Question ID 45cfb9de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 45cfb9de

Adam's school is a 20-minute walk or a 5-minute bus ride away from his house. The bus runs once every 30 minutes, and the number of minutes, *w*, that Adam waits for the bus varies between 0 and 30. Which of the following inequalities gives the values of *w* for which it would be faster for Adam to walk to school?

A. $w - 5 < 20$

B. $w - 5 > 20$

C. $w + 5 < 20$

D. $w + 5 > 20$

ID: 45cfb9de Answer

Correct Answer: D

Rationale

Choice D is correct. It is given that w is the number of minutes that Adam waits for the bus. The total time it takes Adam to get to school on a day he takes the bus is the sum of the minutes, w, he waits for the bus and the 5 minutes the bus ride takes; thus, this time, in minutes, is w + 5. It is also given that the total amount of time it takes Adam to get to school on a day that he walks is 20 minutes. Therefore, w + 5 > 20 gives the values of w for which it would be faster for Adam to walk to school.

Choices A and B are incorrect because w – 5 is not the total length of time for Adam to wait for and then take the bus to school. Choice C is incorrect because the inequality should be true when walking 20 minutes is faster than the time it takes Adam to wait for and ride the bus, not less.

Question Difficulty: Hard

Question ID 95cad55f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 95cad55f

A laundry service is buying detergent and fabric softener from its supplier. The supplier will deliver no more than 300 pounds in a shipment. Each container of detergent weighs 7.35 pounds, and each container of fabric softener weighs 6.2 pounds. The service wants to buy at least twice as many containers of detergent as containers of fabric softener. Let *d* represent the number of containers of detergent, and let *s* represent the number of containers of fabric softener, where *d* and *s* are nonnegative integers. Which of the following systems of inequalities best represents this situation?

A. $7.35d + 6.2s \leq 300$
$d \geq 2s$

B. $7.35d + 6.2s \leq 300$
$2d \geq s$

C. $14.7d + 6.2s \leq 300$
$d \geq 2s$

D. $14.7d + 6.2s \leq 300$
$2d \geq s$

ID: 95cad55f Answer

Correct Answer: A

Rationale

Choice A is correct. The number of containers in a shipment must have a weight less than or equal to 300 pounds. The total weight, in pounds, of detergent and fabric softener that the supplier delivers can be expressed as the weight of each container multiplied by the number of each type of container, which is 7.35d for detergent and 6.2s for fabric softener. Since this total cannot exceed 300 pounds, it follows that $7.35d + 6.2s \leq 300$. Also, since the laundry service wants to buy at least twice as many containers of detergent as containers of fabric softener, the number of containers of detergent should be greater than or equal to two times the number of containers of fabric softener. This can be expressed by the inequality $d \geq 2s$.

Choice B is incorrect because it misrepresents the relationship between the numbers of each container that the laundry service wants to buy. Choice C is incorrect because the first inequality of the system incorrectly doubles the weight per container of detergent. The weight of each container of detergent is 7.35, not 14.7 pounds. Choice D is incorrect because it doubles the weight per container of detergent and transposes the relationship between the numbers of containers.

Question Difficulty: Hard

Question ID ee2f611f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: ee2f611f

A local transit company sells a monthly pass for \$95 that allows an unlimited number of trips of any length. Tickets for individual trips cost \$1.50, \$2.50, or \$3.50, depending on the length of the trip. What is the minimum number of trips per month for which a monthly pass could cost less than purchasing individual tickets for trips?

ID: ee2f611f Answer

Rationale

The correct answer is 28. The minimum number of individual trips for which the cost of the monthly pass is less than the cost of individual tickets can be found by assuming the maximum cost of the individual tickets, \$3.50. If n tickets costing \$3.50 each are purchased in one month, the inequality $95 < 3.50n$ represents this situation. Dividing both sides of the inequality by 3.50 yields $27.14 < n$, which is equivalent to $n > 27.14$. Since only a whole number of tickets can be purchased, it follows that 28 is the minimum number of trips.

Question Difficulty: Hard

Question ID 6c71f3ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 6c71f3ec

A salesperson's total earnings consist of a base salary of x dollars per year, plus commission earnings of 11% of the total sales the salesperson makes during the year. This year, the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary. Which of the following inequalities represents all possible values of total sales s, in dollars, the salesperson can make this year in order to meet that goal?

A. $2x \leq s \leq 3x$

B. $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$

C. $3x \leq s \leq 4x$

D. $\frac{3}{0.11}x \leq s \leq \frac{4}{0.11}x$

ID: 6c71f3ec Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that a salesperson's total earnings consist of a base salary of x dollars per year plus commission earnings of 11% of the total sales the salesperson makes during the year. If the salesperson makes s dollars in total sales this year, the salesperson's total earnings can be represented by the expression $x + 0.11s$. It's also given that the salesperson has a goal for the total earnings to be at least 3 times and at most 4 times the base salary, which can be represented by the expressions $3x$ and $4x$, respectively. Therefore, this situation can be represented by the inequality $3x \leq x + 0.11s \leq 4x$. Subtracting x from each part of this inequality yields $2x \leq 0.11s \leq 3x$. Dividing each part of this inequality by 0.11 yields $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$. Therefore, the inequality $\frac{2}{0.11}x \leq s \leq \frac{3}{0.11}x$ represents all possible values of total sales s, in dollars, the salesperson can make this year in order to meet their goal.

