Question ID 8d93d73a

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

ID: 8d93d73a

$$y < 5x + 6$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	17
5	27
7	37

B.

x	y
3	17
5	35
7	37

C.

x	y
3	25
5	35
7	45

D.

x	y
3	21
5	31
7	41

ID: 8d93d73a Answer

Correct Answer: A

Rationale

Choice A is correct. Substituting 3 for x in the given inequality yields $y < 5(3) + 6$, or $y < 21$. Therefore, when $x = 3$, the corresponding value of y is less than 21. Substituting 5 for x in the given inequality yields $y < 5(5) + 6$, or $y < 31$. Therefore, when $x = 5$, the corresponding value of y is less than 31. Substituting 7 for x in the given inequality yields $y < 5(7) + 6$, or $y < 41$. Therefore, when $x = 7$, the corresponding value of y is less than 41. For the table in choice A, when $x = 3$, the corresponding value of y is 17, which is less than 21; when $x = 5$, the corresponding value of y is 27, which is less than 31; and when $x = 7$, the corresponding value of y is 37, which is less than 41. Therefore, the table in choice A gives values of x and their corresponding values of y that are all solutions to the given inequality.

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: Hard

Question ID 84f5f182

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

ID: 84f5f182

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: 84f5f182 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 90f7af74

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

ID: 90f7af74

A small business owner budgets $\$2{,}200$ to purchase candles. The owner must purchase a minimum of 200 candles to maintain the discounted pricing. If the owner pays $\$4.90$ per candle to purchase small candles and $\$11.60$ per candle to purchase large candles, what is the maximum number of large candles the owner can purchase to stay within the budget and maintain the discounted pricing?

ID: 90f7af74 Answer

Correct Answer: 182

Rationale

The correct answer is 182. Let s represent the number of small candles the owner can purchase, and let ℓ represent the number of large candles the owner can purchase. It's given that the owner pays $\$4.90$ per candle to purchase small candles and $\$11.60$ per candle to purchase large candles. Therefore, the owner pays $4.90s$ dollars for s small candles and 11.60ℓ dollars for ℓ large candles, which means the owner pays a total of $4.90s + 11.60\ell$ dollars to purchase candles. It's given that the owner budgets $\$2{,}200$ to purchase candles. Therefore, $4.90s + 11.60\ell \leq 2{,}200$. It's also given that the owner must purchase a minimum of 200 candles. Therefore, $s + \ell \geq 200$. The inequalities $4.90s + 11.60\ell \leq 2{,}200$ and $s + \ell \geq 200$ can be combined into one compound inequality by rewriting the second inequality so that its left-hand side is equivalent to the left-hand side of the first inequality. Subtracting ℓ from both sides of the inequality $s + \ell \geq 200$ yields $s \geq 200 - \ell$. Multiplying both sides of this inequality by 4.90 yields $4.90s \geq 4.90(200 - \ell)$, or $4.90s \geq 980 - 4.90\ell$. Adding 11.60ℓ to both sides of this inequality yields $4.90s + 11.60\ell \geq 980 - 4.90\ell + 11.60\ell$, or $4.90s + 11.60\ell \geq 980 + 6.70\ell$. This inequality can be combined with the inequality $4.90s + 11.60\ell \leq 2{,}200$, which yields the compound inequality $980 + 6.70\ell \leq 4.90s + 11.60\ell \leq 2{,}200$. It follows that $980 + 6.70\ell \leq 2{,}200$. Subtracting 980 from both sides of this inequality yields $6.70\ell \leq 2{,}200$. Dividing both sides of this inequality by 6.70 yields approximately $\ell \leq 182.09$. Since the number of large candles the owner purchases must be a whole number, the maximum number of large candles the owner can purchase is the largest whole number less than 182.09, which is 182.

Question Difficulty: Hard

Question ID e1a1754e

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

ID: e1a1754e

In a set of four consecutive odd integers, where the integers are ordered from least to greatest, the first integer is represented by x. The product of 12 and the fourth odd integer is at most 26 less than the sum of the first and third odd integers. Which inequality represents this situation?

A. $12(x+6) \leq x+(x+4)-26$

B. $12(x+6) \geq 26-(x+(x+4))$

C. $12(x+4) \leq x+(x+3)-26$

D. $12(x+4) \geq 26-(x+(x+3))$

ID: e1a1754e Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the four odd integers are consecutive, ordered from least to greatest, and that the first odd integer is represented by x. It follows that the second odd integer is represented by $x+2$, the third odd integer is represented by $x+4$, and the fourth odd integer is represented by $x+6$. Therefore, the product of 12 and the fourth odd integer is represented by $12(x+6)$, and 26 less than the sum of the first and third odd integers is represented by $x+(x+4)-26$. Since the product of 12 and the fourth odd integer is at most 26 less than the sum of the first and third odd integers, it follows that $12(x+6) \leq x+(x+4)-26$.

