of best fit shown passes approximately through the points $(0, 0.2)$ and $(5, 9.3)$. It follows that the slope of this line is approximately $\frac{9.3 - 0.2}{5 - 0}$, which is equivalent to $\frac{9.1}{5}$, or 1.82. Therefore, of the given choices, 1.8 is closest to the slope of the line of best fit shown.

Choice A is incorrect. This value is closest to the y -intercept of the y -intercept of the line of best fit shown.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

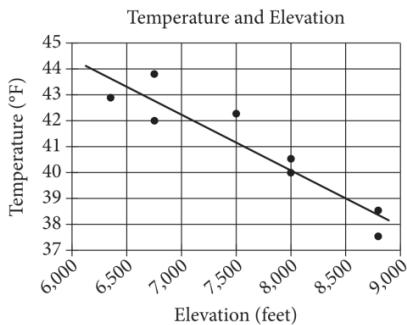
Question Difficulty:

Medium

Question ID 661dfddd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 661dfddd



The scatterplot above shows the high temperature on a certain day and the elevation of 8 different locations in the Lake Tahoe Basin. A line of best fit for the data is also shown. Which of the following statements best describes the association between the elevation and the temperature of locations in the Lake Tahoe Basin?

- A. As the elevation increases, the temperature tends to increase.
- B. As the elevation increases, the temperature tends to decrease.
- C. As the elevation decreases, the temperature tends to decrease.
- D. There is no association between the elevation and the temperature.

ID: 661dfddd Answer

Correct Answer:

B

Rationale

Choice B is correct. The association between the elevation and the temperature of locations in the Lake Tahoe Basin can be described by looking at the direction of the line of best fit. The line of best fit slopes downward, which corresponds to the temperature decreasing as the elevation increases.

Choices A and C are incorrect. Both of these choices would be represented by a line of best fit that slopes from the lower left to the upper right of the graph, which isn't what's shown on the graph. Choice D is incorrect. This choice would be represented by a line of best fit that is horizontal or has a slope very close to 0. This is not what's shown on the graph.

Question Difficulty:

Easy

Question ID a03b7e02

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a03b7e02

The table shows selected values from function f .

x	$f(x)$
-1	16
0	17
1	18
2	19

Which of the following is the best description of function f ?

- A. Decreasing linear
- B. Increasing linear
- C. Decreasing exponential
- D. Increasing exponential

ID: a03b7e02 Answer

Correct Answer:

B

Rationale

Choice B is correct. The given values show that as x increases, $f(x)$ also increases, which means that f is an increasing function. Furthermore, $f(x)$ increases at a constant rate of 1 for each increase of x by 1. A function with a constant rate of change is linear. Thus, the function f can be described as an increasing linear function.

Choice A is incorrect. For a decreasing linear function, as x increases, $f(x)$ decreases rather than increases.

Choice C is incorrect. For a decreasing exponential function, for each increase of x by 1, $f(x)$ decreases by a fixed percentage rather than increases at a constant rate.

Choice D is incorrect. For an increasing exponential function, for each increase of x by 1, $f(x)$ increases by a fixed percentage rather than at a constant rate.

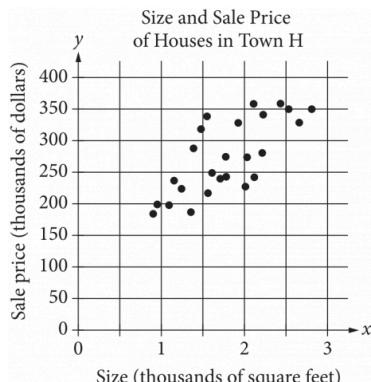
Question Difficulty:

Easy

Question ID 79137c1b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 79137c1b



The scatterplot above shows the size x and the sale price y of 25 houses for sale in Town H. Which of the following could be an equation for a line of best fit for the data?

