



Question Bank

Math

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Linear Equations in One Variable (key)





Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div> <div></div> <div></div> <div></div> </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



Assessment	Test	Domain	Skill	Difficulty
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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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ □ □

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></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



Assessment	Test	Domain	Skill	Difficulty
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ID: 60f71697

$$8x = 88$$

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

- A. 11
- B. 80
- C. 96
- D. 704

ID: 60f71697 Answer

Correct Answer: A

Rationale

Choice A is correct. Dividing both sides of the given equation by 8 yields $x = 11$. Therefore, 11 is the solution to the given equation.

Choice B is incorrect. This is the solution to the equation $x + 8 = 88$.

Choice C is incorrect. This is the solution to the equation $x - 8 = 88$.

Choice D is incorrect. This is the solution to the equation $\frac{x}{8} = 88$.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
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ID: 550b352c

$$10 = 2x + 4$$

How many solutions exist to the equation shown above?

- A. None
- B. Exactly 1
- C. Exactly 3
- D. Infinitely many

ID: 550b352c Answer

Correct Answer: B

Rationale

Choice B is correct. Subtracting 4 from each side of the given equation yields $6 = 2x$, or $x = 3$, so the equation has a unique solution of $x = 3$.

Choice A is incorrect. Since 3 is a value of x that satisfies the given equation, the equation has at least 1 solution. Choice C is incorrect. Linear equations can have 0, 1, or infinitely many solutions; no linear equation has exactly 3 solutions. Choice D is incorrect. If a linear equation has infinitely many solutions, it can be reduced to $0 = 0$. This equation reduces to $x = 3$, so there is only 1 solution.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: ed18c4f7

Cathy has n CDs. Gerry has 3 more than twice the number of CDs that Cathy has. In terms of n , how many CDs does Gerry have?

- A. $3n - 2$
- B. $3n + 2$
- C. $2n - 3$
- D. $2n + 3$

ID: ed18c4f7 Answer

Correct Answer: D

Rationale

Choice D is correct. The term $2n$ represents twice the number of CDs that Cathy has, and adding 3 represents 3 more than that amount.

Choices A and B are incorrect. The expression $3n$ represents three times the number of CDs that Cathy has. Choice C is incorrect. Subtracting 3 represents 3 fewer than twice the number of CDs that Cathy has.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
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ID: 12255364

A gym charges its members a onetime **\$36** enrollment fee and a membership fee of **\$19** per month. If there are no charges other than the enrollment fee and the membership fee, after how many months will a member have been charged a total of **\$188** at the gym?

- A. **4**
- B. **5**
- C. **8**
- D. **10**

ID: 12255364 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that a gym charges its members a onetime **\$36** enrollment fee and a membership fee of **\$19** per month. Let x represent the number of months at the gym after which a member will have been charged a total of **\$188**. If there are no charges other than the enrollment fee and the membership fee, the equation $36 + 19x = 188$ can be used to represent this situation. Subtracting **36** from both sides of this equation yields $19x = 152$. Dividing both sides of this equation by **19** yields $x = 8$. Therefore, a member will have been charged a total of **\$188** after **8** months at the gym.

Choice A is incorrect. A member will have been charged a total of $36 + 19 \times 4$, or **\$112**, after **4** months at the gym.

Choice B is incorrect. A member will have been charged a total of $36 + 19 \times 5$, or **\$131**, after **5** months at the gym.

Choice D is incorrect. A member will have been charged a total of $36 + 19 \times 10$, or **\$226**, after **10** months at the gym.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: d9d83c02

For what value of w does
 $w - 10 = 2(w + 5)$?

- A. 5
- B. 0
- C. -15
- D. -20

ID: d9d83c02 Answer

Correct Answer: D

Rationale

Choice D is correct. To solve the equation, use the distributive property to multiply on the right-hand side of the equation which gives $w - 10 = 2w + 10$. Subtract w from both sides of the equation, which gives $-10 = w + 10$. Finally, subtract 10 from both sides of the equation, which gives $-20 = w$.

Choices A and B are incorrect and may result from making sign errors. Choice C is incorrect and may result from incompletely distributing the 2 in the expression $2(w + 5)$.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 7a987ae4

If $\frac{2n}{5} = 10$, what is the value of $2n - 1$?

- A. 24
- B. 49
- C. 50
- D. 99

ID: 7a987ae4 Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by 5 yields $2n = 50$. Substituting 50 for $2n$ in the expression $2n - 1$ yields $50 - 1 = 49$.

