Student Name:

Algebra I-TEST 1

Algebra I

DIRECTIONS

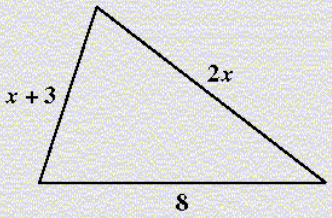
Read each problem carefully. Then work the problem, find your answer among the answer choices.

SAMPLE A

What value of x makes the equation $2x + 1 = 7$ true?

A 2
B 3
C 4
D 5

SAMPLE B



Which of these is equivalent to the perimeter of this triangle?

A $2x^2 + 8$
B $2x^2 + 11$
C $3x + 8$
D $3x + 11$

1. **The terms below belong to a famous mathematical sequence.**

1, 1, 2, 3, 5, ___, 13, 21, 34, . . .

Which term comes between 5 and 13?

A 7

B 8

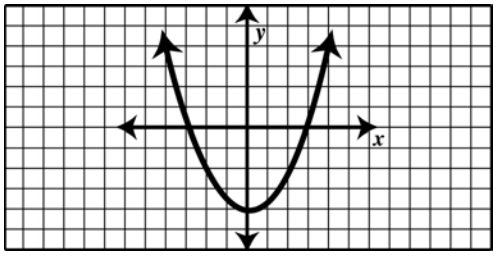
C 10

D 12

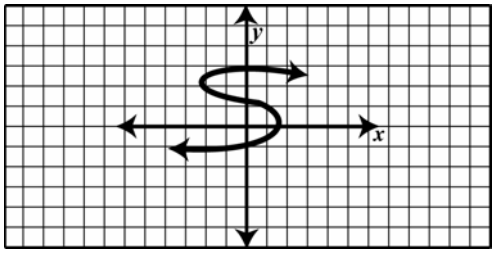
---

2. **Which graph does NOT represent a function?**

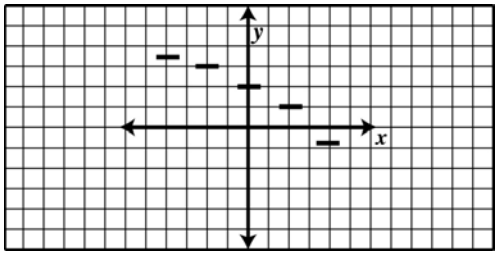
A



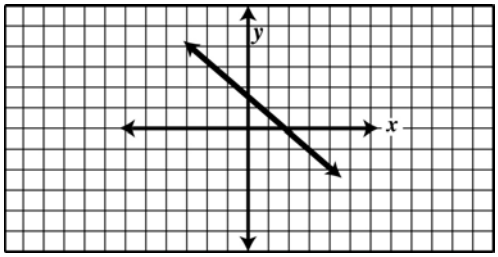
C



B



D



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3. **Kelly solved the equation below using the steps shown.**

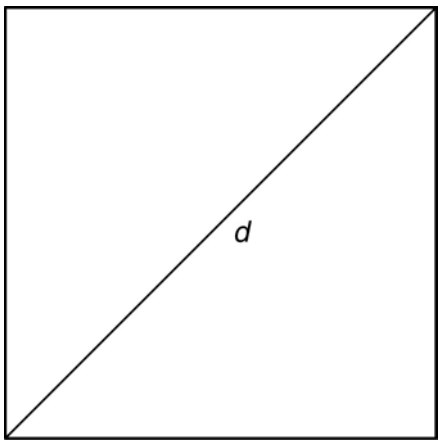
Given: $3(x - 4) - 4 = 1$
Step 1: $3x - 12 - 4 = 1$
Step 2: $3x - 16 = 1$
Step 3: $3x = -15$
Step 4: $x = -5$

Which step contains Kelly's first mistake?

A Step 1
B Step 2
C Step 3
D Step 4

---

4. **The perimeter of the square shown below is 36 inches.**



What is *d*, the length of its diagonal?

A 18 in.
B $9\sqrt{2}$ in.
C 12 in.
D $6\sqrt{2}$ in.

---

5. **The instructions on a container of plant fertilizer read, "Mix 2 tablespoons of fertilizer in 3 quarts of water." After Alfred had made a 3-quart mixture, he accidentally spilled about 7 tablespoons of fertilizer into the mixture. How many MORE quarts of water should he add in order to keep the mixture correct?**

A $10\frac{1}{2}$ quarts

B $13\frac{1}{2}$ quarts

C 21 quarts

D 23 quarts

---

6. **Mrs. Delgado purchased notebooks at 2 for \$5.00 and pens at \$2.00 per package. She spent \$19.00 for a total of 8 items. Which system of equations below could be used to find *n*, the number of notebooks, and *p*, the number of packages of pens, that Mrs. Delgado purchased?**

A $n + p = 8$
$5.00n + 2.00p = 19.00$

B $n + p = 8$
$7.00(n + p) = 19.00$

C $2n + p = 8$
$2.50n + 2.00p = 19.00$

D $n + p = 8$
$2.50n + 2.00p = 19.00$

---

7. **Jet sampled 12 people for a television-watching survey. One of the questions asked for the person's age. The ages were:**

6, 7, 7, 7, 10, 12, 15, 21, 40, 55, 70, 87

Which of these measures is GREATEST for this data set?