- A. $y = 200x + 100$
- B. $y = 100x + 100$
- C. $y = 50x + 100$
- D. $y = 100x$

ID: 79137c1b Answer

Correct Answer:

B

Rationale

Choice B is correct. From the shape of the cluster of points, the line of best fit should pass roughly through the points $(1, 200)$ and $(2.5, 350)$. Therefore, these two points can be used to find an approximate equation for the line of best fit. The slope of this line of

best fit is therefore $\frac{y_2 - y_1}{x_2 - x_1} = \frac{350 - 200}{2.5 - 1}$, or 100. The equation for the line of best fit, in slope-intercept form, is $y = 100x + b$ for some value of b . Using the point $(1, 200)$, 1 can be substituted for x and 200 can be substituted for y : $200 = 100(1) + b$, or $b = 100$. Substituting this value into the slope-intercept form of the equation gives $y = 100x + 100$.

Choice A is incorrect. The line defined by $y = 200x + 100$ passes through the points $(1, 300)$ and $(2, 500)$, both of which are well above the cluster of points, so it cannot be a line of best fit. Choice C is incorrect. The line defined by $y = 50x + 100$ passes through the points $(1, 150)$ and $(2, 200)$, both of which lie at the bottom of the cluster of points, so it cannot be a line of best fit.

Choice D is incorrect and may result from correctly calculating the slope of a line of best fit but incorrectly assuming the y -intercept is at $(0, 0)$.

Question Difficulty:

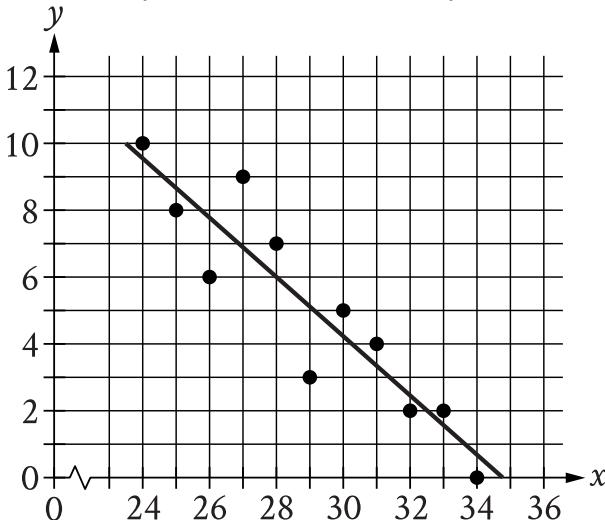
Hard

Question ID fdfc90e4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: fdfc90e4

The scatterplot shows the relationship between two variables, x and y . A line of best fit for the data is also shown.



At $x = 32$, which of the following is closest to the y -value predicted by the line of best fit?

- A. 0.4
- B. 1.5
- C. 2.4
- D. 3.3

ID: fdfc90e4 Answer

Correct Answer:

C

Rationale

Choice C is correct. At $x = 32$, the line of best fit has a y -value between 2 and 3. The only choice with a value between 2 and 3 is choice C.

Choice A is incorrect. This is the difference between the y -value predicted by the line of best fit and the actual y -value at $x = 32$ rather than the y -value predicted by the line of best fit at $x = 32$.

Choice B is incorrect. This is the y -value predicted by the line of best fit at $x = 31$ rather than at $x = 32$.

Choice D is incorrect. This is the y -value predicted by the line of best fit at $x = 33$ rather than at $x = 32$.

Question Difficulty:

Medium

Question ID 9b5b23fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9b5b23fc

For $x > 0$, the function f is defined as follows:

$f(x)$ equals 201% of x

Which of the following could describe this function?

- A. Decreasing exponential
- B. Decreasing linear
- C. Increasing exponential
- D. Increasing linear

ID: 9b5b23fc Answer

Correct Answer:

D

Rationale

Choice D is correct. It's given that for $x > 0$, $f(x)$ is equal to 201% of x . This is equivalent to $f(x) = \frac{201}{100}x$, or $f(x) = 2.01x$, for $x > 0$. This function indicates that as x increases, $f(x)$ also increases, which means f is an increasing function.

Furthermore, $f(x)$ increases at a constant rate of 2.01 for each increase of x by 1. A function with a constant rate of change is linear. Thus, the function f can be described as an increasing linear function.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect. This could describe the function $f(x) = (2.01)^x$, where $f(x)$ is equal to 201% of $f(x - 1)$, not x , for $x > 0$.

