Question ID 8a6a48b7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 8a6a48b7

The point $(8, 2)$ in the *xy*-plane is a solution to which of the following systems of inequalities?

A. $x > 0$
$y > 0$

B. $x > 0$
$y < 0$

C. $x < 0$
$y > 0$

D. $x < 0$
$y < 0$

ID: 8a6a48b7 Answer

Correct Answer: A

Rationale

Choice A is correct. The given point, $8, 2$, is located in the first quadrant in the *xy*-plane. The system of inequalities in choice A represents all the points in the first quadrant in the *xy*-plane. Therefore, $8, 2$ is a solution to the system of inequalities in choice A.

Alternate approach: Substituting 8 for x in the first inequality in choice A, $x > 0$, yields $8 > 0$, which is true. Substituting 2 for y in the second inequality in choice A, $y > 0$, yields $2 > 0$, which is true. Since the coordinates of the point $8, 2$ make the inequalities $x > 0$ and $y > 0$ true, the point $8, 2$ is a solution to the system of inequalities consisting of $x > 0$ and $y > 0$.

Choice B is incorrect. This system of inequalities represents all the points in the fourth quadrant, not the first quadrant, in the *xy*-plane.

Choice C is incorrect. This system of inequalities represents all the points in the second quadrant, not the first quadrant, in the *xy*-plane.

Choice D is incorrect. This system of inequalities represents all the points in the third quadrant, not the first quadrant, in the *xy*-plane.

Question Difficulty: Medium

Question ID fb2eb0af

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: fb2eb0af

On a car trip, Rhett and Jessica each drove for part of the trip, and the total distance they drove was under 220 miles. Rhett drove at an average speed of 35 miles per hour (mph), and Jessica drove at an average speed of 40 mph. Which of the following inequalities represents this situation, where r is the number of hours Rhett drove and j is the number of hours Jessica drove?

A. $35r + 40j > 220$

B. $35r + 40j < 220$

C. $40r + 35j > 220$

D. $40r + 35j < 220$

ID: fb2eb0af Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that Rhett drove at an average speed of 35 miles per hour and that he drove for r hours. Multiplying 35 miles per hour by r hours yields $35r$ miles, or the distance that Rhett drove. It's also given that Jessica drove at an average speed of 40 miles per hour and that she drove for j hours. Multiplying 40 miles per hour by j hours yields $40j$ miles, or the distance that Jessica drove. The total distance, in miles, that Rhett and Jessica drove can be represented by the expression $35r + 40j$. It's given that the total distance they drove was under 220 miles. Therefore, the inequality $35r + 40j < 220$ represents this situation.

Choice A is incorrect. This inequality represents a situation in which the total distance Rhett and Jessica drove was over, rather than under, 220 miles.

Choice C is incorrect. This inequality represents a situation in which Rhett drove at an average speed of 40, rather than 35, miles per hour, Jessica drove at an average speed of 35, rather than 40, miles per hour, and the total distance they drove was over, rather than under, 220 miles.

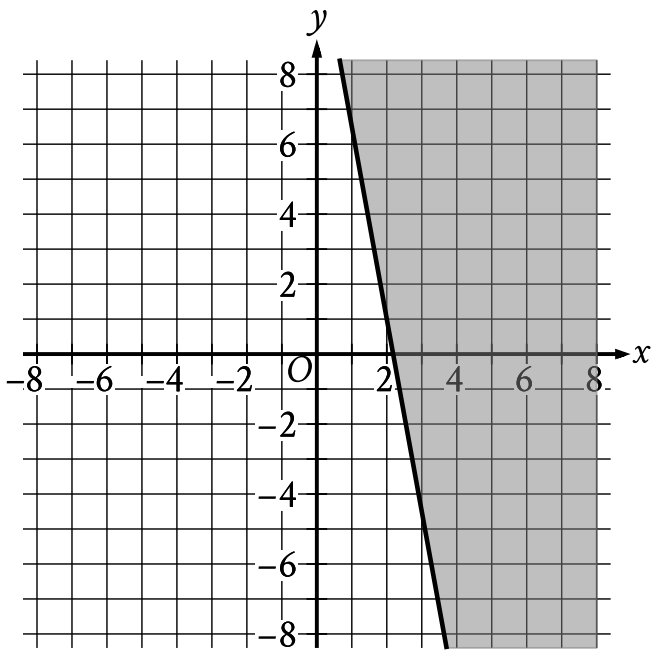
Choice D is incorrect. This inequality represents a situation in which Rhett drove at an average speed of 40, rather than 35, miles per hour, and Jessica drove at an average speed of 35, rather than 40, miles per hour.

