Question ID 696e199b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$\frac{(x+9)(x-9)}{x+9} = 7$$

What is the solution to the given equation?

A. 7

B. 9

C. 16

D. 63

Correct Answer: C

Rationale

Choice C is correct. Since the left-hand side of the given equation has a factor of $x + 9$ in both the numerator and the denominator, the solution to the given equation can be found by solving the equation $x - 9 = 7$. Adding 9 to both sides of this equation yields $x = 16$. Substituting 16 for x in the given equation yields $\frac{(16+9)(16-9)}{16+9} = 7$, or $7 = 7$. Therefore, the solution to the given equation is 16.

Choice A is incorrect. Substituting 7 for x in the given equation yields $\frac{(7+9)(7-9)}{7+9} = 7$, or $-2 = 7$, which is false.

Choice B is incorrect. Substituting 9 for x in the given equation yields $\frac{(9+9)(9-9)}{9+9} = 7$, or $0 = 7$, which is false.

Choice D is incorrect. Substituting 63 for x in the given equation yields $\frac{(63+9)(63-9)}{63+9} = 7$, or $54 = 7$, which is false.

Question Difficulty: Medium

Question ID 6fbfbe0d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$x = 8a(b+9)$$

The given equation relates the positive numbers a, b, and x. Which equation correctly expresses a in terms of b and x?

A. $a = \frac{x}{8} - (b+9)$

B. $a = \frac{x}{8(b+9)}$

C. $a = \frac{8(b+9)}{x}$

D. $a = 8x(b+9)$

Correct Answer: B

Rationale

Choice B is correct. To express a in terms of b and x, the given equation can be rewritten such that a is isolated on one side of the equation. Since it's given that b is a positive number, $b + 9$ is not equal to zero. Therefore, dividing both sides of the given equation by $8(b+9)$ yields the equivalent equation $\frac{x}{8(b+9)} = a$, or $a = \frac{x}{8(b+9)}$.

Choice A is incorrect. This equation is equivalent to $x = 8(a + (b+9))$.

Choice C is incorrect. This equation is equivalent to $x = \frac{8(b+9)}{a}$.

Choice D is incorrect. This equation is equivalent to $x = \frac{a}{8(b+9)}$.

Question Difficulty: Medium

Question ID 5bfaf155

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$p = 20 + \frac{16}{n}$$

The given equation relates the numbers p and n, where n is not equal to 0 and $p > 20$. Which equation correctly expresses n in terms of p?

A. $n = \frac{p-20}{16}$

B. $n = \frac{p}{16} + 20$

C. $n = \frac{p}{16} - 20$

D. $n = \frac{16}{p-20}$

Correct Answer: D

Rationale

Choice D is correct. To express n in terms of p, the given equation must be solved for n. Subtracting 9 from both sides of the given equation yields $p - 9 = \frac{14}{n}$. Since n is not equal to 0, multiplying both sides of this equation by n yields $(p-9)(n) = 14$. It's given that $p > 9$, which means $p - 9$ is not equal to 0. Therefore, dividing both sides of $(p-9)(n) = 14$ by $(p-9)$ yields $\frac{(p-9)(n)}{p-9} = \frac{14}{p-9}$, or $n = \frac{14}{p-9}$.

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 408d3547

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 408d3547

$$(5x + 4)(2x - 5) = 0$$

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

A. $-\frac{5}{2}$

B. $-\frac{5}{4}$

C. $-\frac{4}{5}$

D. $-\frac{2}{5}$

ID: 408d3547 Answer

Correct Answer: C

Rationale

Choice C is correct. Since a product of two factors is equal to 0 if and only if at least one of the factors is 0, either $5x + 4 = 0$ or $2x - 5 = 0$. Subtracting 4 from each side of the equation $5x + 4 = 0$ yields $5x = -4$. Dividing each side of this equation by 5 yields $x = -\frac{4}{5}$. Adding 5 to each side of the equation $2x - 5 = 0$ yields $2x = 5$. Dividing each side of this equation by 2 yields $x = \frac{5}{2}$. It follows that the solutions to the given equation are $-\frac{4}{5}$ and $\frac{5}{2}$. Therefore, $-\frac{4}{5}$ is a solution to the given equation.

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 1c7b6b0a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

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

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

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 753ebb31

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$5x^2 - 37x - 24 = 0$$

What is the positive solution to the given equation?