A Mean

B Median

C Range

D Mode

---

8. **The number $43\frac{1}{3}$ can be classified as which type of number?**

A Integer

B Irrational number

C Real number

D Whole number

---

9. **Which of these equations is a linear equation?**

A $y = \frac{5}{x}$

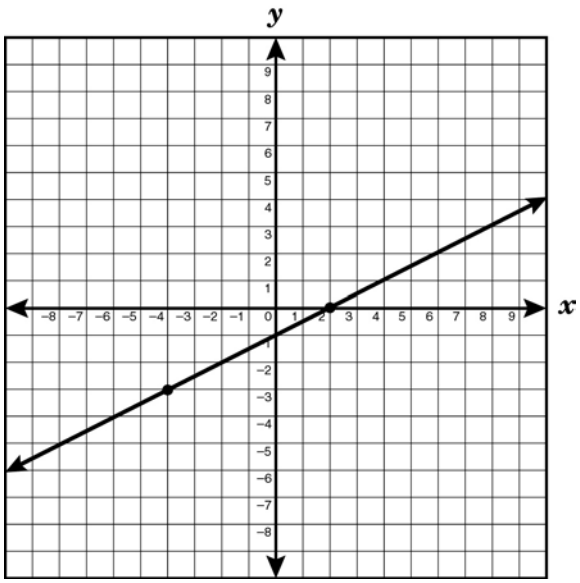
B $y = \frac{1}{2}x + 4$

C $y = 5x^2$

D $y = x^3 + 2$

---

10. **A relationship between x and y is represented by the following graph. The points (-4, -3) and (2, 0) lie on the graph.**



What is the value of y when x is 45?

A 44

B $22\frac{1}{2}$

C 22

D $21\frac{1}{2}$

---

11. **If a is a real number greater than 2 and $b = a$, which of these expressions has the GREATEST value?**

A ab

B $a + b$

C a^b

D $\frac{a}{b}$

---

12. **For a bakery, the cost of making each day's batch of doughnuts is given by the equation below, where C is the total cost in dollars of making a batch of doughnuts and N is the number of doughnuts in the batch.**

$$C = 30 + 0.1N$$

If the number of doughnuts in a batch is increased by 20 doughnuts, by how much will the cost of a batch increase?

A $2.00

B $2.20

C $20.00

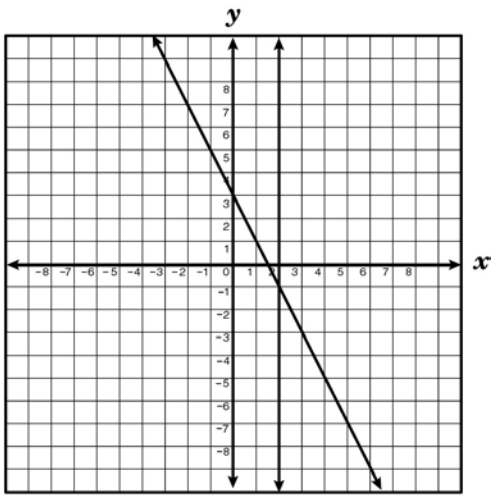
D $220.00

---

13. **The graph of the system of equations**

$$2y = -4x + 6$$
$$x = 2$$

is shown below.



Which point satisfies both of the following inequalities?

$$2y \geq -4x + 6$$
$$x \leq 2$$

A (3, -1)

B (-1, 3)

C (1, 3)

D (1, -3)

---

14. **What is the PRODUCT of the solutions to the equation $|2x-1| = 3$?**

A 2

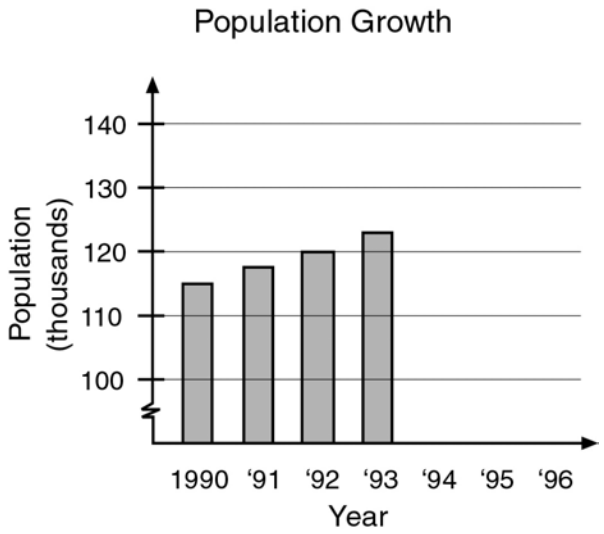
B -2

C 4

D -4

---

15. **The graph shows how the population of a town has increased over a 4-year period.**



If the population growth pattern continues, which will be closest to the population of the town in the year 2002?

A 130,000

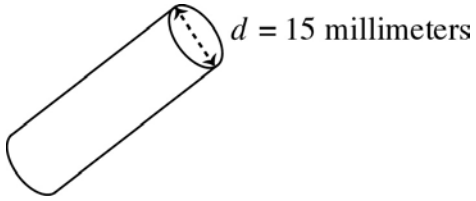
B 132,500

C 145,000

D 152,500

---

16. **The picture shows a machine part in the shape of a cylinder. The diameter of the base is specified as shown.**



A part passes inspection if its diameter measure is within 0.12 millimeters of the specified measure. Which inequality could be used to find the range of diameters that would pass inspection?