Question Difficulty:

Hard

Question ID af142f8d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 75%; background-color: #005a99; height: 10px;"></div>

ID: af142f8d

	Amount invested	Balance increase
Account A	\$500	6% annual interest
Account B	\$1,000	\$25 per year

Two investments were made as shown in the table above. The interest in Account A is compounded once per year. Which of the following is true about the investments?

- A. Account A always earns more money per year than Account B.
- B. Account A always earns less money per year than Account B.
- C. Account A earns more money per year than Account B at first but eventually earns less money per year.
- D. Account A earns less money per year than Account B at first but eventually earns more money per year.

ID: af142f8d Answer

Correct Answer:

A

Rationale

Choice A is correct. Account A starts with \$500 and earns interest at 6% per year, so in the first year Account A earns $(500)(0.06) = \$30$, which is greater than the \$25 that Account B earns that year. Compounding interest can be modeled by an increasing exponential function, so each year Account A will earn more money than it did the previous year. Therefore, each year Account A earns at least \$30 in interest. Since Account B always earns \$25 each year, Account A always earns more money per year than Account B.

Choices B and D are incorrect. Account A earns \$30 in the first year, which is greater than the \$25 Account B earns in the first year. Therefore, neither the statement that Account A always earns less money per year than Account B nor the statement that Account A earns less money than Account B at first can be true. Choice C is incorrect. Since compounding interest can be modeled by an increasing exponential function, each year Account A will earn more money than it did the previous year. Therefore, Account A always earns at least \$30 per year, which is more than the \$25 per year that Account B earns.

Question Difficulty:

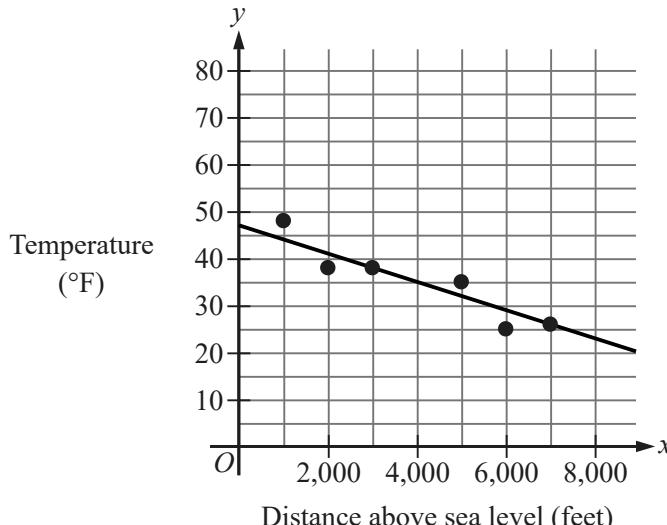
Hard

Question ID bc59c2d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bc59c2d9

The scatterplot shows the temperature, in degrees Fahrenheit ($^{\circ}\text{F}$), and the distance above sea level, in feet, measured at 6 locations on Mount Jefferson. A line of best fit is also shown.



At a distance of 4,000 feet above sea level, what is the temperature, in $^{\circ}\text{F}$, predicted by the line of best fit?

- A. 47
- B. 35
- C. 25
- D. 0

ID: bc59c2d9 Answer

Correct Answer:

B

Rationale

Choice B is correct. In the given scatterplot, the x-values represent the distance above sea level, in feet, and the y-values represent the temperature, in $^{\circ}\text{F}$. The point on the line of best fit with an x-value of 4,000 has a corresponding y-value of 35. Therefore, at a distance of 4,000 feet above sea level, the temperature predicted by the line of best fit is 35°F .

Choice A is incorrect. This is the temperature, in $^{\circ}\text{F}$, predicted by the line of best fit at a distance of 0 feet above sea level.