Alternate approach: Dividing both sides of $2n = 50$ by 2 yields $n = 25$. Evaluating the expression $2n - 1$ for $n = 25$ yields $2(25) - 1 = 49$.

Choice A is incorrect and may result from finding the value of $n - 1$ instead of $2n - 1$. Choice C is incorrect and may result from finding the value of $2n$ instead of $2n - 1$. Choice D is incorrect and may result from finding the value of $4n - 1$ instead of $2n - 1$.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div> <div></div> <div></div> <div></div> </div>

ID: 9ff10b3b

If $\frac{1}{2}x - \frac{1}{6}x = 1$, what is the value of x ?

A. -4 B. $\frac{1}{3}$ C. 3 D. 6

ID: 9ff10b3b Answer

Correct Answer: C

Rationale

Choice C is correct. To make it easier to add like terms on the left-hand side of the given equation, both sides of the equation can be multiplied by 6, which is the lowest common denominator of $\frac{1}{2}$ and $\frac{1}{6}$. This yields $3x - x = 6$, which can be rewritten as $2x = 6$. Dividing both sides of this equation by 2 yields $x = 3$.

Choice A is incorrect and may result from subtracting the denominators instead of numerators with common denominators to get $-\frac{1}{4}x$, rather than $\frac{1}{3}x$, on the left-hand side of the equation. Choice B is incorrect and may result from rewriting the given equation as $\frac{1}{2}x = \frac{1}{6}$ instead of $2x = 6$. Choice D is incorrect and may result from conceptual or computational errors.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 4e77195b

If $2 + x = 60$, what is the value of $16 + 8x$?

ID: 4e77195b Answer

Correct Answer: 480

Rationale

The correct answer is **480**. Multiplying both sides of the given equation by 8 yields $8(2 + x) = 8(60)$, or $16 + 8x = 480$. Therefore, if $2 + x = 60$, the value of $16 + 8x$ is **480**.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 4f7981a0

If $3x + 2 = 8$, what is the value of $9x + 6$?

ID: 4f7981a0 Answer

Rationale

The correct answer is 24. Multiplying both sides of the given equation by 3 yields $3(3x + 2) = 24$. Using the distributive property to rewrite the left-hand side of this equation yields $9x + 6 = 24$.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 46f68129

A librarian has 43 books to distribute to a group of children. If he gives each child 2 books, he will have 7 books left over. How many children are in the group?

- A. 15
- B. 18
- C. 25
- D. 29

ID: 46f68129 Answer

Rationale

Choice B is correct. Subtracting the number of books left over from the total number of books results in $43 - 7 = 36$, which is the number of books distributed. Dividing the number of books distributed by the

number of books given to each child results in $\frac{36}{2} = 18$.

Choice A is incorrect and results from dividing the total number of books by the number of books given to each child, $\frac{43}{2} \approx 22$, then subtracting the number of books left over from the result, $22 - 7 = 15$. Choice C is incorrect and results from adding the number of books left over to the total number of books, $43 + 7 = 50$, then

dividing the result by the number of books given to each child, $\frac{50}{2} = 25$. Choice D is incorrect and results

from dividing the total number of books by the number of books given to each child, $\frac{43}{2} \approx 22$, then adding the number of books left over, $22 + 7 = 29$.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: e53870b6

$$6x + k = 6x + 5$$

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

ID: e53870b6 Answer

Rationale

The correct answer is 5. Subtracting $6x$ from both sides of the given equation gives $k = 5$, so for any value of x , $6x + k = 6x + 5$ if and only if $k = 5$. Therefore, if the given equation has infinitely many solutions, the value of k is 5.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 70774aa4

If $5x = 20$, what is the value of $15x$?

- A. 7
- B. 12
- C. 23
- D. 60

ID: 70774aa4 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that $5x = 20$. Multiplying both sides of this equation by 3 yields $15x = 60$. Therefore, the value of $15x$ is 60.

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: a9c04a21

What is the solution to the equation $2x + 3 = 7$?

- A. 1
- B. 1.5
- C. 2
- D. 4

ID: a9c04a21 Answer

Correct Answer: C

Rationale

Choice C is correct. Subtracting 3 from both sides of the given equation yields $2x = 4$. Dividing both sides by 2 results in $x = 2$.

