Question ID 0cec7ab3

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 0cec7ab3

A rocket contained $467{,}000$ kilograms (kg) of propellant before launch. Exactly 21 seconds after launch, $362{,}105$ kg of this propellant remained. On average, approximately how much propellant, in kg, did the rocket burn each second after launch?

A. $4{,}995$

B. $17{,}243$

C. $39{,}481$

D. $104{,}895$

ID: 0cec7ab3 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the rocket contained $467{,}000\ \text{kilograms (kg)}$ of propellant before launch and had $362{,}105\ \text{kg}$ remaining exactly 21 seconds after launch. Finding the difference between the amount, in kg, of propellant before launch and the remaining amount, in kg, of propellant after launch gives the amount, in kg, of propellant burned during the 21 seconds: $467{,}000 - 362{,}105 = 104{,}895$. Dividing the amount of propellant burned by the number of seconds yields $\frac{104{,}895}{21} = 4{,}995$. Thus, an average of $4{,}995\ \text{kg}$ of propellant burned each second after launch.

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 finding the amount of propellant burned, rather than the amount of propellant burned each second.

Question Difficulty: Medium

Question ID df89e027

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: df89e027

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: df89e027 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: Medium

Question ID 45085bc8

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 45085bc8

3 more than 8 times a number x is equal to 83. Which equation represents this situation?

A. $(3)(8)x = 83$

B. $8x = 83 + 3$

C. $3x + 8 = 83$

D. $8x + 3 = 83$

ID: 45085bc8 Answer

Correct Answer: D

Rationale

Choice D is correct. The given phrase "8 times a number x" can be represented by the expression $8x$. The given phrase "3 more than" indicates an increase of 3 to a quantity. Therefore "3 more than 8 times a number x" can be represented by the expression $8x + 3$. Since it's given that 3 more than 8 times a number x is equal to 83, it follows that $8x + 3$ is equal to 83, or $8x + 3 = 83$. Therefore, the equation that represents this situation is $8x + 3 = 83$.

Choice A is incorrect. This equation represents 3 times the quantity 8 times a number x is equal to 83.

Choice B is incorrect. This equation represents 8 times a number x is equal to 3 more than 83.

Choice C is incorrect. This equation represents 8 more than 3 times a number x is equal to 83.

Question Difficulty: Medium

Question ID b2426806

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: b2426806

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

ID: b2426806 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: Medium

Question ID ecad178b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: ecad178b

Nasir bought 9 storage bins that were each the same price. He used a coupon for $\$63$ off the entire purchase. The cost for the entire purchase after using the coupon was $\$27$. What was the original price, in dollars, for 1 storage bin?

ID: ecad178b Answer

Correct Answer: 10

Rationale

The correct answer is 10. It's given that the cost for the entire purchase was $\$27$ after a coupon was used for $\$63$ off the entire purchase. Adding the amount of the coupon to the purchase price yields $27 + 63 = 90$. Thus, the cost for the entire purchase before using the coupon was $\$90$. It's given that Nasir bought 9 storage bins. The original price for 1 storage bin can be found by dividing the total cost by 9. Therefore, the original price, in dollars, for 1 storage bin is $\frac{90}{9}$, or 10.

Question Difficulty: Medium

Question ID e5485d14

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: e5485d14

If $4x = 3$, what is the value of $24x$?

A. $\frac{9}{2}$

B. 6

C. 18

D. 72

ID: e5485d14 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $4x = 3$. Multiplying each side of this equation by 6 yields $24x = 18$. Therefore, the value of $24x$ is 18.

Choice A is incorrect. This is the value of $6x$, not $24x$.

Choice B is incorrect. This is the value of $8x$, not $24x$.

Choice D is incorrect. This is the value of $96x$, not $24x$.