Choice C is incorrect. This is the measured temperature, in $^{\circ}\text{F}$, at a distance of 6,000 feet above sea level.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

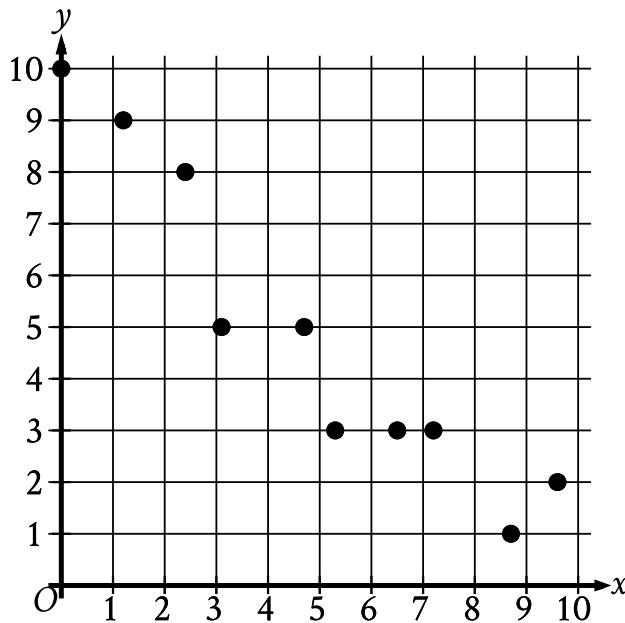
Easy

Question ID 50b2807e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 50b2807e

The scatterplot shows the relationship between two variables, x and y .



Which of the following equations is the most appropriate linear model for the data shown?

- A. $y = 0.9 + 9.4x$
- B. $y = 0.9 - 9.4x$
- C. $y = 9.4 + 0.9x$
- D. $y = 9.4 - 0.9x$

ID: 50b2807e Answer

Correct Answer:

D

Rationale

Choice D is correct. The data points suggest that as the variable x increases, the variable y decreases, which implies that an appropriate linear model for the data has a negative slope. The data points also show that when x is close to 0, y is greater than 9. Therefore, the y -intercept of the graph of an appropriate linear model has a y -coordinate greater than 9. The graph of an equation of the form $y = a + bx$, where a and b are constants, has a y -intercept with a y -coordinate of a and has a slope of b . Of the given choices, only choice D represents a graph that has a negative slope, -0.9 , and a y -intercept with a y -coordinate greater than 9, 9.4.

Choice A is incorrect. The graph of this equation has a positive slope, not a negative slope, and a y -intercept with a y -coordinate less than **1**, not greater than **9**.

Choice B is incorrect. The graph of this equation has a y -intercept with a y -coordinate less than **1**, not greater than **9**.

Choice C is incorrect. The graph of this equation has a positive slope, not a negative slope.

Question Difficulty:

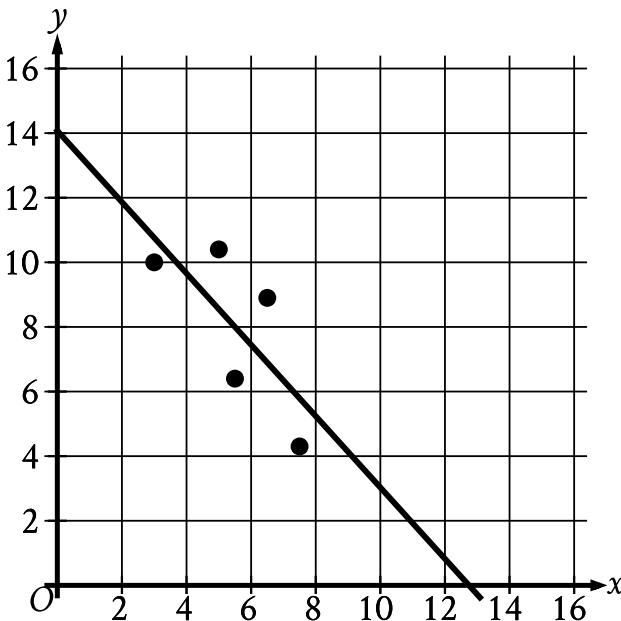
Medium

Question ID 24a1e6a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #005599; height: 10px;"></div> <div style="width: 50%; background-color: #CCCCCC; height: 10px;"></div>

ID: 24a1e6a7

The scatterplot shows the relationship between two variables, x and y . A line of best fit is also shown.



Which of the following is closest to the slope of this line of best fit?

