

Question ID 00a21c1d

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 00a21c1d

$$\begin{aligned}x &= 8 \\ y &= x^2 + 8\end{aligned}$$

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

- A. 8
- B. 24
- C. 64
- D. 72

ID: 00a21c1d Answer

Correct Answer: D

Rationale

Choice D is correct. Since the graphs of the equations in the given system intersect at the point (x, y) , the point (x, y) represents a solution to the given system of equations. The first equation of the given system of equations states that $x = 8$. Substituting 8 for x in the second equation of the given system of equations yields $y = 8^2 + 8$, or $y = 72$. Therefore, the value of y is 72.

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

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 109ed6af

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 109ed6af

$$b = 42cf$$

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

- A. $c = \frac{b}{42f}$
- B. $c = \frac{b-42}{f}$
- C. $c = 42bf$
- D. $c = 42 - b - f$

ID: 109ed6af Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the equation $b = 42cf$ relates the positive numbers b , c , and f . Dividing each side of the given equation by $42f$ yields $\frac{b}{42f} = c$, or $c = \frac{b}{42f}$. Thus, the equation $c = \frac{b}{42f}$ correctly expresses c in terms of b and f .

Choice B is incorrect. This equation can be rewritten as $b = cf + 42$.

Choice C is incorrect. This equation can be rewritten as $b = \frac{c}{42f}$.

Choice D is incorrect. This equation can be rewritten as $b = 42 - c - f$.

Question Difficulty: Medium

Question ID 517ac77b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 517ac77b

$$3x^2 - 15x + 18 = 0$$

How many distinct real solutions are there to the given equation?

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

ID: 517ac77b Answer

Correct Answer: B

Rationale

Choice B is correct. The number of solutions to 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, $3x^2 - 15x + 18 = 0$, $a = 3$, $b = -15$, and $c = 18$. Substituting 3 for a , -15 for b , and 18 for c in $b^2 - 4ac$ yields $(-15)^2 - 4(3)(18)$, or 9 . Since the value of the discriminant is positive, the given equation has exactly two distinct real solutions.

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 43eb3ad8

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 43eb3ad8

$5|x| = 45$

What is the positive solution to the given equation?

ID: 43eb3ad8 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: Medium

Question ID 500ad346

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 500ad346

$$(x + 2)(x - 5)(x + 9) = 0$$

What is a positive solution to the given equation?

- A. 3
- B. 4
- C. 5
- D. 18

ID: 500ad346 Answer

Correct Answer: C

Rationale

Choice C is correct. Applying the zero product property to the given equation yields three equations: $x + 2 = 0$, $x - 5 = 0$, and $x + 9 = 0$. Subtracting 2 from both sides of the equation $x + 2 = 0$ yields $x = -2$. Adding 5 to both sides of the equation $x - 5 = 0$ yields $x = 5$. Subtracting 9 from both sides of the equation $x + 9 = 0$ yields $x = -9$. Therefore, the solutions to the given equation are -2 , 5 , and -9 . It follows that a positive solution to the given equation 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 and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID 572758f9

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 572758f9

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

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: 572758f9 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: Medium

Question ID 88a7b360

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 88a7b360

$$8j = k + 15m$$

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

- A. $j = \frac{k}{8} + 15m$
- B. $j = k + \frac{15m}{8}$
- C. $j = 8(k + 15m)$
- D. $j = \frac{k+15m}{8}$

ID: 88a7b360 Answer

Correct Answer: D

Rationale

Choice D is correct. To express j in terms of k and m , the given equation must be solved for j . Dividing each side of the given equation by 8 yields $j = \frac{k+15m}{8}$.

Choice A is incorrect. This is equivalent to $8j = k + 120m$.

Choice B is incorrect. This is equivalent to $8j = 8k + 15m$.

Choice C is incorrect. This is equivalent to $\frac{j}{8} = k + 15m$.

Question Difficulty: Medium

Question ID 098b6267

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 098b6267

$$p + 34 = q + r$$

The given equation relates the variables p , q , and r . Which equation correctly expresses p in terms of q and r ?

- A. $p = q + r + 34$
- B. $p = q + r - 34$
- C. $p = -q - r + 34$
- D. $p = -q - r - 34$

ID: 098b6267 Answer

Correct Answer: B

Rationale

Choice B is correct. Subtracting 34 from each side of the given equation yields $p = q + r - 34$. Thus, the equation $p = q + r - 34$ correctly expresses p in terms of q and r .

Choice A is incorrect. This equation can be rewritten as $p - 34 = q + r$.

Choice C is incorrect. This equation can be rewritten as $p - 34 = -q - r$.

Choice D is incorrect. This equation can be rewritten as $p + 34 = -q - r$.