Choices A and B are incorrect and may result from computational errors. Choice D is incorrect. This is the value of $2x$.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

ID: 70e29454

$$a(3-x) - b = -1 - 2x$$

In the equation above, a and b are constants. If the equation has infinitely many solutions, what are the values of a and b ?

- A. $a = 2$ and $b = 1$
- B. $a = 2$ and $b = 7$
- C. $a = -2$ and $b = 5$
- D. $a = -2$ and $b = -5$

ID: 70e29454 Answer

Correct Answer: B

Rationale

Choice B is correct. Distributing the a on the left-hand side of the equation gives $3a - b - ax = -1 - 2x$. Rearranging the terms in each side of the equation yields $-ax + 3a - b = -2x - 1$. Since the equation has infinitely many solutions, it follows that the coefficients of x and the free terms on both sides must be equal. That is, $-a = -2$, or $a = 2$, and $3a - b = -1$. Substituting 2 for a in the equation $3a - b = -1$ gives $3(2) - b = -1$, so $b = 7$.

Choice A is incorrect and may be the result of a conceptual error when finding the value of b . Choices C and D are incorrect and may result from making a sign error when simplifying.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

ID: f09097b1

An agricultural scientist studying the growth of corn plants recorded the height of a corn plant at the beginning of a study and the height of the plant each day for the next 12 days. The scientist found that the height of the plant increased by an average of 1.20 centimeters per day for the 12 days. If the height of the plant on the last day of the study was 36.8 centimeters, what was the height, in centimeters, of the corn plant at the beginning of the study?

ID: f09097b1 Answer

Rationale

The correct answer is 22.4. If the height of the plant increased by an average of 1.20 centimeters per day for 12 days, then its total growth over the 12 days was $(1.20)(12) = 14.4$ centimeters. The plant was 36.8 centimeters tall after 12 days, so at the beginning of the study its height was $36.8 - 14.4 = 22.4$ centimeters. Note that 22.4 and $112/5$ are examples of ways to enter a correct answer.

Alternate approach: The equation $36.8 = 12(1.20) + h$ can be used to represent this situation, where h is the height of the plant, in centimeters, at the beginning of the study. Solving this equation for h yields 22.4 centimeters.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

ID: 4f669597

$$2(p+1)+8(p-1)=5p$$

What value of p is the solution of the equation above?

ID: 4f669597 Answer

Rationale

The correct answer is 1.2. One way to solve the equation $2(p+1)+8(p-1)=5p$ is to first distribute the terms outside the parentheses to the terms inside the parentheses: $2p+2+8p-8=5p$. Next, combine like terms on the left side of the equal sign: $10p-6=5p$. Subtracting $10p$ from both sides yields $-6=-5p$. Finally, dividing both sides by -5 gives $p=\frac{6}{5}$, which is equivalent to $p=1.2$. Note that 1.2 and $\frac{6}{5}$ are examples of ways to enter a correct answer.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

ID: ce314070

If $4x - \frac{1}{2} = -5$, what is the value of $8x - 1$?

- A. 2
- B. $-\frac{9}{8}$
- C. $-\frac{5}{2}$
- D. -10

ID: ce314070 Answer

Correct Answer: D

Rationale

Choice D is correct. Multiplying the given equation by 2 on each side yields $2\left(4x - \frac{1}{2}\right) = 2(-5)$. Applying the distributive property, this equation can be rewritten as $2(4x) - 2\left(\frac{1}{2}\right) = 2(-5)$, or $8x - 1 = -10$.

Choices A, B, and C are incorrect and may result from calculation errors in solving the given equation for x and then substituting that value of x in the expression $8x - 1$.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div> <div></div> <div></div> <div></div> </div>

ID: 36ab4122

Megan’s regular wage at her job is p dollars per hour for the first 8 hours of work in a day plus 1.5 times her regular hourly wage for work in excess of 8 hours that day. On a given day, Megan worked for 10 hours, and her total earnings for that day were \$137.50. What is Megan’s regular hourly wage?

- A. \$11.75
- B. \$12.50
- C. \$13.25
- D. \$13.75

ID: 36ab4122 Answer

Rationale

Choice B is correct. Since p represents Megan’s regular pay per hour, $1.5p$ represents the pay per hour in excess of 8 hours. Since Megan worked for 10 hours, she must have been paid p dollars per hour for 8 of the hours plus $1.5p$ dollars per hour for the remaining 2 hours. Therefore, since Megan earned \$137.50 for the 10 hours, the situation can be represented by the equation $137.5 = 8p + 2(1.5)p$. Distributing the 2 in the equation gives $137.5 = 8p + 3p$, and combining like terms gives $137.5 = 11p$. Dividing both sides by 11 gives $p = 12.5$. Therefore, Megan’s regular wage is \$12.50.