Choice A is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 2 times and at most 3 times, rather than at least 3 times and at most 4 times, the base salary.

Choice C is incorrect. This inequality represents a situation in which the total sales, rather than the total earnings, are at least 3 times and at most 4 times the base salary.

Choice D is incorrect. This inequality represents a situation in which the total earnings are at least 4 times and at most 5 times, rather than at least 3 times and at most 4 times, the base salary.

Question Difficulty: Hard

Question ID 1a621af4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 1a621af4

A number x is at most 2 less than 3 times the value of y. If the value of y is -4, what is the greatest possible value of x?

ID: 1a621af4 Answer

Correct Answer: -14

Rationale

The correct answer is -14. It's given that a number x is at most 2 less than 3 times the value of y. Therefore, x is less than or equal to 2 less than 3 times the value of y. The expression $3y$ represents 3 times the value of y. The expression $3y - 2$ represents 2 less than 3 times the value of y. Therefore, x is less than or equal to $3y - 2$. This can be shown by the inequality $x \leq 3y - 2$. Substituting -4 for y in this inequality yields $x \leq 3(-4) - 2$ or, $x \leq -14$. Therefore, if the value of y is -4, the greatest possible value of x is -14.

Question Difficulty: Hard

Question ID 1035faea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 1035faea

A psychologist set up an experiment to study the tendency of a person to select the first item when presented with a series of items. In the experiment, 300 people were presented with a set of five pictures arranged in random order. Each person was asked to choose the most appealing picture. Of the first 150 participants, 36 chose the first picture in the set. Among the remaining 150 participants, p people chose the first picture in the set. If more than 20% of all participants chose the first picture in the set, which of the following inequalities best describes the possible values of p ?

A. $p > 0.20(300 - 36)$, where $p \leq 150$

B. $p > 0.20(300 + 36)$, where $p \leq 150$

C. $p - 36 > 0.20(300)$, where $p \leq 150$

D. $p + 36 > 0.20(300)$, where $p \leq 150$

ID: 1035faea Answer

Correct Answer: D

Rationale

Choice D is correct. Of the first 150 participants, 36 chose the first picture in the set, and of the 150 remaining participants, p chose the first picture in the set. Hence, the proportion of the participants who chose the first picture in the set is $\frac{36+p}{300}$.

Since more than 20% of all the participants chose the first picture, it follows that $\frac{36+p}{300} > 0.20$.

This inequality can be rewritten as $p + 36 > 0.20(300)$. Since p is a number of people among the remaining 150 participants, $p \leq 150$.

Choices A, B, and C are incorrect and may be the result of some incorrect interpretations of the given information or of computational errors.

Question Difficulty: Hard

Question ID 5bf5136d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 5bf5136d

The triangle inequality theorem states that the sum of any two sides of a triangle must be greater than the length of the third side. If a triangle has side lengths of 6 and 12, which inequality represents the possible lengths, x, of the third side of the triangle?

A. $x < 18$

B. $x > 18$

C. $6 < x < 18$

D. $x < 6$ or $x > 18$

ID: 5bf5136d Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that a triangle has side lengths of 6 and 12, and x represents the length of the third side of the triangle. It's also given that the triangle inequality theorem states that the sum of any two sides of a triangle must be greater than the length of the third side. Therefore, the inequalities $6 + x > 12$, $6 + 12 > x$, and $12 + x > 6$ represent all possible values of x. Subtracting 6 from both sides of the inequality $6 + x > 12$ yields $x > 12 - 6$, or $x > 6$. Adding 6 and 12 in the inequality $6 + 12 > x$ yields $18 > x$, or $x < 18$. Subtracting 12 from both sides of the inequality $12 + x > 6$ yields $x > 6 - 12$, or $x > -6$. Since all x-values that satisfy the inequality $x > 6$ also satisfy the inequality $x > -6$, it follows that the inequalities $x > 6$ and $x < 18$ represent the possible values of x. Therefore, the inequality $6 < x < 18$ represents the possible lengths, x, of the third side of the triangle.

Choice A is incorrect. This inequality gives the upper bound for x but does not include its lower bound.

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: Hard

Question ID e8f9e117

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: e8f9e117

$$I = \frac{V}{R}$$

The formula above is Ohm's law for an electric circuit with current I, in amperes, potential difference V, in volts, and resistance R, in ohms. A circuit has a resistance of 500 ohms, and its potential difference will be generated by n six-volt batteries that produce a total potential difference of $6n$ volts. If the circuit is to have a current of no more than 0.25 ampere, what is the greatest number, n, of six-volt batteries that can be used?