Question Difficulty: Medium

Question ID 605ec72a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 605ec72a

$$\begin{aligned}x &= 3 \\ y &= (15 - x)^2\end{aligned}$$

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

- A. 432
- B. 54
- C. 45
- D. 18

ID: 605ec72a Answer

Correct Answer: A

Rationale

Choice A is correct. The first equation in the given system of equations is $x = 3$. Substituting 3 for x in the second equation in the given system of equations yields $y = (15 - 3)^2$, or $y = 144$. Substituting 3 for x and 144 for y in the expression xy yields $(3)(144)$, or 432. Therefore, the value of xy is 432.

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

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

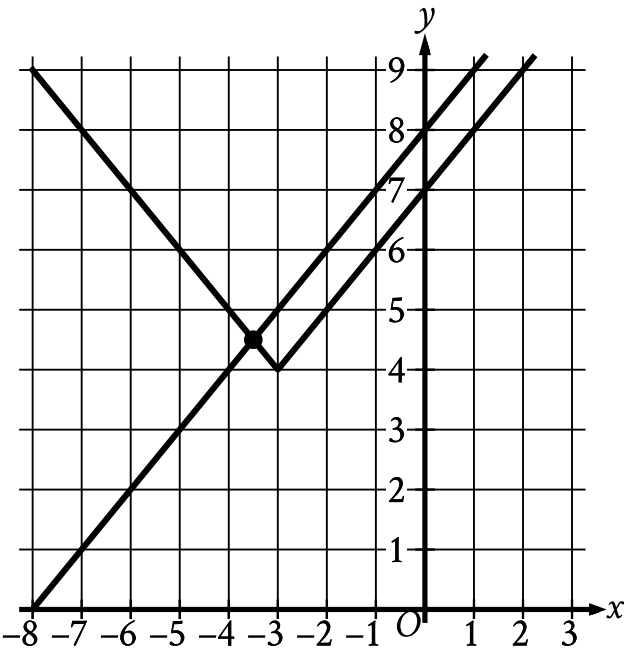
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID c6d78f38

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: c6d78f38



The graph of a system of an absolute value function and a linear function is shown. What is the solution (x, y) to this system of two equations?

- A. $(0, 8)$
- B. $(\frac{7}{2}, \frac{9}{2})$
- C. $(-\frac{7}{2}, \frac{9}{2})$
- D. $(-3, 4)$

ID: c6d78f38 Answer

Correct Answer: C

Rationale

Choice C is correct. The solution to a system of two equations corresponds to the point where the graphs of the equations intersect. The graphs of the linear function and the absolute value function shown intersect at a point with an x -coordinate between -4 and -3 and a y -coordinate between 4 and 5 . Of the given choices, only $(-\frac{7}{2}, \frac{9}{2})$ has an x -coordinate between -4 and -3 and a y -coordinate between 4 and 5 .

Choice A is incorrect. This is the y -intercept of the graph of the linear function.

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

Choice D is incorrect. This is the vertex of the graph of the absolute value function.

Question Difficulty: Medium

Question ID c5e573c2

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: c5e573c2

$$c - 7 = 25p + k$$

The given equation relates the positive numbers c , p , and k . Which equation correctly expresses c in terms of p and k ?

- A. $c = 25p + k + 7$
- B. $c = 25p + k - 7$
- C. $c = 7(25p + k)$
- D. $c = \frac{25p+k}{7}$

ID: c5e573c2 Answer

Correct Answer: A

Rationale

- Choice A is correct. Adding 7 to each side of the given equation yields $c = 25p + k + 7$.
- Choice B is incorrect. This equation is equivalent to $c + 7 = 25p + k$, not $c - 7 = 25p + k$.
- Choice C is incorrect. This equation is equivalent to $\frac{c}{7} = 25p + k$, not $c - 7 = 25p + k$.
- Choice D is incorrect. This equation is equivalent to $7c = 25p + k$, not $c - 7 = 25p + k$.

Question Difficulty: Medium

Question ID 91c00638

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 91c00638

$$\begin{aligned}x + 7 &= 10 \\ (x + 7)^2 &= y\end{aligned}$$

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

- A. $(3, 100)$
- B. $(3, 3)$
- C. $(3, 10)$
- D. $(3, 70)$

ID: 91c00638 Answer

Correct Answer: A

Rationale

Choice A is correct. The solution to a system of equations is the ordered pair (x, y) that satisfies all equations in the system. It's given by the first equation in the system that $x + 7 = 10$. Substituting 10 for $x + 7$ into the second equation yields $10^2 = y$, or $y = 100$. The x-coordinate of the solution to the system of equations can be found by subtracting 7 from both sides of the equation $x + 7 = 10$, which yields $x = 3$. Therefore, the ordered pair $(3, 100)$ is a solution to the given system of equations.