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: Hard

Question ID 8ac533d5

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

ID: 8ac533d5

A business owner plans to purchase the same model of chair for each of the 81 employees. The total budget to spend on these chairs is $\$14{,}000$, which includes a 7% sales tax. Which of the following is closest to the maximum possible price per chair, before sales tax, the business owner could pay based on this budget?

A. $\$148.15$

B. $\$161.53$

C. $\$172.84$

D. $\$184.94$

ID: 8ac533d5 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that a business owner plans to purchase 81 chairs. If p is the price per chair, the total price of purchasing 81 chairs is $81p$. It's also given that 7% sales tax is included, which is equivalent to $81p$ multiplied by 1.07, or $81(1.07)p$. Since the total budget is $\$14{,}000$, the inequality representing the situation is given by $81(1.07)p \leq 14{,}000$. Dividing both sides of this inequality by $81(1.07)$ and rounding the result to two decimal places gives $p \leq 161.53$. To not exceed the budget, the maximum possible price per chair is $\$161.53$.

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

Choice C is incorrect. This is the maximum possible price per chair including sales tax, not the maximum possible price per chair before sales tax.

Choice D is incorrect. This is the maximum possible price if the sales tax is added to the total budget, not the maximum possible price per chair before sales tax.

Question Difficulty: Hard

Question ID b2d50dc7

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

ID: b2d50dc7

$$y < 6x + 2$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	20
5	32
7	44

B.

x	y
3	16
5	36
7	40

C.

x	y
3	16
5	28
7	40

D.

x	y
3	24
5	36
7	48

ID: b2d50dc7 Answer

Correct Answer: C

Rationale

Choice C is correct. All the tables in the choices have the same three values of x, so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y < 6(3) + 2$, or $y < 20$. Therefore, when $x = 3$, the corresponding value of y is less than 20. Substituting 5 for x in the given inequality yields $y < 6(5) + 2$, or $y < 32$. Therefore, when $x = 5$, the corresponding value of y is less than 32. Substituting 7 for x in the given inequality yields $y < 6(7) + 2$, or $y < 44$. Therefore, when $x = 7$, the corresponding value of y is less than 44. For the table in choice C, when $x = 3$, the corresponding value of y is 16, which is less than 20; when $x = 5$, the corresponding value of y is 28, which is less than 32; when $x = 7$, the corresponding value of y is 40, which is less than 44. Therefore, the table in choice C gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is 20, which is not less than 20; when $x = 5$, the corresponding value of y is 32, which is not less than 32; when $x = 7$, the corresponding value of y is 44, which is not less than 44.

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is 36, which is not less than 32.

Choice D is incorrect. In the table for choice D, when $x = 3$, the corresponding value of y is 24, which is not less than 20; when $x = 5$, the corresponding value of y is 36, which is not less than 32; when $x = 7$, the corresponding value of y is 48, which is not less than 44.

Question Difficulty: Hard

Question ID b2d50dc7

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

ID: b2d50dc7

$$y < 6x + 2$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	20
5	32
7	44

B.

x	y
3	16
5	36
7	40

C.

x	y
3	16
5	28
7	40

D.

x	y
3	24
5	36
7	48

ID: b2d50dc7 Answer

Correct Answer: C

Rationale

Choice C is correct. All the tables in the choices have the same three values of x, so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y < 6(3) + 2$, or $y < 20$. Therefore, when $x = 3$, the corresponding value of y is less than 20. Substituting 5 for x in the given inequality yields $y < 6(5) + 2$, or $y < 32$. Therefore, when $x = 5$, the corresponding value of y is less than 32. Substituting 7 for x in the given inequality yields $y < 6(7) + 2$, or $y < 44$. Therefore, when $x = 7$, the corresponding value of y is less than 44. For the table in choice C, when $x = 3$, the corresponding value of y is 16, which is less than 20; when $x = 5$, the corresponding value of y is 28, which is less than 32; when $x = 7$, the corresponding value of y is 40, which is less than 44. Therefore, the table in choice C gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is 20, which is not less than 20; when $x = 5$, the corresponding value of y is 32, which is not less than 32; when $x = 7$, the corresponding value of y is 44, which is not less than 44.