- A. -3.3
- B. -1.1
- C. 1.1
- D. 3.3

ID: 24a1e6a7 Answer

Correct Answer:

B

Rationale

Choice B is correct. A line in the xy -plane that passes through points (x_1, y_1) and (x_2, y_2) has a slope of $\frac{y_2 - y_1}{x_2 - x_1}$. The line of best fit shown passes approximately through the points $(0, 14)$ and $(13, 0)$. It follows that the slope of this line of best fit is approximately $\frac{0 - 14}{13 - 0}$, or $-\frac{14}{13}$. Of the given choices, -1.1 is closest to $-\frac{14}{13}$.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

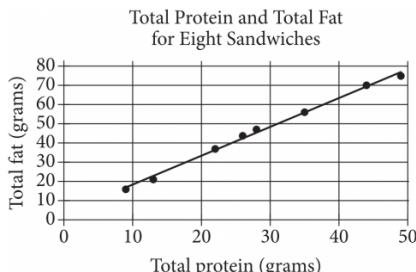
Question Difficulty:

Medium

Question ID 9d95e7ad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 9d95e7ad



The scatterplot above shows the numbers of grams of both total protein and total fat for eight sandwiches on a restaurant menu. The line of best fit for the data is also shown. According to the line of best fit, which of the following is closest to the predicted increase in total fat, in grams, for every increase of 1 gram in total protein?

- A. 2.5
- B. 2.0
- C. 1.5
- D. 1.0

ID: 9d95e7ad Answer

Correct Answer:

C

Rationale

Choice C is correct. The predicted increase in total fat, in grams, for every increase of 1 gram in total protein is represented by the slope of the line of best fit. Any two points on the line can be used to calculate the slope of the line as the change in total fat over the change in total protein. For instance, it can be estimated that the points $(20, 34)$ and $(30, 48)$ are on the line of best fit, and the

slope of the line that passes through them is $\frac{48 - 34}{30 - 20} = \frac{14}{10}$, or 1.4. Of the choices given, 1.5 is the closest to the slope of the line of best fit.

Choices A, B, and D are incorrect and may be the result of incorrectly finding ordered pairs that lie on the line of best fit or of incorrectly calculating the slope.

Question Difficulty:

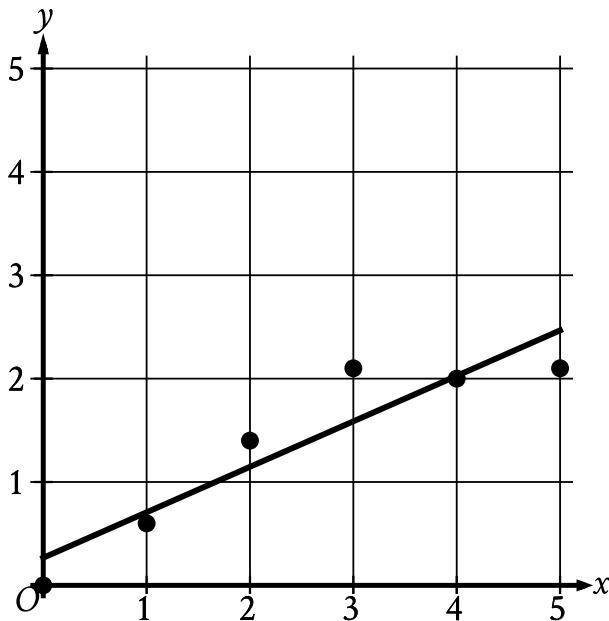
Hard

Question ID 39aa146d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 39aa146d

The scatterplot shows the relationship between x and y . A line of best fit is also shown.



Which of the following is closest to the slope of the line of best fit shown?

- A. **-2.27**
- B. **-0.44**
- C. **0.44**
- D. **2.27**

ID: 39aa146d Answer

Correct Answer:

C

Rationale

Choice C is correct. It's given that the scatterplot shows the relationship between two variables, x and y , and a line of best fit is shown. For the line of best fit shown, for each increase in the value of x by 1, the corresponding value of y increases by a constant rate. It follows that the relationship between the variables x and y has a positive linear trend. A line in the xy -plane that passes through the points (a, b) and (c, d) has a slope of $\frac{d-b}{c-a}$. The line of best fit shown passes approximately through the points $(0, 0.25)$ and $(4, 2)$. It follows that the slope of this line is approximately $\frac{2-0.25}{4-0}$, which is equivalent to **0.4375**. Therefore, of the given choices, **0.44** is closest to the slope of the line of best fit shown.