Question Difficulty: Medium

Question ID 90298d0c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 90298d0c



The shaded region shown represents solutions to an inequality. Which ordered pair (x, y) is a solution to this inequality?

A. $(0, -4)$

B. $(0, 4)$

C. $(-4, 0)$

D. $(4, 0)$

ID: 90298d0c Answer

Correct Answer: D

Rationale

Choice D is correct. Since the shaded region shown represents solutions to an inequality, an ordered pair x, y is a solution to the inequality if it's represented by a point in the shaded region. Of the given choices, only $4, 0$ is represented by a point in the shaded region. Therefore, $4, 0$ is a solution to the inequality.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Question Difficulty: Medium

Question ID fecc76fb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: fecc76fb

During a portion of a flight, a small airplane's cruising speed varied between 150 miles per hour and 170 miles per hour. Which inequality best represents this situation, where s is the cruising speed, in miles per hour, during this portion of the flight?

A. $s \leq 20$

B. $s \leq 150$

C. $s \leq 170$

D. $150 \leq s \leq 170$

ID: fecc76fb Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that during a portion of a flight, a small airplane's cruising speed varied between 150 miles per hour and 170 miles per hour. It's also given that s represents the cruising speed, in miles per hour, during this portion of the flight. It follows that the airplane's cruising speed, in miles per hour, was at least 150, which means $s \geq 150$, and was at most 170, which means $s \leq 170$. Therefore, the inequality that best represents this situation is $150 \leq s \leq 170$.

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 a72ab42b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: a72ab42b

A cleaning service that cleans both offices and homes can clean at most 14 places per day. Which inequality represents this situation, where f is the number of offices and h is the number of homes?

A. $f + h \leq 14$

B. $f + h \geq 14$

C. $f - h \leq 14$

D. $f - h \geq 14$

ID: a72ab42b Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the cleaning service cleans both offices and homes, where f is the number of offices and h is the number of homes the cleaning service can clean per day. Therefore, the expression $f + h$ represents the number of places the cleaning service can clean per day. It's also given that the cleaning service can clean at most 14 places per day. Since $f + h$ represents the number of places the cleaning service can clean per day and the service can clean at most 14 places per day, it follows that the inequality $f + h \leq 14$ represents this situation.

Choice B is incorrect. This inequality represents a cleaning service that cleans at least 14 places per day.

Choice C is incorrect. This inequality represents a cleaning service that cleans at most 14 more offices than homes per day.

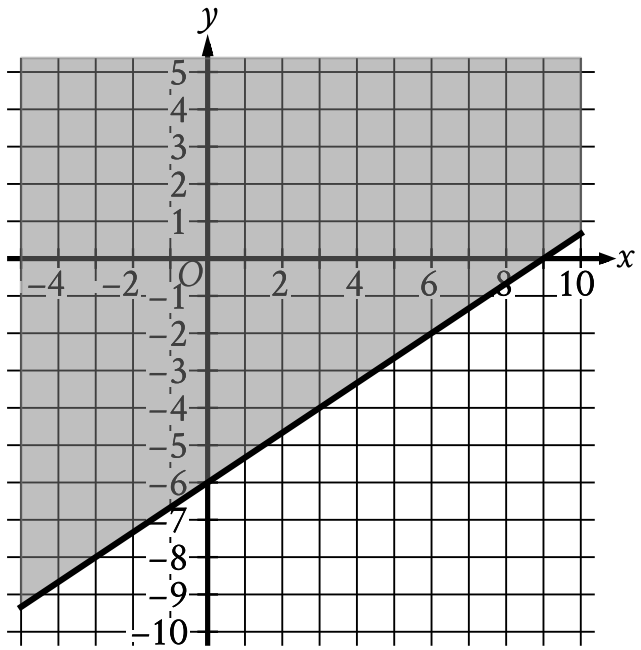
Choice D is incorrect. This inequality represents a cleaning service that cleans at least 14 more offices than homes per day.

Question Difficulty: Medium

Question ID 06313578

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 06313578



The shaded region shown represents the solutions to which inequality?