A. $\frac{3}{5}$

B. 3

C. 8

D. 37

Correct Answer: C

Rationale

Choice C is correct. The left-hand side of the given equation can be factored as $(5x + 3)(x - 8)$. Therefore, the given equation, $5x^2 - 37x - 24 = 0$, can be written as $(5x + 3)(x - 8) = 0$. Applying the zero product property to this equation yields $5x + 3 = 0$ and $x - 8 = 0$. Subtracting 3 from both sides of the equation $5x + 3 = 0$ yields $5x = -3$. Dividing both sides of this equation by 5 yields $x = -\frac{3}{5}$. Adding 8 to both sides of the equation $x - 8 = 0$ yields $x = 8$. Therefore, the two solutions to the given equation, $5x^2 - 37x - 24 = 0$, are $-\frac{3}{5}$ and 8. It follows that 8 is the positive solution to the given equation.

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 e9e5f5d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: e9e5f5d5

$$7x^2 - 20x - 32 = 0$$

What is the positive solution to the given equation?

ID: e9e5f5d5 Answer

Correct Answer: 4

Rationale

The correct answer is 4. The left-hand side of the given equation can be factored as $(7x + 8)(x - 4)$. Therefore, the given equation, $7x^2 - 20x - 32 = 0$, can be written as $(7x + 8)(x - 4) = 0$. Applying the zero product property to this equation yields $7x + 8 = 0$ and $x - 4 = 0$. Subtracting 8 from both sides of the equation $7x + 8 = 0$ yields $7x = -8$. Dividing both sides of this equation by 7 yields $x = -\frac{8}{7}$. Adding 4 to both sides of the equation $x - 4 = 0$ yields $x = 4$. Therefore, the two solutions to the given equation, $7x^2 - 20x - 32 = 0$, are $-\frac{8}{7}$ and 4. It follows that 4 is the positive solution to the given equation.

Question Difficulty: Medium

Question ID c33339b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: c33339b0

The equation $12t + b = c$ relates the variables t, b, and c. Which of the following correctly expresses the value of $c - b$ in terms of t?

A. $\frac{t}{12}$

B. t

C. $t + \frac{1}{12}$

D. $12t$

ID: c33339b0 Answer

Correct Answer: D

Rationale

Choice D is correct. Subtracting b from each side of the given equation yields $12t = c - b$. Therefore, the expression $12t$ correctly expresses the value of $c - b$ in terms of t.

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 247b1034

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$y = 4x$$
$$y = x^2 - 12$$

A solution to the given system of equations is (x, y), where $x > 0$. What is the value of x?

Correct Answer: 6

Rationale

The correct answer is 6. It's given that $y = 4x$ and $y = x^2 - 12$. Since $y = 4x$, substituting $4x$ for y in the second equation of the given system yields $4x = x^2 - 12$. Subtracting $4x$ from both sides of this equation yields $0 = x^2 - 4x - 12$. This equation can be rewritten as $0 = (x - 6)(x + 2)$. By the zero product property, $x - 6 = 0$ or $x + 2 = 0$. Adding 6 to both sides of the equation $x - 6 = 0$ yields $x = 6$. Subtracting 2 from both sides of the equation $x + 2 = 0$ yields $x = -2$. Therefore, solutions to the given system of equations occur when $x = 6$ and when $x = -2$. It's given that a solution to the given system of equations is (x, y), where $x > 0$. Since 6 is greater than 0, it follows that the value of x is 6.

Question Difficulty: Medium

Question ID 7b2d91a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 7b2d91a2

$$\frac{-54}{w} = 6$$

What is the solution to the given equation?

ID: 7b2d91a2 Answer

Correct Answer: -9

Rationale

The correct answer is -9. Since w is in the denominator of a fraction in the given equation, w can't be equal to 0. Since w isn't equal to 0, multiplying both sides of the given equation by w yields an equivalent equation, $-54 = 6w$. Dividing both sides of this equation by 6 yields $-9 = w$. Therefore, -9 is the solution to the given equation.

Question Difficulty: Medium

Question ID bc0575e7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: bc0575e7

$$w^2 + 12w - 40 = 0$$

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

A. $6 - 2\sqrt{19}$

B. $2\sqrt{19}$

C. $\sqrt{19}$

D. $-6 + 2\sqrt{19}$

ID: bc0575e7 Answer

Correct Answer: D

Rationale

Choice D is correct. Adding 40 to both sides of the given equation yields $w^2 + 12w = 40$. To complete the square, adding $\left(\frac{12}{2}\right)^2$, or 6^2, to both sides of this equation yields $w^2 + 12w + 6^2 = 40 + 6^2$, or $(w + 6)^2 = 76$. Taking the square root of both sides of this equation yields $w + 6 = \pm\sqrt{76}$, or $w + 6 = \pm2\sqrt{19}$. Subtracting 6 from both sides of this equation yields $w = -6 \pm 2\sqrt{19}$. Therefore, the solutions to the given equation are $-6 + 2\sqrt{19}$ and $-6 - 2\sqrt{19}$. Of these two solutions, only $-6 + 2\sqrt{19}$ is given as a choice.