A $|d+15|<0.12$

B $|d-15|<0.12$

C $|d|<15-.012$

D $|d|<15+0.12$

---

17. **If the point $(a, 2a)$ lies on the line represented by $4x - 3y = -3$, what is the value of a?**

A -3

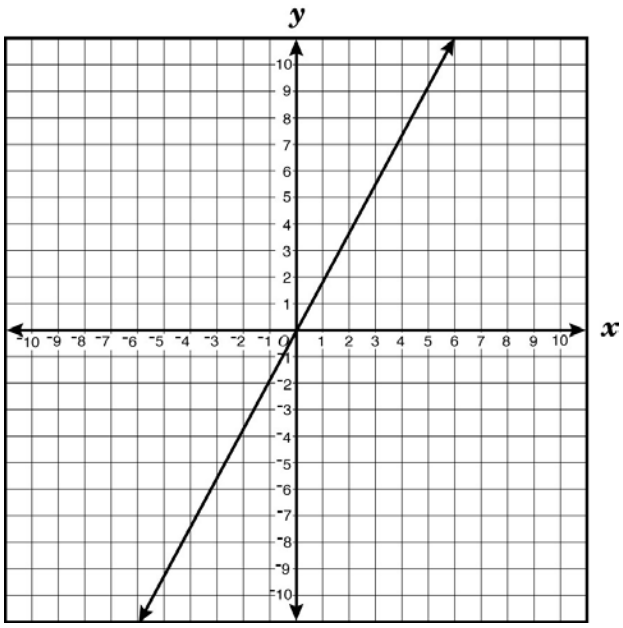
B $-\frac{3}{2}$

C $\frac{3}{2}$

D 3

---

18. **The graph of the line $y = 2x$ is shown below.**



If the line is translated 2 units up, which of these will be its new equation?

A $y = \frac{1}{2}(x + 2)$

B $y = \frac{1}{2}x + 2$

C $y = 2x + 2$

D $y = 2x - 2$

---

19. **The circulation of a magazine is 26,500,000. What is this number expressed in scientific notation?**

A 2.65×10^{7}

B 2.65×10^{5}

C 2.65×10^{-5}

D 2.65×10^{-7}

---

20. **The table shows data collected from a timed practice period for a bicyclist riding at a constant rate.**

Timed Practice Period

x **(distance in miles)**	***y*** **(time in minutes)**
3	**10**
7.5	**25**

Which equation represents the linear relationship between *y*, the total number of minutes ridden, and *x*, the total number of miles ridden?

A $y = 10x - \frac{485}{2}$

B $y = \frac{1}{10}x + \frac{97}{10}$

C $y = \frac{1}{10}x + 25$

D $y = \frac{10}{3}x$

---

21. **Which of the following situations could be represented by the equation $y = 3x + 5$?**

A A bricklayer lays 5 bricks in 3 minutes. What is the total number of bricks he can lay in x minutes?

B An express package costs \$5 plus \$3 per pound to ship. What is the total cost for x pounds?

C A jogger is 3 miles from home, jogging toward home at 5 miles per hour. What is the total number of minutes it will take her to get home?

D A math teacher gave some problems worth 5 points and a bonus problem worth 3 points. What was the total value of the problems?

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22. **Marlee rented a paddleboat at the park for a fixed charge of $2.50 plus $1.50 per hour. She wants to stay out on the water as long as possible. How many hours can she use the boat without spending more than $7.00?**

A 2.5 hr

B 3 hr

C 4 hr

D 4.5 hr

---

23. **What is the *domain* of the function**

$$f(x) = 2x - 3$$

when the range is {-9, -3, 1}?

A {-21, -9, -1}

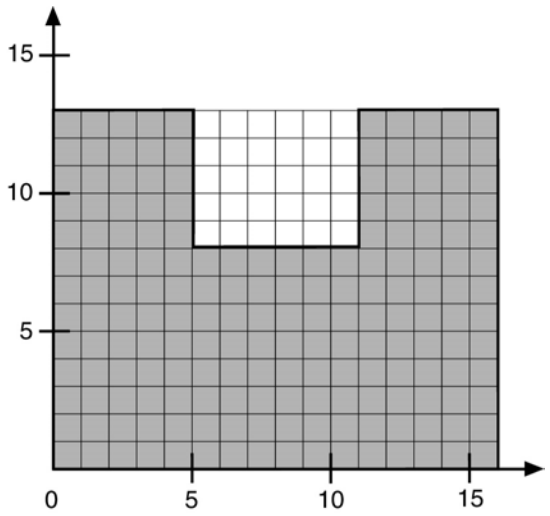
B {-2, 0, 6}

C {-8, -2, 2}

D {-3, 0, 2}

---

24. **The Peters family wants to place new carpet in the area of their home represented by the shaded region in the scale drawing. In this drawing, 1 unit represents 1 foot.**



How many square feet of carpet will be needed to cover the shaded region?