Question Difficulty: Medium

Question ID 482d48d4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 482d48d4

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

A. 1

B. 8

C. 24

D. 35

ID: 482d48d4 Answer

Correct Answer: B

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID c8160a03

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: c8160a03

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

A. -24

B. -22

C. -6

D. -1

ID: c8160a03 Answer

Correct Answer: C

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 464e9c5b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 464e9c5b

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

A. $16p - 37 = 165$

B. $37p - 16 = 165$

C. $16p + 37 = 165$

D. $37p + 16 = 165$

ID: 464e9c5b Answer

Correct Answer: C

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID f98ae0c1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: f98ae0c1

$$2.6 + x = 2.8$$

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

ID: f98ae0c1 Answer

Correct Answer: 0.2, 1/5

Rationale

The correct answer is $.2$. Subtracting 2.6 from each side of the given equation yields $x = 0.2$. Therefore, the value of x that's the solution to the given equation is 0.2. Note that .2 and 1/5 are examples of ways to enter a correct answer.

Question Difficulty: Medium

Question ID d27694f4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: d27694f4

What value of x is the solution to the equation $16x + 24 = 24x$?

A. -4

B. $\frac{3}{10}$

C. $\frac{1}{3}$

D. 3

ID: d27694f4 Answer

Correct Answer: D

Rationale

Choice D is correct. Subtracting $16x$ from both sides of the given equation yields $24 = 8x$. Dividing both sides of this equation by 8 yields $3 = x$. Therefore, the solution to the given equation is 3.

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

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

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

Question Difficulty: Medium

Question ID 409c8260

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 409c8260

$$3x + 5(x + 4) = 76$$

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

A. 7

B. 8

C. 56

D. 72

ID: 409c8260 Answer

Correct Answer: A

Rationale

Choice A is correct. Applying the distributive property on the left-hand side of the given equation yields $3x + 5x + 20 = 76$, or $8x + 20 = 76$. Subtracting 20 from each side of this equation yields $8x = 56$. Dividing each side of this equation by 8 yields $x = 7$.

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. This is the solution to the equation $x + 4 = 76$, not $3x + 5(x + 4) = 76$.

Question Difficulty: Medium

Question ID 74e1e65a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 74e1e65a

A manager is responsible for ordering supplies for a shaved ice shop. The shop's inventory starts with $4{,}500$ paper cups, and the manager estimates that 70 of these paper cups are used each day. Based on this estimate, in how many days will the supply of paper cups reach $1{,}700$?

A. 20

B. 40

C. 60

D. 80

ID: 74e1e65a Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that the shop's inventory starts with $4{,}500$ paper cups and that the manager estimates that 70 of these paper cups are used each day. Let x represent the number of days in which the estimated supply of paper cups will reach $1{,}700$. The equation $4{,}500 - 70x = 1{,}700$ represents this situation. Subtracting $4{,}500$ from both sides of this equation yields $-70x = -2{,}800$. Dividing both sides of this equation by -70 yields $x = 40$. Therefore, based on this estimate, the supply of paper cups will reach $1{,}700$ in 40 days.

Choice A is incorrect. After 20 days, the estimated supply of paper cups would be $4{,}500 - 70(20)$, or $3{,}100$ cups, not $1{,}700$ cups.

Choice C is incorrect. After 60 days, the estimated supply of paper cups would be $4{,}500 - 70(60)$, or 300 cups, not $1{,}700$ cups.

Choice D is incorrect. After 80 days, the estimated supply of paper cups would be $4{,}500 - 70(80)$, or $-1{,}100$ cups, which isn't possible.

Question Difficulty: Medium

Question ID f92d3827

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: f92d3827

The perimeter of an isosceles triangle is 36 feet. Each of the two congruent sides of the triangle has a length of 10 feet. What is the length, in feet, of the third side?

A. 10

B. 12

C. 16

D. 18

ID: f92d3827 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the perimeter of an isosceles triangle is 36 feet and that each of the two congruent sides has a length of 10 feet. The perimeter of a triangle is the sum of the lengths of its three sides. The equation $10 + 10 + x = 36$ can be used to represent this situation, where x is the length, in feet, of the third side. Combining like terms on the left-hand side of this equation yields $20 + x = 36$. Subtracting 20 from each side of this equation yields $x = 16$. Therefore, the length, in feet, of the third side is 16.

Choice A is incorrect. This would be the length, in feet, of the third side if the perimeter was 30 feet, not 36 feet.

Choice B is incorrect. This would be the length, in feet, of the third side if the perimeter was 32 feet, not 36 feet.