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 cb03e399

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: cb03e399

$$y = (x - 2)(x + 4)$$
$$y = 6x - 12$$

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

A. $(0, 2)$

B. $(-4, 2)$

C. $(2, 0)$

D. $(2, -4)$

ID: cb03e399 Answer

Correct Answer: C

Rationale

Choice C is correct. The second equation in the given system of equations is $y = 6x - 12$. Substituting $6x - 12$ for y in the first equation of the given system yields $6x - 12 = (x - 2)(x + 4)$. Factoring 6 out of the left-hand side of this equation yields $6(x - 2) = (x - 2)(x + 4)$. An expression with a factor of the form $(x - a)$ is equal to zero when $x = a$. Each side of this equation has a factor of $(x - 2)$, so each side of the equation is equal to zero when $x = 2$. Substituting 2 for x into the equation $6(x - 2) = (x - 2)(x + 4)$ yields $6(2 - 2) = (2 - 2)(2 + 4)$, or $0 = 0$, which is true. Substituting 2 for x into the second equation in the given system of equations yields $y = 6(2) - 12$, or $y = 0$. Therefore, the solution to the system of equations is the ordered pair $(2, 0)$.

Choice A is incorrect and may result from switching the order of the solutions for x and y.

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 4f36c8ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

If $|4x - 4| = 112$, what is the positive value of $x - 1$?

Correct Answer: 28

Rationale

The correct answer is 28. The given absolute value equation can be rewritten as two linear equations: $4x - 4 = 112$ and $-(4x - 4) = 112$, or $4x - 4 = -112$. Adding 4 to both sides of the equation $4x - 4 = 112$ results in $4x = 116$. Dividing both sides of this equation by 4 results in $x = 29$. Adding 4 to both sides of the equation $4x - 4 = -112$ results in $4x = -108$. Dividing both sides of this equation by 4 results in $x = -27$. Therefore, the two values of $x - 1$ are $29 - 1$, or 28, and $-27 - 1$, or -28. Thus, the positive value of $x - 1$ is 28.

Alternate approach: The given equation can be rewritten as $|4(x - 1)| = 112$, which is equivalent to $4|x - 1| = 112$. Dividing both sides of this equation by 4 yields $|x - 1| = 28$. This equation can be rewritten as two linear equations: $x - 1 = 28$ and $-(x - 1) = 28$, or $x - 1 = -28$. Therefore, the positive value of $x - 1$ is 28.

Question Difficulty: Medium

Question ID 5ee494b6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$x^2 + y + 10 = 10$$
$$8x + 16 - y = 0$$

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

Correct Answer: B

Rationale

Choice B 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 22a0e553

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 22a0e553

$$v = -\frac{w}{150x}$$

The given equation relates the distinct positive numbers v, w, and x. Which equation correctly expresses w in terms of v and x?

A. $w = -150vx$

B. $w = -\frac{150v}{x}$

C. $w = -\frac{x}{150v}$

D. $w = v + 150x$

ID: 22a0e553 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that x is positive. Therefore, multiplying each side of the given equation by $-150x$ yields $-150xv = w$, which is equivalent to $w = -150vx$. Thus, the equation $w = -150vx$ correctly expresses w in terms of v and x.

Choice B is incorrect. This equation is equivalent to $v = -\frac{wx}{150}$.

Choice C is incorrect. This equation is equivalent to $v = -\frac{x}{150w}$.

Choice D is incorrect. This equation is equivalent to $v = w - 150x$.

Question Difficulty: Medium

Question ID 430e5f54

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$\frac{1}{7b} = \frac{11x}{y}$$

The given equation relates the positive numbers b, x, and y. Which equation correctly expresses x in terms of b and y?

A. $x = \frac{7by}{11}$

B. $x = y - 77b$

C. $x = \frac{y}{77b}$

D. $x = 77by$

Correct Answer: C

Rationale

Choice C is correct. Multiplying each side of the given equation by y yields the equivalent equation $\frac{y}{7b} = 11x$. Dividing each side of this equation by 11 yields $\frac{y}{77b} = x$, or $x = \frac{y}{77b}$.