A 68 ft^2

B 178 ft^2

C 183 ft^2

D 208 ft^2

---

25. **What values of *x*, *y*, *z*, and *w* make this matrix equation true?**

$$\begin{bmatrix} 4 & 3 \\ -2 & 7 \end{bmatrix} + \begin{bmatrix} x & y \\ z & w \end{bmatrix} = \begin{bmatrix} 5 & -2 \\ 7 & 3 \end{bmatrix}$$

A $x = 1, y = -5, z = 9, w = 4$

B $x = 1, y = -5, z = 9, w = -4$

C $x = 1, y = -1, z = 9, w = -4$

D $x = 1, y = -5, z = 5, w = -4$

---

26. **If $x = 0$, which of these expressions has a value of 0?**

A $(x+2)\cdot 3+4$

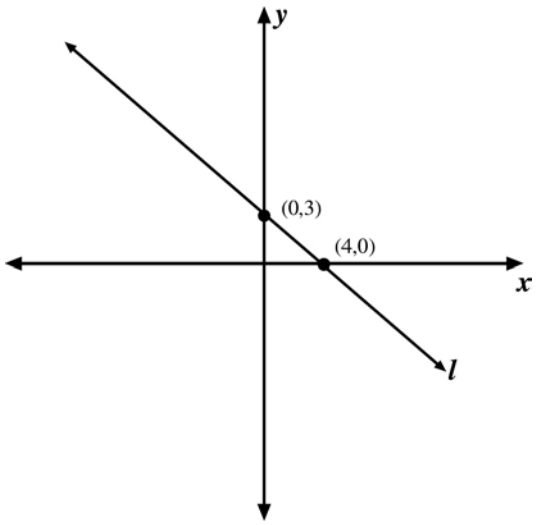
B $(x-2)\cdot(3+4)$

C $x\cdot(2-3-4)$

D $x+(2\cdot 3-4)$

---

27. **The equation of line *l* is shown on the grid.**



Which equation describes a line that is parallel to line *l*?

A $y = \frac{3}{4}x - \frac{7}{4}$

B $y = -\frac{3}{4}x + \frac{7}{4}$

C $y = -\frac{4}{3}x - 2$

D $y = \frac{4}{3}x + 2$

---

28. **Elaine's class used two number cubes in a probability experiment. One cube has one of the numbers 1 through 6 on each of its faces. The other cube has 2 red, 2 blue, and 2 green faces. How many different outcomes are possible for a number and a color on the top faces when both cubes are rolled at the same time?**

A 6

B 9

C 18

D 36

---

29. **When she began a new exercise program, Abigail could do only 9 minutes of high intensity exercises. At the end of the first week, she could do a maximum of 18 minutes of the same exercises. By the end of the third week, she had increased her maximum time for these exercises to 30 minutes. What was her average rate of increase in minutes per week?**

A 3 min per week

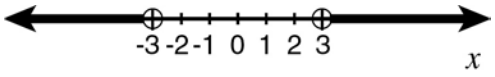
B 7 min per week

C 9 min per week

D 12 min per week

---

30. **Which inequality describes the set of real numbers modeled by this graph?**



A $|x| \leq 3$

B $|x| \geq 3$

C $|x| < 3$

D $|x| > 3$

---

31. **Which equation best describes the graph of the line that has slope $-\frac{1}{3}$ and passes through point (3, -9)?**

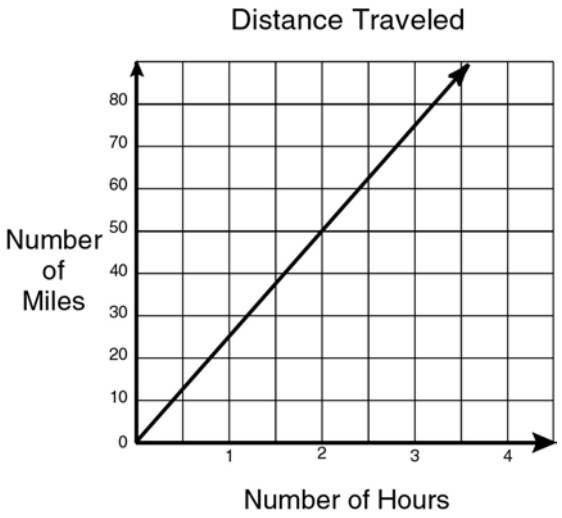
A $-9y = 3x - \frac{1}{3}$

B $-\frac{1}{3}y = 3x - 9$

C $y = -\frac{1}{3}x - 8$

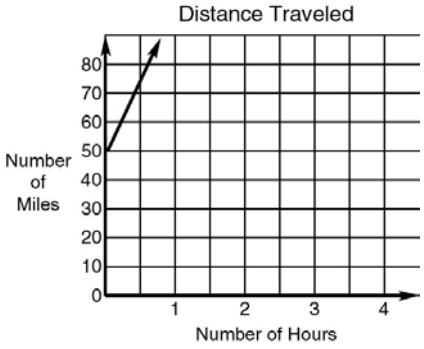
D $y = -\frac{1}{3}x + 10$

32. **The graph below shows the distance traveled by a car moving at a speed of 25 miles per hour.**

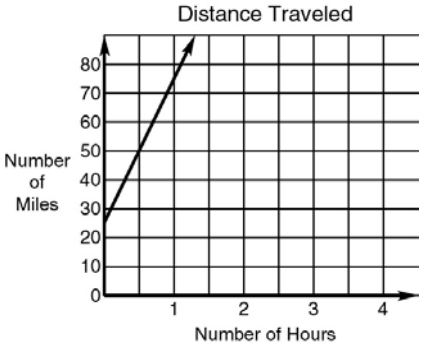


The equation is $d = 25t$, where d is the distance traveled and t is the number of hours. Which graph best represents the distance traveled by a car moving at a speed of 50 miles per hour?