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 8e2874df

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 8e2874df

$$q - 29r = s$$

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: 8e2874df 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: Medium

Question ID 83ac0391

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 83ac0391

$k^2 - 53 = 91$

What is the positive solution to the given equation?

- A. 144
- B. 72
- C. 38
- D. 12

ID: 83ac0391 Answer

Correct Answer: D

Rationale

Choice D is correct. Adding 53 to each side of the given equation yields $k^2 = 144$. Taking the square root of each side of this equation yields $k = \pm 12$. Therefore, the positive solution to the given equation is 12.

Choice A is incorrect. This is the positive solution to the equation $k^2 - 53 = 20,683$, not $k^2 - 53 = 91$.

Choice B is incorrect. This is the positive solution to the equation $k^2 - 53 = 5,131$, not $k^2 - 53 = 91$.

Choice C is incorrect. This is the positive solution to the equation $k^2 - 53 = 1,391$, not $k^2 - 53 = 91$.

Question Difficulty: Medium

Question ID 22758602

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 22758602

$$\begin{aligned}x &= 49 \\ y &= \sqrt{x} + 9\end{aligned}$$

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

- A. 16
- B. 40
- C. 81
- D. 130

ID: 22758602 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the graphs of the given equations intersect at the point (x, y) in the xy -plane. It follows that (x, y) represents a solution to the system consisting of the given equations. The first equation given is $x = 49$. Substituting 49 for x in the second equation given, $y = \sqrt{x} + 9$, yields $y = \sqrt{49} + 9$, which is equivalent to $y = 7 + 9$, or $y = 16$. It follows that the graphs of the given equations intersect at the point $(49, 16)$. Therefore, the value of y is 16 .

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 857bd220

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 857bd220

$$\frac{x^2}{25} = 36$$

What is a solution to the given equation?

- A. 6
- B. 30
- C. 450
- D. 900

ID: 857bd220 Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying the left- and right-hand sides of the given equation by **25** yields $x^2 = 900$. Taking the square root of the left- and right-hand sides of this equation yields $x = 30$ or $x = -30$. Of these two solutions, only **30** is given as a choice.

Choice A is incorrect. This is a solution to the equation $x^2 = 36$.

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 8b0c1b88

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 8b0c1b88

$$7m = 2(n + p)$$

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

- A. $m = \frac{2(n+p)}{7}$
- B. $m = 2(n + p)$
- C. $m = 2(n + p) - 7$
- D. $m = 2 - n - p - 7$

ID: 8b0c1b88 Answer

Correct Answer: A

Rationale

Choice A is correct. Dividing each side of the given equation by 7 yields $m = \frac{2(n+p)}{7}$.

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

Choice C is incorrect. This equation is equivalent to $7 + m = 2(n + p)$, not $7m = 2(n + p)$.

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

Question Difficulty: Medium

Question ID 2335db65

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 2335db65

$x^2 = (22)(22)$

What is the positive solution to the given equation?

ID: 2335db65 Answer

Correct Answer: 22

Rationale

The correct answer is **22**. The given equation, $x^2 = (22)(22)$, is equivalent to $x^2 = (22)^2$. Taking the square root of each side of this equation yields $x = \pm 22$. Thus, the positive solution to the given equation is **22**.

Question Difficulty: Medium

Question ID d60a1fdc

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: d60a1fdc

$$\begin{aligned}y &= 5x + 4 \\ y &= 5x^2 + 4\end{aligned}$$

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: d60a1fdc 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: Medium

Question ID 69544d84

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 69544d84

$$y - 57 = px$$

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

- A. $y = 57x + p$
- B. $y = px + 57$
- C. $y = 57px$
- D. $y = \frac{px}{57}$

ID: 69544d84 Answer

Correct Answer: B

Rationale

Choice B is correct. Adding 57 to each side of the given equation yields $y = px + 57$. Therefore, the equation $y = px + 57$ correctly expresses y in terms of p and x .

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 83bf92a1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	Medium

ID: 83bf92a1

$$6r = 7s + t$$

The given equation relates the variables r , s , and t . Which equation correctly expresses s in terms of r and t ?

- A. $s = 42r - t$
- B. $s = 7(6r - t)$
- C. $s = \frac{6}{7}r - t$
- D. $s = \frac{6r - t}{7}$

ID: 83bf92a1 Answer

Correct Answer: D

Rationale

Choice D is correct. Subtracting t from both sides of the given equation yields $6r - t = 7s$. Dividing both sides of this equation by 7 yields $\frac{6r - t}{7} = s$. Therefore, the equation $s = \frac{6r - t}{7}$ correctly expresses s in terms of r and 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