Choice A is incorrect. This equation is not equivalent to the given equation.

Choice B is incorrect. This equation is not equivalent to the given equation.

Choice D is incorrect. This equation is not equivalent to the given equation.

Question Difficulty: Medium

Question ID 036e585d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 036e585d

$$3x(x - 4)(x + 5) = 0$$

What is one of the solutions to the given equation?

A. -4

B. 0

C. 3

D. 5

ID: 036e585d Answer

Correct Answer: B

Rationale

Choice B is correct. Applying the zero product property to the given equation yields $3x = 0$, $x - 4 = 0$, and $x + 5 = 0$. Dividing each side of the equation $3x = 0$ by 3 yields $x = 0$. Adding 4 to each side of the equation $x - 4 = 0$ yields $x = 4$. Subtracting 5 from each side of the equation $x + 5 = 0$ yields $x = -5$. Therefore, the solutions to the given equation are 0, 4, and -5. Thus, one of the solutions to the given equation is 0.

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 9658700e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

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

What is a solution to the given equation?

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 92b3b634

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$z^2 + 10z - 24 = 0$$

What is one of the solutions to the given equation?

Correct Answer: 2, -12

Rationale

The correct answer is either 2 or -12. The left-hand side of the given equation can be rewritten by factoring. The two values that multiply to -24 and add to 10 are 12 and -2. It follows that the given equation can be rewritten as $(z + 12)(z - 2) = 0$. Setting each factor equal to 0 yields two equations: $z + 12 = 0$ and $z - 2 = 0$. Subtracting 12 from both sides of the equation $z + 12 = 0$ results in $z = -12$. Adding 2 to both sides of the equation $z - 2 = 0$ results in $z = 2$. Note that 2 and -12 are examples of ways to enter a correct answer.

Question Difficulty: Medium

Question ID e669571f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: e669571f

$$P = N(19 - C)$$

The given equation relates the positive numbers P, N, and C. Which equation correctly expresses C in terms of P and N?

A. $C = \frac{19+P}{N}$

B. $C = \frac{19-P}{N}$

C. $C = 19 + \frac{P}{N}$

D. $C = 19 - \frac{P}{N}$

ID: e669571f Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the values of P, N, and C are positive. Therefore, dividing each side of the given equation by N yields $\frac{P}{N} = 19 - C$. Subtracting 19 from each side of this equation yields $\frac{P}{N} - 19 = -C$. Dividing each side of this equation by -1 yields $19 - \frac{P}{N} = C$, or $C = 19 - \frac{P}{N}$.

Choice A is incorrect. This equation is equivalent to $P = NC - 19$, not $P = N(19 - C)$.

Choice B is incorrect. This equation is equivalent to $P = 19 - NC$, not $P = N(19 - C)$.

Choice C is incorrect. This equation is equivalent to $P = N(C - 19)$, not $P = N(19 - C)$.

Question Difficulty: Medium

Question ID e0cc40e8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: e0cc40e8

$$38x^2 = 38(9)$$

What is the negative solution to the given equation?

ID: e0cc40e8 Answer

Correct Answer: -3

Rationale

The correct answer is -3. Dividing both sides of the given equation by 38 yields $x^2 = 9$. Taking the square root of both sides of this equation yields the solutions $x = 3$ and $x = -3$. Therefore, the negative solution to the given equation is -3.

Question Difficulty: Medium

Question ID 0f587cc6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 0f587cc6

$$-4x^2 - 7x = -36$$

What is the positive solution to the given equation?

A. $\frac{7}{4}$

B. $\frac{9}{4}$

C. 4

D. 7

ID: 0f587cc6 Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying each side of the given equation by -16 yields $64x^2 + 112x = 576$. To complete the square, adding 49 to each side of this equation yields $64x^2 + 112x + 49 = 576 + 49$, or $(8x + 7)^2 = 625$. Taking the square root of each side of this equation yields two equations: $8x + 7 = 25$ and $8x + 7 = -25$. Subtracting 7 from each side of the equation $8x + 7 = 25$ yields $8x = 18$. Dividing each side of this equation by 8 yields $x = \frac{18}{8}$, or $x = \frac{9}{4}$. Therefore, $\frac{9}{4}$ is a solution to the given equation. Subtracting 7 from each side of the equation $8x + 7 = -25$ yields $8x = -32$. Dividing each side of this equation by 8 yields $x = -4$. Therefore, the given equation has two solutions, $\frac{9}{4}$ and -4. Since $\frac{9}{4}$ is positive, it follows that $\frac{9}{4}$ is the positive solution to the given equation.