Choices A and C are incorrect and may be the result of calculation errors. Choice D is incorrect and may result from finding the average hourly wage that Megan earned for the 10 hours of work.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	<div><div></div><div></div><div></div></div>

ID: 5ad9eff0

The width of a rectangular dance floor is w feet. The length of the floor is 6 feet longer than its width. Which of the following expresses the perimeter, in feet, of the dance floor in terms of w ?

- A. $2w + 6$
- B. $4w + 12$
- C. $w^2 + 6$
- D. $w^2 + 6w$

ID: 5ad9eff0 Answer

Correct Answer: B

Rationale

Choice B is correct. It is given that the width of the dance floor is w feet. The length is 6 feet longer than the width; therefore, the length of the dance floor is $w + 6$. So the perimeter is $w + w + (w + 6) + (w + 6) = 4w + 12$.

Choice A is incorrect because it is the sum of one length and one width, which is only half the perimeter. Choice C is incorrect and may result from using the formula for the area instead of the formula for the perimeter and making a calculation error. Choice D is incorrect because this is the area, not the perimeter, of the dance floor.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

ID: 45bba652

If $2(x-5) + 3(x-5) = 10$, what is the value of $x-5$?

- A. 2
- B. 5
- C. 7
- D. 12

ID: 45bba652 Answer

Correct Answer: A

Rationale

Choice A is correct. Adding the like terms on the left-hand side of the given equation yields $5(x-5) = 10$.

Dividing both sides of this equation by 5 yields $x-5 = 2$.

Choice B is incorrect and may result from subtracting 5, not dividing by 5, on both sides of the equation $5(x-5) = 10$. Choice C is incorrect. This is the value of x , not the value of $x-5$. Choice D is incorrect. This is the value of $x+5$, not the value of $x-5$.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ □

ID: eafdbbbd

$$\frac{1}{4}(x + 5) - \frac{1}{3}(x + 5) = -7$$

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

- A. -12
- B. -5
- C. **79**
- D. **204**

ID: eafdbbbd Answer

Correct Answer: C

Rationale

Choice C is correct. For the given equation, $(x + 5)$ is a factor of both terms on the left-hand side. Therefore, the given equation can be rewritten as $(\frac{1}{4} - \frac{1}{3})(x + 5) = -7$, or $(\frac{3}{12} - \frac{4}{12})(x + 5) = -7$, which is equivalent to $-\frac{1}{12}(x + 5) = -7$. Multiplying both sides of this equation by -12 yields $x + 5 = 84$. Subtracting 5 from both sides of this equation yields $x = 79$.

Choice A is incorrect. This is the value of x for which the left-hand side of the given equation equals $\frac{7}{12}$, not -7 .

Choice B is incorrect. This is the value of x for which the left-hand side of the given equation equals 0 , not -7 .

Choice D is incorrect. This is the value of x for which the left-hand side of the given equation equals $-\frac{209}{12}$, not -7 .

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: 2937ef4f

Hector used a tool called an auger to remove corn from a storage bin at a constant rate. The bin contained 24,000 bushels of corn when Hector began to use the auger. After 5 hours of using the auger, 19,350 bushels of corn remained in the bin. If the auger continues to remove corn at this rate, what is the total number of hours Hector will have been using the auger when 12,840 bushels of corn remain in the bin?

- A. 3
- B. 7
- C. 8
- D. 12

ID: 2937ef4f Answer

Correct Answer: D

Rationale

Choice D is correct. After using the auger for 5 hours, Hector had removed $24,000 - 19,350 = 4,650$ bushels of corn from the storage bin. During the 5-hour period, the auger removed corn from the bin at a constant rate of $\frac{4,650}{5} = 930$ bushels per hour. Assuming the auger continues to remove corn at this rate, after x hours it will have removed $930x$ bushels of corn. Because the bin contained 24,000 bushels of corn when Hector started using the auger, the equation $24,000 - 930x = 12,840$ can be used to find the number of hours, x , Hector will have been using the auger when 12,840 bushels of corn remain in the bin. Subtracting 12,840 from both sides of this equation and adding $930x$ to both sides of the equation yields $11,160 = 930x$. Dividing both sides of this equation by 930 yields $x = 12$. Therefore, Hector will have been using the auger for 12 hours when 12,840 bushels of corn remain in the storage bin.