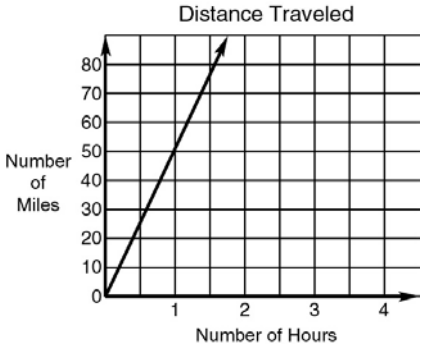
A



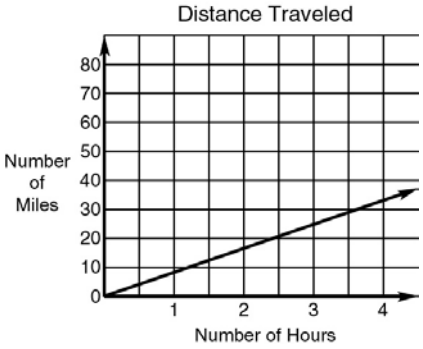
C



B



D



33. **For which equation is the solution set {0, 2}?**

A $x^2 - 2x = 0$

B $x^2 + x - 2 = 0$

C $x^2 - 2 = 0$

D $(x - 2)^2 = 0$

---

34. **A restaurant needs to set up 7 tables for the 34 members of a high school science club. The restaurant has tables that can seat 4 and tables that can seat 6. This system of equations represents the combination of *x*, the number of tables for 4, and *y*, the number of tables for 6, that will seat exactly 34 people.**

$$x + y = 7$$
$$4x + 6y = 34$$

How many tables that seat 6 should be set up?

A 2

B 3

C 4

D 5

---

35. **After Zach made a bicycle trip in Colorado, he used the equation $y = \frac{1}{20}x + 5000$ to model *y*, his altitude in feet, in terms of *x*, the number of feet he bicycled. Which BEST describes the rate of change in altitude as he traveled?**

A For every 5000 feet he traveled, the altitude increased $\frac{1}{20}$ foot.

B For every 20 feet he traveled, the altitude increased 1 foot.

C For every 20 feet he traveled, the altitude increased 250 feet.

D For every foot he traveled, the altitude increased 20 feet.

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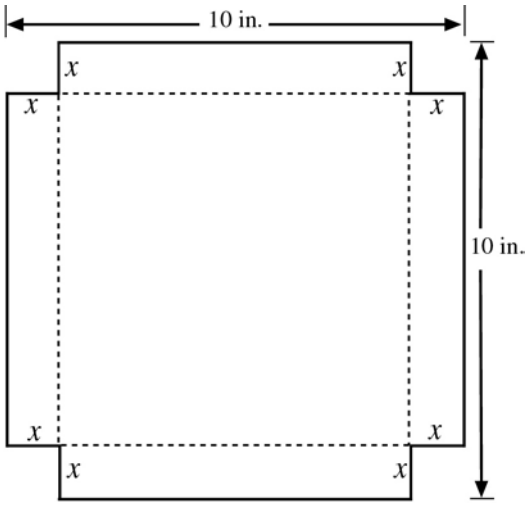
36. **Matthew took a 10-inch by 10-inch square piece of cardboard and cut an *x*-inch by *x*-inch square off each corner.**



If he folds up the sides to make an open box, which expression represents its volume?

A $x^2(40 - 8x)$

B $x(40 - 8x)^2$

C $x^2(10 - 2x)$

D $x(10 - 2x)^2$

---

37. **Which of the following is equivalent to this expression?**

$$6^2 \bullet 3^{-4}$$

A -144

B $\frac{4}{27}$

C $\frac{4}{9}$

D 1

---

38. **The annual salary for a teacher is $34,000, plus an additional $500 per year for each year of experience. Which equation represents *y*, the annual salary for a teacher with *x* years of experience?**

A $y = \frac{500}{x} + 34{,}000$

B $y = -\frac{500}{x} + 34{,}000$

C $y = -500x + 34{,}000$

D $y = 500x + 34{,}000$

---

39. **Which expression is equivalent to $\frac{x(x+4)-12}{x-2}$?**

A $-x - 12$

B $x + 4$

C $x + 6$

D $x + 10$

---

40. **Isabel wants to mail a letter to her cousin in Chicago. The cost of sending mail first class is $0.33 for the first ounce and $0.22 for each additional ounce. Which expression represents the cost in dollars of mailing a first class letter weighing *x* additional ounces?**

A $0.33x - 0.22$

B $0.33 + 0.22x$

C $0.33 + \frac{x}{0.22}$

D $\frac{0.33}{x} + 0.22$

---

41. **A high school cafeteria allows students to determine their own menus by choosing 1 item from each of 5 food lists.**

List 1	List 2	List 3	List 4	List 5
Pizza	Fries	Milk	Apple	Ice cream
Burger	Onion rings	Juice	Orange	Cookie
Taco		Sports drink	Salad	
Sub		Soft drink		

How many different menu combinations are possible?

A 5

B 15

C 120

D 192

---

42. **Which of the following represent third-degree polynomials?**

I. $5x^2y$

II. $4x^2y^2 - 3x^3 + 7x^2y$

III. $9xy + 7xy^2$

IV. $4x + 9x^2 + 11x^3$

A IV only

B I and III only

C I, III, and IV only

D I, II, III, and IV

---

43. **What is the *sum* of the solutions to the quadratic equation**

$$x^2 - 4x - 5 = 0$$

A 0

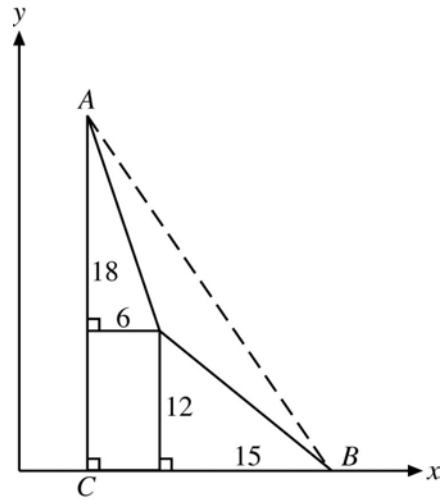
B 4

C 5

D 6

---

44. **Triangle *ABC* is located on a coordinate grid as shown.**



What is the slope of $\overline{AB}$?