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is 36, which is not less than 32.

Choice D is incorrect. In the table for choice D, when $x = 3$, the corresponding value of y is 24, which is not less than 20; when $x = 5$, the corresponding value of y is 36, which is not less than 32; when $x = 7$, the corresponding value of y is 48, which is not less than 44.

Question Difficulty: Hard

Question ID 56d2643d

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

ID: 56d2643d

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: 56d2643d 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 46f90b4a

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

ID: 46f90b4a

$$y \leq x + 7$$
$$y \geq -2x - 1$$

Which point (x, y) is a solution to the given system of inequalities in the *xy*-plane?

A. $(-14, 0)$

B. $(0, -14)$

C. $(0, 14)$

D. $(14, 0)$

ID: 46f90b4a Answer

Correct Answer: D

Rationale

Choice D is correct. A point (x, y) is a solution to a system of inequalities in the *xy*-plane if substituting the *x*-coordinate and the *y*-coordinate of the point for x and y, respectively, in each inequality makes both of the inequalities true. Substituting the *x*-coordinate and the *y*-coordinate of choice D, 14 and 0, for x and y, respectively, in the first inequality in the given system, $y \leq x + 7$, yields $0 \leq 14 + 7$, or $0 \leq 21$, which is true. Substituting 14 for x and 0 for y in the second inequality in the given system, $y \geq -2x - 1$, yields $0 \geq -2(14) - 1$, or $0 \geq -29$, which is true. Therefore, the point $(14, 0)$ is a solution to the given system of inequalities in the *xy*-plane.

Choice A is incorrect. Substituting -14 for x and 0 for y in the inequality $y \leq x + 7$ yields $0 \leq -14 + 7$, or $0 \leq -7$, which is not true.

Choice B is incorrect. Substituting 0 for x and -14 for y in the inequality $y \geq -2x - 1$ yields $-14 \geq -2(0) - 1$, or $-14 \geq -1$, which is not true.

Choice C is incorrect. Substituting 0 for x and 14 for y in the inequality $y \leq x + 7$ yields $14 \leq 0 + 7$, or $14 \leq 7$, which is not true.

Question Difficulty: Hard

Question ID 89f5185f

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

ID: 89f5185f

$$y > 13x - 18$$

For which of the following tables are all the values of x and their corresponding values of y solutions to the given inequality?

A.

x	y
3	21
5	47
8	86

B.

x	y
3	26
5	42
8	86

C.

x	y
3	16
5	42
8	81

D.

x	y
3	26
5	52
8	91

ID: 89f5185f Answer

Correct Answer: D

Rationale

Choice D is correct. All the tables in the choices have the same three values of x, so each of the three values of x can be substituted in the given inequality to compare the corresponding values of y in each of the tables. Substituting 3 for x in the given inequality yields $y > 13(3) - 18$, or $y > 21$. Therefore, when $x = 3$, the corresponding value of y is greater than 21. Substituting 5 for x in the given inequality yields $y > 13(5) - 18$, or $y > 47$. Therefore, when $x = 5$, the corresponding value of y is greater than 47. Substituting 8 for x in the given inequality yields $y > 13(8) - 18$, or $y > 86$. Therefore, when $x = 8$, the corresponding value of y is greater than 86. For the table in choice D, when $x = 3$, the corresponding value of y is 26, which is greater than 21; when $x = 5$, the corresponding value of y is 52, which is greater than 47; when $x = 8$, the corresponding value of y is 91, which is greater than 86. Therefore, the table in choice D gives values of x and their corresponding values of y that are all solutions to the given inequality.

Choice A is incorrect. In the table for choice A, when $x = 3$, the corresponding value of y is 21, which is not greater than 21; when $x = 5$, the corresponding value of y is 47, which is not greater than 47; when $x = 8$, the corresponding value of y is 86, which is not greater than 86.

Choice B is incorrect. In the table for choice B, when $x = 5$, the corresponding value of y is 42, which is not greater than 47; when $x = 8$, the corresponding value of y is 86, which is not greater than 86.

Choice C is incorrect. In the table for choice C, when $x = 3$, the corresponding value of y is 16, which is not greater than 21; when $x = 5$, the corresponding value of y is 42, which is not greater than 47; when $x = 8$, the corresponding value of y is 81, which is not greater than 86.

Question Difficulty: Hard

Question ID c729c1d7

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

ID: c729c1d7

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: c729c1d7 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