Alternate approach: Adding $4x^2$ and $7x$ to each side of the given equation yields $0 = 4x^2 + 7x - 36$. The right-hand side of this equation can be rewritten as $4x^2 + 16x - 9x - 36$. Factoring out the common factor of $4x$ from the first two terms of this expression and the common factor of -9 from the second two terms yields $4x(x + 4) - 9(x + 4)$. Factoring out the common factor of $(x + 4)$ from these two terms yields the expression $(4x - 9)(x + 4)$. Since this expression is equal to 0, it follows that either $4x - 9 = 0$ or $x + 4 = 0$. Adding 9 to each side of the equation $4x - 9 = 0$ yields $4x = 9$. Dividing each side of this equation by 4 yields $x = \frac{9}{4}$. Therefore, $\frac{9}{4}$ is a positive solution to the given equation. Subtracting 4 from each side of the equation $x + 4 = 0$ yields $x = -4$. Therefore, the given equation has two solutions, $\frac{9}{4}$ and -4. Since $\frac{9}{4}$ is positive, it follows that $\frac{9}{4}$ is the positive solution to the given equation.

Choice A is incorrect. Substituting $\frac{7}{4}$ for x in the given equation yields $-\frac{49}{2} = -36$, which is false.

Choice C is incorrect. Substituting 4 for x in the given equation yields $-92 = -36$, which is false.

Choice D is incorrect. Substituting 7 for x in the given equation yields $-245 = -36$, which is false.

Question ID 28a0ca32

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$14j + 5k = m$$

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. $k = 5m - 14j$

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 f20cc110

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: f20cc110

$$\frac{55}{x+6} = x$$

What is the positive solution to the given equation?

ID: f20cc110 Answer

Correct Answer: 5

Rationale

The correct answer is 5. Multiplying both sides of the given equation by $x + 6$ results in $55 = x(x + 6)$. Applying the distributive property of multiplication to the right-hand side of this equation results in $55 = x^2 + 6x$. Subtracting 55 from both sides of this equation results in $0 = x^2 + 6x - 55$. The right-hand side of this equation can be rewritten by factoring. The two values that multiply to -55 and add to 6 are 11 and -5. It follows that the equation $0 = x^2 + 6x - 55$ can be rewritten as $0 = (x + 11)(x - 5)$. Setting each factor equal to 0 yields two equations: $x + 11 = 0$ and $x - 5 = 0$. Subtracting 11 from both sides of the equation $x + 11 = 0$ results in $x = -11$. Adding 5 to both sides of the equation $x - 5 = 0$ results in $x = 5$. Therefore, the positive solution to the given equation is 5.

Question Difficulty: Medium

Question ID baa012ad

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

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

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. $n = 7m - 5 - p$

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 0106a3a1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 0106a3a1

$$x^2 = -841$$

How many distinct real solutions does the given equation have?

A. Exactly one

B. Exactly two

C. Infinitely many

D. Zero

ID: 0106a3a1 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 8f89f154

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 8f89f154

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

A. 24

B. 48

C. 72

D. 96

ID: 8f89f154 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 42c3e1dd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$y = x^2 + 14x + 48$$
$$x + 8 = 11$$

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

Correct Answer: 99

Rationale

The correct answer is 99. In the given system of equations, the second equation is $x + 8 = 11$. Subtracting 8 from both sides of this equation yields $x = 3$. In the given system of equations, the first equation is $y = x^2 + 14x + 48$. Substituting 3 for x in this equation yields $y = (3)^2 + 14(3) + 48$, or $y = 99$. Therefore, the solution to the given system of equations is $(x, y) = (3, 99)$. Thus, the value of y is 99.

Question Difficulty: Medium

Question ID 0daafba7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

$$x^2 - 12x + 27 = 0$$

How many distinct real solutions does the given equation have?

A. Exactly two

B. Exactly one

C. Zero

D. Infinitely many

Correct Answer: A

Rationale

Choice A is correct. The number of solutions of a quadratic equation of 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 positive, then the quadratic equation has exactly 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 negative, then the quadratic equation has zero real solutions. In the given equation, $x^2 - 12x + 27 = 0$, $a = 1$, $b = -12$, and $c = 27$. Substituting these values for a, b, and c in $b^2 - 4ac$ yields $(-12)^2 - 4(1)(27)$, or 36. Since the value of its discriminant is positive, the given equation has exactly two distinct real solutions.

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