A $-\frac{10}{7}$

B $-\frac{5}{6}$

C $-\frac{1}{2}$

D $-\frac{1}{3}$

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45. **Trinomials of the form $ax^2 + bx + c$ are "unfactorable" over the set of real numbers if $b^2 - 4ac$ is negative. Which trinomial or trinomials are unfactorable?**

A $4x^2 - 36$

B $3x^2 - 2x + 3$

C $x^2 - 2x + 1$

D $5x^2 + 20x$

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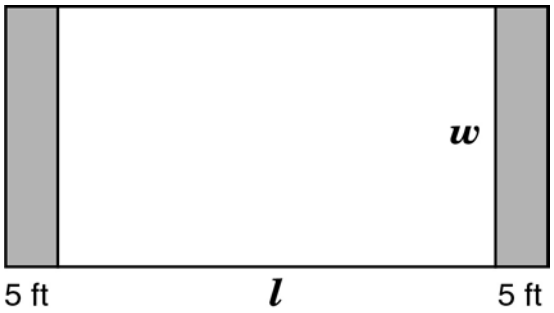
46. **As shown in the drawing, a college basketball court is 10 feet longer than a high school court but is the same width.**



Let w represent the width and l represent the length of a high school basketball court. Which equation could be used to determine D, the difference between the area of a college court and the area of a high school court?

A $D = lw - 10$

B $D = 10w$

C $D = lw - 10l$

D $D = 9lw$

---

47. **Marvin's Music Store sells CDs and cassette tapes. The prices for three types of music are shown in the chart below.**

Marvin's Prices

	Classical	Rock	Jazz
CD	$18.98	$12.98	$9.98
Cassette	$12.49	$8.49	$6.49

The prices can also be represented by the following matrix:

$$\begin{bmatrix} 18.98 & 12.98 & 9.98 \\ 12.49 & 8.49 & 6.49 \end{bmatrix}$$

Next week the cost of each CD will be increased by $1.50, and the cost of each cassette will be decreased by $0.50. Which of these could be used to determine next week's prices?

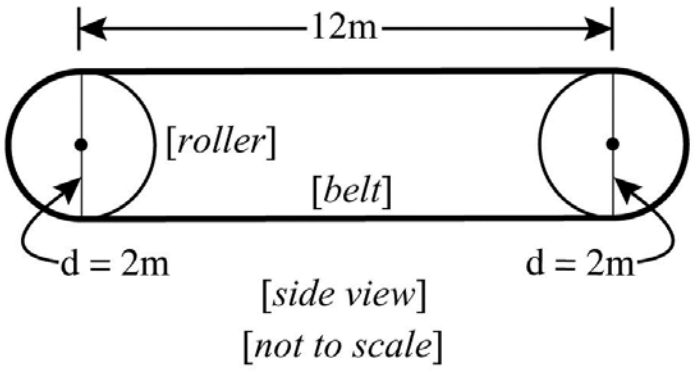
A $\begin{bmatrix} 18.98 & 12.98 & 9.98 \\ 12.49 & 8.49 & 6.49 \end{bmatrix} + \begin{bmatrix} 1.50 \\ 0.50 \end{bmatrix}$

B $\begin{bmatrix} 18.98 & 12.98 & 9.98 \\ 12.49 & 8.49 & 6.49 \end{bmatrix} + \begin{bmatrix} 1.50 \\ -0.50 \end{bmatrix}$

C $\begin{bmatrix} 18.98 & 12.98 & 9.98 \\ 12.49 & 8.49 & 6.49 \end{bmatrix} + \begin{bmatrix} 1.50 & 1.50 & 1.50 \\ 0.50 & 0.50 & 0.50 \end{bmatrix}$

D $\begin{bmatrix} 18.98 & 12.98 & 9.98 \\ 12.49 & 8.49 & 6.49 \end{bmatrix} + \begin{bmatrix} 1.50 & 1.50 & 1.50 \\ -0.50 & -0.50 & -0.50 \end{bmatrix}$

48. **A conveyer belt in an assembly plant must be replaced.**



What is the length of the shortest belt that will fit around the two rollers as shown?

A $(12 + 2\pi)$ meters

B $(12 + 4\pi)$ meters

C $(24 + 2\pi)$ meters

D $(24 + 4\pi)$ meters

---

49. **The area of a rectangle can be expressed as $x^2 + 7x - 60$. What is the factored form of $x^2 + 7x - 60$?**

A $(x+4)(x-15)$

B $(x+6)(x+1)$

C $(x+12)(x-5)$

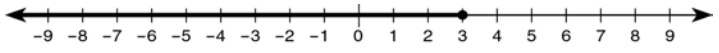
D $(x+20)(x-3)$

---

50. **Which graph below best represents the solution for this inequality?**

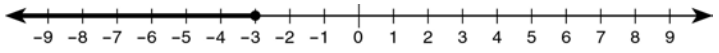
$$-(x + 4) \geq -7$$

A

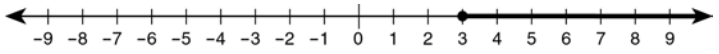


B

C



D



---

51. **What is the product below expressed in scientific notation?**

$$(2.1 \times 10^3)(3 \times 10^6)$$

A 6.3×10^3

B 6.3×10^6

C 6.3×10^9

D 6.3×10^{18}

---

52. **In a region with a sales tax of 7%, the total cost of a purchase is calculated using the formula**

$$t = 1.0p + 0.07p,$$

where t represents the total cost and p represents the price of the item to be purchased. Which equation correctly shows the price of the item in terms of t?