Choice D is incorrect. This would be the length, in feet, of the third side if the perimeter was 38 feet, not 36 feet.

Question Difficulty: Medium

Question ID f7b8c675

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: f7b8c675

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

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

ID: f7b8c675 Answer

Correct Answer: 130

Rationale

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

Question Difficulty: Medium

Question ID 3c1e4fac

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 3c1e4fac

If $6 + x = 9$, what is the value of $18 + 3x$?

ID: 3c1e4fac Answer

Correct Answer: 27

Rationale

The correct answer is 27. Multiplying both sides of the given equation by 3 yields $3(6 + x) = 3(9)$, or $18 + 3x = 27$. Therefore, the value of $18 + 3x$ is 27.

Question Difficulty: Medium

Question ID 89e1a0ac

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 89e1a0ac

If $4x + 2 = 12$, what is the value of $16x + 8$?

A. 40

B. 48

C. 56

D. 60

ID: 89e1a0ac Answer

Correct Answer: B

Rationale

Choice B is correct. Multiplying both sides of the given equation by 4 yields $(4)(4x + 2) = (4)(12)$, or $16x + 8 = 48$. Therefore, the value of $16x + 8$ is 48.

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 cd6f35a5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: cd6f35a5

If $2x = 12$, what is the value of $9x$?

ID: cd6f35a5 Answer

Correct Answer: 54

Rationale

The correct answer is 54. Dividing both sides of the given equation by 2 yields $x = 6$. Multiplying both sides of this equation by 9 yields $9x = 54$. Thus, the value of $9x$ is 54.

Question Difficulty: Medium

Question ID 0261dcc4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 0261dcc4

If $6n = 12$, what is the value of $n + 4$?

ID: 0261dcc4 Answer

Correct Answer: 6

Rationale

The correct answer is 6. Dividing both sides of the equation $6n = 12$ by 6 yields $n = 2$. Substituting 2 for n in the expression $n + 4$ yields $2 + 4$, or 6.

Question Difficulty: Medium

Question ID 53f75a3e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 53f75a3e

If $8x = 6$, what is the value of $72x$?

A. 3

B. 15

C. 54

D. 57

ID: 53f75a3e Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $8x = 6$. Multiplying each side of this equation by 9 yields $72x = 54$. Therefore, the value of $72x$ is 54.

Choice A is incorrect. This is the value of $4x$, not $72x$.

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 32f51e96

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 32f51e96

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

A. -1

B. 5

C. 13

D. 23

ID: 32f51e96 Answer

Correct Answer: D

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 10f4c0f4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 10f4c0f4

If $2x + 3 = 9$, what is the value of $6x - 1$?

ID: 10f4c0f4 Answer

Correct Answer: 17

Rationale

The correct answer is 17. It's given that $2x + 3 = 9$. Multiplying each side of this equation by 3 yields $3(2x + 3) = 3(9)$, or $6x + 9 = 27$. Subtracting 10 from each side of this equation yields $6x + 9 - 10 = 27 - 10$, or $6x - 1 = 17$. Therefore, the value of $6x - 1$ is 17.

Question Difficulty: Medium

Question ID 3d3f6745

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 3d3f6745

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

Which equation has the same solution as the given equation?

A. $2x-3=9$

B. $2x-3=56$

C. $2x-21=63$

D. $2x-21=70$

ID: 3d3f6745 Answer

Correct Answer: A

Rationale

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

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

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

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

Question Difficulty: Medium

Question ID 50dc6fcf

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 50dc6fcf

$$13x = 112 - x$$

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

ID: 50dc6fcf Answer

Correct Answer: 8

Rationale

The correct answer is 8. Adding x to both sides of the given equation yields $14x = 112$. Dividing both sides of this equation by 14 yields $x = 8$.

Question Difficulty: Medium

Question ID 35c55df9

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 35c55df9

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

ID: 35c55df9 Answer

Correct Answer: .2, 1/5

Rationale

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

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

Question Difficulty: Medium

Question ID 7b80d37c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear equations in one variable	Medium

ID: 7b80d37c

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: 7b80d37c 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: Medium