A. $y \geq \frac{2}{3}x - 6$

B. $y \geq \frac{2}{3}x + 6$

C. $y \geq \frac{2}{3}x - 9$

D. $y \geq \frac{2}{3}x + 9$

ID: 06313578 Answer

Correct Answer: A

Rationale

Choice A is correct. The equation for the line representing the boundary of the shaded region can be written in slope-intercept form $y = mx + b$, where m is the slope and $0, b$ is the y-intercept of the line. For the graph shown, the boundary line passes through the points $0, -6$ and $9, 0$. Given two points on a line, x_1, y_1 and x_2, y_2, the slope of the line can be calculated using the equation $m = \frac{y_2 - y_1}{x_2 - x_1}$. Substituting the points $0, -6$ and $9, 0$ for x_1, y_1 and x_2, y_2, respectively, in this equation yields $m = \frac{0 - -6}{9 - 0}$, which is equivalent to $m = \frac{6}{9}$, or $m = \frac{2}{3}$. Since the point $0, -6$ represents the y-intercept, it follows that $b = -6$. Substituting $\frac{2}{3}$ for m and -6 for b in the equation $y = mx + b$ yields $y = \frac{2}{3}x - 6$ as the equation of the boundary line. Since the shaded region represents all the points on and above this boundary line, it follows that the shaded region shown represents the solutions to the inequality $y \geq \frac{2}{3}x - 6$.

Choice B is incorrect. This inequality represents a region whose boundary line has a *y*-intercept of $0, 6$, not $0, -6$.

Choice C is incorrect. This inequality represents a region whose boundary line has a *y*-intercept of $0, -9$, not $0, -6$.

Choice D is incorrect. This inequality represents a region whose boundary line has a *y*-intercept of $0, 9$, not $0, -6$.

Question Difficulty: Medium

Question ID 2a668eec

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 2a668eec

$$2\ell + 2w \leq 27$$

A rectangle has length ℓ and width w. The inequality gives the possible values of ℓ and w for which the perimeter of this rectangle is less than or equal to 27. Which statement is the best interpretation of $(\ell, w) = (8, 3)$ in this context?

A. If the rectangle has length 3 and width 8, its perimeter is less than or equal to 27.

B. If the rectangle has length 8 and width 3, its perimeter is less than or equal to 27.

C. If the rectangle has length 3 and width 8, its perimeter is greater than or equal to 27.

D. If the rectangle has length 8 and width 3, its perimeter is greater than or equal to 27.

ID: 2a668eec Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that a rectangle has length l and width w, and the inequality $2l + 2w \leq 27$ gives the possible values of l and w for which the perimeter of this rectangle is less than or equal to 27. To determine the best interpretation of $(l, w) = (8, 3)$ in this context, the values can be substituted in the given inequality. Substituting 8 for l and 3 for w in this inequality yields $2(8) + 2(3) \leq 27$, which is equivalent to $16 + 6 \leq 27$, or $22 \leq 27$. Since this inequality is true, if the rectangle has length 8 and width 3, its perimeter is less than or equal to 27.

Choice A is incorrect. The interpretation of $(l, w) = (8, 3)$ implies that the rectangle has length 8 and width 3, not length 3 and width 8.

Choice C is incorrect. The interpretation of $(l, w) = (8, 3)$ implies that the rectangle has length 8 and width 3, not length 3 and width 8.

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

Question Difficulty: Medium

Question ID 039e86a4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 039e86a4

During spring migration, a dragonfly traveled a minimum of $1{,}510$ miles and a maximum of $4{,}130$ miles between stopover locations. Which inequality represents this situation, where d is a possible distance, in miles, this dragonfly traveled between stopover locations during spring migration?

A. $d \leq 1{,}510$

B. $1{,}510 \leq d \leq 4{,}130$

C. $d \geq 4{,}130$

D. $4{,}130 \leq d \leq 5{,}640$

ID: 039e86a4 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that during spring migration, a dragonfly traveled a minimum of $1{,}510$ miles and a maximum of $4{,}130$ miles between stopover locations. It's also given that d represents a possible distance, in miles, this dragonfly traveled between stopover locations. It follows that the inequality $1{,}510 \leq d \leq 4{,}130$ represents this situation.

Choice A is incorrect. This inequality represents a situation in which a dragonfly traveled a maximum of $1{,}510$ miles between stopover locations.