A $p = 1.07t$

B $p = 0.17t$

C $p = t - 1.07$

D $p = \frac{t}{1.07}$

---

53. **An airplane is 30 miles away when it appears on the airport's radar. It is flying directly toward a runway at 2 miles per minute. If the speed and heading of the airplane remain constant, in how many minutes will the airplane be 5 miles from the runway? (Use $d = rt$)**

A 6.0

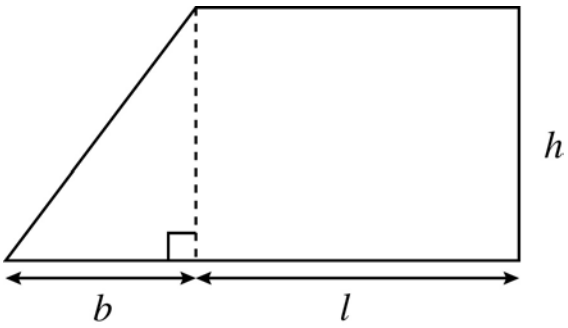
B 12.5

C 15.0

D 17.5

---

54. **The polygon pictured is made up of a rectangle and right triangle.**



The formula for the area of the polygon is given below.

$$A = \frac{1}{2}bh + hl$$

Which equation correctly expresses b in terms of A, h, and l?

A $b = \frac{2(A - hl)}{h}$

B $b = \frac{h}{2}A - hl$

C $b = \frac{A}{h(2 + l)}$

D $b = 2Ah - l$

---

55. **Which of the following is an irrational number?**

A $\sqrt{0.16}$

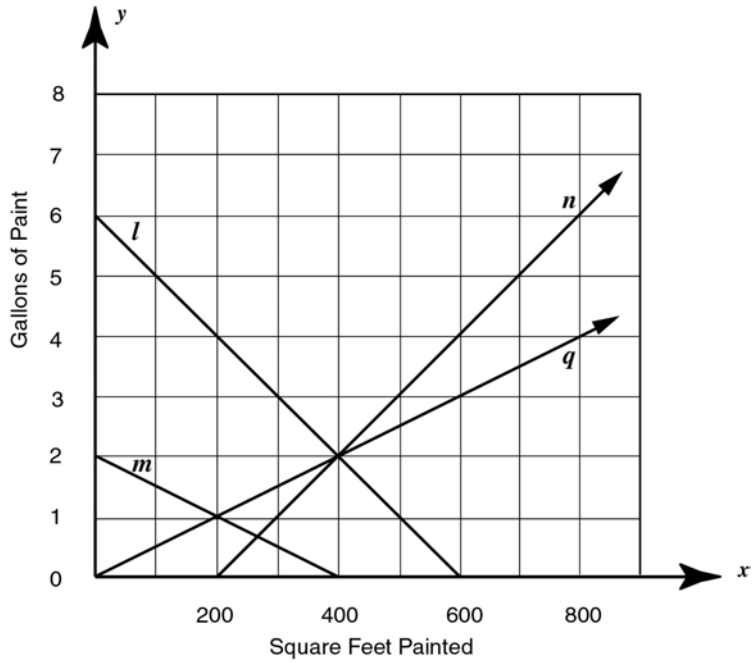
B $\sqrt{\frac{144}{25}}$

C $\sqrt{17}$

D $\sqrt{25}$

---

56. **A painter uses 2 gallons of paint to cover a 400-square-foot area.**



Which line on the grid best represents *y*, the total number of gallons of paint he will need to paint a total of *x* square feet?

A l

B m

C n

D q

---

57. **The area of a rectangular lot is represented by $8b^2 - 22b - 21$. If the width of the lot is $4b + 3$, which expression represents the length?**

A $4b + 7$

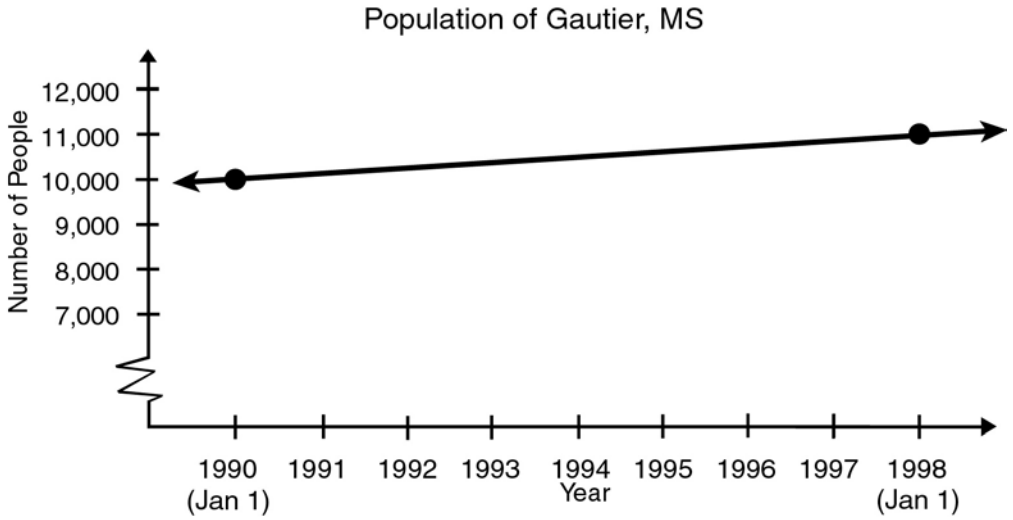
B $4b - 7$

C $2b + 7$

D $2b - 7$

---

58. **The population of Gautier, Mississippi, grew at about the same rate per year from approximately 10,000 people in 1990 to approximately 11,000 in 1998 as shown in the graph.**