ID: e8f9e117 Answer

Rationale

The correct answer is 20. For the given circuit, the resistance R is 500 ohms, and the total potential difference V generated by n batteries is $6n$ volts. It's also given that the circuit is to have a current of no more than 0.25 ampere, which can be expressed as $I < 0.25$. Since Ohm's law says that $I = \frac{V}{R}$, the given values for V and R can be substituted for I in this inequality, which yields $\frac{6n}{500} < 0.25$. Multiplying both sides of this inequality by 500 yields $6n < 125$, and dividing both sides of this inequality by 6 yields $n < 20.833$. Since the number of batteries must be a whole number less than 20.833, the greatest number of batteries that can be used in this circuit is 20.

Question Difficulty: Hard

Question ID 963da34c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 963da34c

A shipping service restricts the dimensions of the boxes it will ship for a certain type of service. The restriction states that for boxes shaped like rectangular prisms, the sum of the perimeter of the base of the box and the height of the box cannot exceed 130 inches. The perimeter of the base is determined using the width and length of the box. If a box has a height of 60 inches and its length is 2.5 times the width, which inequality shows the allowable width x, in inches, of the box?

A. $0 < x \le 10$

B. $0 < x \le 11\frac{2}{3}$

C. $0 < x \le 17\frac{1}{2}$

D. $0 < x \le 20$

ID: 963da34c Answer

Correct Answer: A

Rationale

Choice A is correct. If x is the width, in inches, of the box, then the length of the box is 2.5x inches. It follows that the perimeter of the base is $2(2.5x + x)$, or 7x inches. The height of the box is given to be 60 inches. According to the restriction, the sum of the perimeter of the base and the height of the box should not exceed 130 inches. Algebraically, this can be represented by $7x + 60 \le 130$, or $7x \le 70$. Dividing both sides of the inequality by 7 gives $x \le 10$. Since x represents the width of the box, x must also be a positive number. Therefore, the inequality $0 < x \le 10$ represents all the allowable values of x that satisfy the given conditions.

Choices B, C, and D are incorrect and may result from calculation errors or misreading the given information.

Question Difficulty: Hard

Question ID b8e73b5b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: b8e73b5b

Ken is working this summer as part of a crew on a farm. He earned \$8 per hour for the first 10 hours he worked this week. Because of his performance, his crew leader raised his salary to \$10 per hour for the rest of the week. Ken saves 90% of his earnings from each week. What is the least number of hours he must work the rest of the week to save at least \$270 for the week?

A. 38

B. 33

C. 22

D. 16

ID: b8e73b5b Answer

Correct Answer: C

Rationale

Choice C is correct. Ken earned \$8 per hour for the first 10 hours he worked, so he earned a total of \$80 for the first 10 hours he worked. For the rest of the week, Ken was paid at the rate of \$10 per hour. Let x be the number of hours he will work for the rest of the week. The total of Ken's earnings, in dollars, for the week will be $10x+80$. He saves 90% of his earnings each week, so this week he will save $0.9(10x+80)$ dollars. The inequality $0.9(10x+80)\geq 270$ represents the condition that he will save at least \$270 for the week. Factoring 10 out of the expression $10x+80$ gives $10(x+8)$. The product of 10 and 0.9 is 9, so the inequality can be rewritten as $9(x+8)\geq 270$. Dividing both sides of this inequality by 9 yields $x+8\geq 30$, so $x\geq 22$. Therefore, the least number of hours Ken must work the rest of the week to save at least \$270 for the week is 22.

Choices A and B are incorrect because Ken can save \$270 by working fewer hours than 38 or 33 for the rest of the week. Choice D is incorrect. If Ken worked 16 hours for the rest of the week, his total earnings for the week will be $\$80+\$160=\$240$, which is less than \$270. Since he saves only 90% of his earnings each week, he would save even less than \$240 for the week.

Question Difficulty: Hard

Question ID 830120b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Algebra	Linear inequalities in one or two variables	■■■

ID: 830120b0

$$y > 2x - 1$$
$$2x > 5$$

Which of the following consists of the y-coordinates of all the points that satisfy the system of inequalities above?

A. $y > 6$

B. $y > 4$

C. $y > \frac{5}{2}$

D. $y > \frac{3}{2}$

ID: 830120b0 Answer

Correct Answer: B

Rationale

Choice B is correct. Subtracting the same number from each side of an inequality gives an equivalent inequality. Hence, subtracting 1 from each side of the inequality $2x > 5$ gives $2x - 1 > 4$. So the given system of inequalities is equivalent to the system of inequalities $y > 2x - 1$ and $2x - 1 > 4$, which can be rewritten as $y > 2x - 1 > 4$. Using the transitive property of inequalities, it follows that $y > 4$.

Choice A is incorrect because there are points with a y-coordinate less than 6 that satisfy the given system of inequalities. For example, $(3,5.5)$ satisfies both inequalities. Choice C is incorrect. This may result from solving the inequality $2x > 5$ for x, then replacing x with y. Choice D is incorrect because this inequality allows y-values that are not the y-coordinate of any point that satisfies both inequalities. For example, $y = 2$ is contained in the set $y > \frac{3}{2}$; however, if 2 is substituted into the first inequality for y, the result is $x < \frac{3}{2}$. This cannot be true because the second inequality gives $x > \frac{5}{2}$.

Question Difficulty: Hard