Choice A is incorrect. Three hours after Hector began using the auger, $24,000 - 3(930) = 21,210$ bushels of corn remained, not 12,840. Choice B is incorrect. Seven hours after Hector began using the auger, $24,000 - 7(930) = 17,490$ bushels of corn will remain, not 12,840. Choice C is incorrect. Eight hours after Hector began using the auger, $24,000 - 8(930) = 16,560$ bushels of corn will remain, not 12,840.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: ae2287e2

A certain product costs a company \$65 to make. The product is sold by a salesperson who earns a commission that is equal to 20% of the sales price of the product. The profit the company makes for each unit is equal to the sales price minus the combined cost of making the product and the commission. If the sales price of the product is \$100, which of the following equations gives the number of units, u , of the product the company sold to make a profit of \$6,840 ?

- A. $(100(1 - 0.2) - 65)u = 6,840$
- B. $(100 - 65)(1 - 0.8)u = 6,840$
- C. $0.8(100) - 65u = 6,840$
- D. $(0.2(100) + 65)u = 6,840$

ID: ae2287e2 Answer

Correct Answer: A

Rationale

Choice A is correct. The sales price of one unit of the product is given as \$100. Because the salesperson is awarded a commission equal to 20% of the sales price, the expression $100(1 - 0.2)$ gives the sales price of one unit after the commission is deducted. It is also given that the profit is equal to the sales price minus the combined cost of making the product, or \$65, and the commission: $100(1 - 0.2) - 65$. Multiplying this expression by u gives the profit of u units: $(100(1 - 0.2) - 65)u$. Finally, it is given that the profit for u units is \$6,840; therefore $(100(1 - 0.2) - 65)u = \$6,840$.

Choice B is incorrect. In this equation, cost is subtracted before commission and the equation gives the commission, not what the company retains after commission. Choice C is incorrect because the number of units is multiplied only by the cost but not by the sale price. Choice D is incorrect because the value 0.2 shows the commission, not what the company retains after commission.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: 771bd0ca

$$5(t + 3) - 7(t + 3) = 38$$

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

ID: 771bd0ca Answer

Correct Answer: -22

Rationale

The correct answer is -22 . The given equation can be rewritten as $-2(t + 3) = 38$. Dividing both sides of this equation by -2 yields $t + 3 = -19$. Subtracting 3 from both sides of this equation yields $t = -22$. Therefore, -22 is the value of t that is the solution to the given equation.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: 90095507

Townsend Realty Group Investments

Property address	Purchase price (dollars)	Monthly rental price (dollars)
Clearwater Lane	128,000	950
Driftwood Drive	176,000	1,310
Edgemont Street	70,000	515
Glenview Street	140,000	1,040
Hamilton Circle	450,000	3,365

The Townsend Realty Group invested in the five different properties listed in the table above. The table shows the amount, in dollars, the company paid for each property and the corresponding monthly rental price, in dollars, the company charges for the property at each of the five locations. Townsend Realty purchased the Glenview Street property and received a 40% discount off the original price along with an additional 20% off the discounted price for purchasing the property in cash. Which of the following best approximates the original price, in dollars, of the Glenview Street property?

- A. \$350,000
- B. \$291,700
- C. \$233,300
- D. \$175,000

ID: 90095507 Answer

Correct Answer: B

Rationale

Choice B is correct. Let x be the original price, in dollars, of the Glenview Street property. After the 40% discount, the price of the property became $0.6x$ dollars, and after the additional 20% off the discounted price, the price of the property became $0.8(0.6x)$. Thus, in terms of the original price of the property, x , the purchase price of the property is $0.48x$. It follows that $0.48x = 140,000$. Solving this equation for x gives $x = 291,666.\bar{6}$. Therefore, of the given choices, \$291,700 best approximates the original price of the Glenview Street property.

Choice A is incorrect because it is the result of dividing the purchase price of the property by 0.4, as though the purchase price were 40% of the original price. Choice C is incorrect because it is the closest to dividing the purchase price of the property by 0.6, as though the purchase price were 60% of the original price. Choice D is incorrect because it is the result of dividing the purchase price of the property by 0.8, as though the purchase price were 80% of the original price.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: 0cb57740

Each side of a **30**-sided polygon has one of three lengths. The number of sides with length **8 centimeters (cm)** is **5** times the number of sides n with length **3 cm**. There are **6** sides with length **4 cm**. Which equation must be true for the value of n ?