Which of these could be used to determine the slope of the line that models the population growth?

A $\frac{11{,}000 + 10{,}000}{1998 + 1990}$

B $\frac{1998 + 1990}{11{,}000 + 10{,}000}$

C $\frac{11{,}000 - 10{,}000}{1998 - 1990}$

D $\frac{1998 - 1990}{11{,}000 - 10{,}000}$

---

59. **Which expression is the result when $2a - 5$ is subtracted from $3a + 3$?**

A $a - 2$

B $5a - 2$

C $a + 8$

D $-a + 8$

---

60. **Line p passes through point (2, 5) and is perpendicular to the line whose equation is $y = 2x + 3$. Which equation describes the graph of line p?**

A $y = -\frac{1}{2}x + 6$

B $y = -2x + 9$

C $y = \frac{1}{2}x + 4$

D $y = -\frac{1}{2}x + 3$

---

61. **A rectangular lily pond in a small park is 4 feet wide and 6 feet long. The park maintenance staff wants to double the area of the rectangular pond by increasing the width and length by x feet. Which of these could be used to determine x?**

A $24 = (4x)(6x)$

B $24 = (4 + x)(6 + x)$

C $48 = (4x)(6x)$

D $48 = (4 + x)(6 + x)$

---

62. **The following exponential function describes the growth of a certain plant cell in *t* hours.**

$$p(t) = 3 \bullet 16^t$$

How many plant cells are there after $\frac{3}{4}$ hour?

A 12

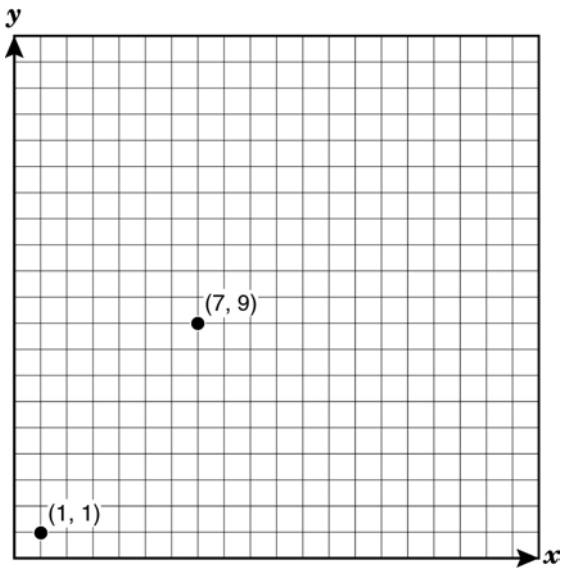
B 18

C 24

D 36

---

63. **The plans for a new amusement park were laid out on the first quadrant of a coordinate plane. The entrance to the roller coaster was shown at (1, 1), and the entrance to the bumper cars was shown at (7, 9).**



If each unit on the grid represents 70 meters, how far apart will the 2 entrances be?

A 1400 m

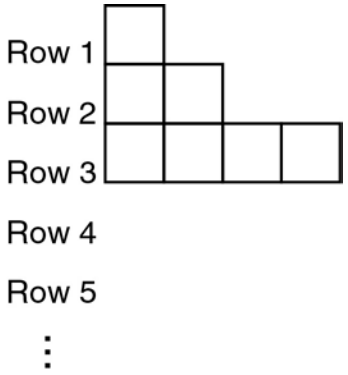
B 980 m

C 700 m

D 490 m

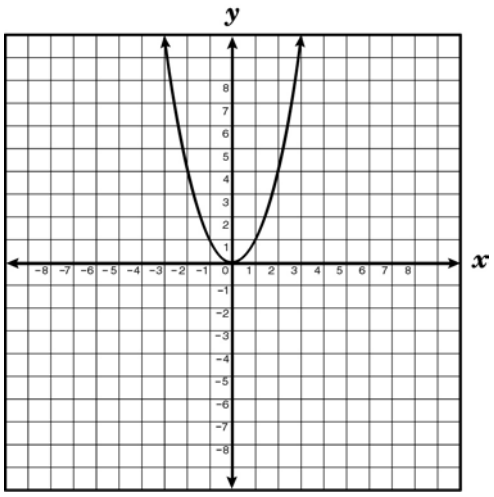
---

64. **The number of squares in each row shown below follow a pattern.**



Sherra said that the number of squares in Row 8 would be 128. Marion said that the number of squares in Row 8 would be 29. Can both girls be right? Show or explain how you made your decision.

65. **The graph of $y = x^2$ is shown below. Ellie drew the line that contains the two points (2, 4) and (-2, 4). She said that her line proves that the graph is not a function.**



Is Ellie correct? Explain your reasoning.