Choice C is incorrect. This inequality represents a situation in which a dragonfly traveled a minimum of $4{,}130$ miles between stopover locations.

Choice D is incorrect. This inequality represents a situation in which a dragonfly traveled a minimum of $4{,}310$ miles and a maximum of $5{,}640$ miles between stopover locations.

Question Difficulty: Medium

Question ID b70a9861

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: b70a9861

A geologist estimates that the volume of a slab of granite is greater than 12.7 cubic feet but less than 15.7 cubic feet. The geologist also estimates that the slab of granite weighs 165 pounds per cubic foot of volume. Which inequality represents this situation, where x represents the estimated total weight, in pounds, of the slab of granite?

A. $165 - 15.7 < x < 165 - 12.7$

B. $165 + 12.7 < x < 165 + 15.7$

C. $165(12.7) < x < 165(15.7)$

D. $\frac{165}{15.7} < x < \frac{165}{12.7}$

ID: b70a9861 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the estimated volume of the slab of granite is greater than 12.7 cubic feet but less than 15.7 cubic feet. It's also given that the estimated weight per cubic foot of volume of that slab is 165 pounds. The estimated total weight of the slab of granite, in pounds, can be calculated by multiplying the estimated volume by the estimated weight per cubic foot. Therefore, if the estimated volume of the slab of granite is 12.7 cubic feet, its estimated total weight is $165(12.7)$ pounds, and if the estimated volume of the slab of granite is 15.7 cubic feet, its estimated total weight is $165(15.7)$ pounds. Since the estimated volume of the slab of granite is greater than 12.7 cubic feet but less than 15.7 cubic feet, the estimated total weight x, in pounds, must be greater than $165(12.7)$ pounds and less than $165(15.7)$ pounds. This situation can be represented by the inequality $165(12.7) < x < 165(15.7)$.

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

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

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

Question Difficulty: Medium

Question ID d7546d9f

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: d7546d9f

For a party, 50 dinner rolls are needed. Dinner rolls are sold in packages of 12. What is the minimum number of packages that should be bought for the party?

ID: d7546d9f Answer

Correct Answer: 5

Rationale

The correct answer is 5. Let p represent the number of packages of dinner rolls that should be bought for the party. It's given that dinner rolls are sold in packages of 12. Therefore, $12p$ represents the number of dinner rolls that should be bought for the party. It's also given that 50 dinner rolls are needed; therefore, $12p \geq 50$. Dividing both sides of this inequality by 12 yields $p \geq \frac{50}{12}$, or approximately $p \geq 4.17$. Since the number of packages of dinner rolls must be a whole number, the minimum number of packages that should be bought for the party is 5.

Question Difficulty: Medium

Question ID 3838d947

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 3838d947

Ty set a goal to walk at least 24 kilometers every day to prepare for a multiday hike. On a certain day, Ty plans to walk at an average speed of 4 kilometers per hour. What is the minimum number of hours Ty must walk on that day to fulfill the daily goal?

A. 4

B. 6

C. 20

D. 24

ID: 3838d947 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that Ty plans to walk at an average speed of 4 kilometers per hour. The number of kilometers Ty will walk is determined by the expression $4s$, where s is the number of hours Ty walks. The given goal of at least 24 kilometers means that the inequality $4s \geq 24$ represents the situation. Dividing both sides of this inequality by 4 gives $s \geq 6$, which corresponds to a minimum of 6 hours Ty must walk.

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

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

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

Question Difficulty: Medium

Question ID 3f8c36d6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Algebra	Linear inequalities in one or two variables	Medium

ID: 3f8c36d6

For a 3-week period in a town in Illinois, the lowest recorded temperature was 31 degrees Fahrenheit $(^\circ\mathrm{F})$ and the highest recorded temperature was $67^\circ\mathrm{F}$. Which inequality is true for any recorded temperature t, in $^\circ\mathrm{F}$, in this town for this 3-week period?

A. $t \geq 98$

B. $t \geq 67$

C. $31 \leq t \leq 67$

D. $t \leq 31$

ID: 3f8c36d6 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that for a 3-week period in a town in Illinois, the lowest recorded temperature was $31°\mathrm{F}$ and the highest recorded temperature was $67°\mathrm{F}$. It follows that the inequality $31 \leq t \leq 67$ is true for any recorded temperature t, in $°\mathrm{F}$, in this town for this 3-week period.

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Medium