Choice A is incorrect. This is the slope of a line of best fit for a relationship between x and y that has a negative, rather than a positive, linear trend.

Choice B is incorrect. This is the slope of a line of best fit for a relationship between x and y that has a negative, rather than a positive, linear trend.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty:

Easy

Question ID 58171b5e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 58171b5e

Each year, the value of an investment increases by **0.49%** of its value the previous year. Which of the following functions best models how the value of the investment changes over time?

- A. Decreasing exponential
- B. Decreasing linear
- C. Increasing exponential
- D. Increasing linear

ID: 58171b5e Answer

Correct Answer:

C

Rationale

Choice C is correct. Because the value of the investment increases each year, the function that best models how the value of the investment changes over time is an increasing function. It's given that each year, the value of the investment increases by **0.49%** of its value the previous year. Since the value of the investment changes by a fixed percentage each year, the function that best models how the value of the investment changes over time is an exponential function. Therefore, the function that best models how the value of the investment changes over time is an increasing exponential function.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty:

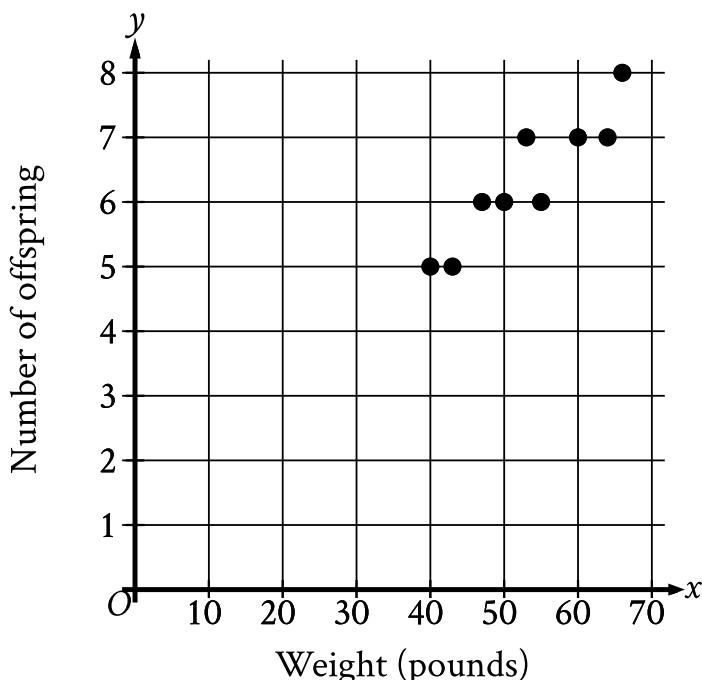
Medium

Question ID 8d63b6f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	Two-variable data: Models and scatterplots	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 8d63b6f1

The scatterplot shows the relationship between the weight, in pounds, of each of 9 female gray wolves on April 30 and the number of offspring each gray wolf produced.



How many offspring did the 50-pound gray wolf produce?

- A. 8
- B. 7
- C. 6
- D. 5

ID: 8d63b6f1 Answer

Correct Answer:

C

Rationale

Choice C is correct. For each point on the scatterplot shown, the x-value represents the weight, in pounds, of a female gray wolf and the y-value represents the number of offspring that wolf produced. The point on the graph with an x-value of 50 has a y-value of 6. Therefore, the 50-pound gray wolf produced 6 offspring.

Choice A is incorrect. One of the wolves produced 8 offspring, but its weight was greater than 50 pounds.

Choice B is incorrect. Three of the wolves produced 7 offspring each, but their weights were each greater than 50 pounds.

Choice D is incorrect. Two of the wolves produced **5** offspring each, but their weights were each less than **50** pounds.

Question Difficulty:

Easy