- A. $5n + 6 = 30$
- B. $6n + 6 = 30$
- C. $8n + 3n + 4n = 30$
- D. $8(5n) + 3n + 4(6) = 30$

ID: 0cb57740 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that each side of a **30**-sided polygon has one of three lengths. It's also given that the number of sides with length **8 centimeters (cm)** is **5** times the number of sides n with length **3 cm**. Therefore, there are $5 \times n$, or $5n$, sides with length **8 cm**. It's also given that there are **6** sides with length **4 cm**. Therefore, the number of **3 cm**, **4 cm**, and **8 cm** sides are n , **6**, and $5n$, respectively. Since there are a total of **30** sides, the equation $n + 6 + 5n = 30$ represents this situation. Combining like terms on the left-hand side of this equation yields $6n + 6 = 30$. Therefore, the equation that must be true for the value of n is $6n + 6 = 30$.

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



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: aee9fd2d

If $\frac{x+6}{3} = \frac{x+6}{13}$, the value of $x + 6$ is between which of the following pairs of values?

- A. -7 and -3
- B. -2 and 2
- C. 2 and 7
- D. 8 and 13

ID: aee9fd2d Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by $(3)(13)$, or 39 , yields $(39)\left(\frac{x+6}{3}\right) = (39)\left(\frac{x+6}{13}\right)$, or $13(x+6) = 3(x+6)$. Subtracting $3(x+6)$ from both sides of this equation yields $10(x+6) = 0$. Dividing both sides of this equation by 10 yields $x+6 = 0$. Therefore, if $\frac{x+6}{3} = \frac{x+6}{13}$, then the value of $x+6$ is 0 . It follows that of the given choices, the value of $x+6$ is between -2 and 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: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: 3f8a701b

The equation $9x + 5 = a(x + b)$, where a and b are constants, has no solutions. Which of the following must be true?

I. $a = 9$

II. $b = 5$

III. $b \neq \frac{5}{9}$

- A. None
- B. I only
- C. I and II only
- D. I and III only

ID: 3f8a701b Answer

Correct Answer: D

Rationale

Choice D is correct. For a linear equation in a form $ax + b = cx + d$ to have no solutions, the x-terms must have equal coefficients and the remaining terms must not be equal. Expanding the right-hand side of the given equation yields $9x + 5 = ax + ab$. Inspecting the x-terms, 9 must equal a , so statement I must be true.

Inspecting the remaining terms, 5 can't equal $9b$. Dividing both of these quantities by 9 yields that b can't equal $\frac{5}{9}$. Therefore, statement III must be true. Since b can have any value other than $\frac{5}{9}$, statement II may or may not be true.

Choice A is incorrect. For the given equation to have no solution, both $a = 9$ and $b \neq \frac{5}{9}$ must be true. Choice B is incorrect because it must also be true that $b \neq \frac{5}{9}$. Choice C is incorrect because when $a = 9$, there are many values of b that lead to an equation having no solution. That is, b might be 5, but b isn't required to be 5.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear equations in one variable	■ ■ ■

ID: 628300a9

A science teacher is preparing the 5 stations of a science laboratory. Each station will have either Experiment A materials or Experiment B materials, but not both. Experiment A requires 6 teaspoons of salt, and Experiment B requires 4 teaspoons of salt. If x is the number of stations that will be set up for Experiment A and the remaining stations will be set up for Experiment B, which of the following expressions represents the total number of teaspoons of salt required?

- A. $5x$
- B. $10x$
- C. $2x + 20$
- D. $10x + 20$

ID: 628300a9 Answer

Correct Answer: C

Rationale

Choice C is correct. It is given that x represents the number of stations that will be set up for Experiment A and that there will be 5 stations total, so it follows that $5 - x$ is the number of stations that will be set up for Experiment B. It is also given that Experiment A requires 6 teaspoons of salt and that Experiment B requires 4 teaspoons of salt, so the total number of teaspoons of salt required is $6x + 4(5 - x)$, which simplifies to $2x + 20$.

Choices A, B, and D are incorrect and may be the result of not understanding the description of the context.

Question Difficulty: Hard