

6. Mario needs to cut three shelves from a board that is 1.8 meters long. The second shelf is 15 centimeters longer than twice the length of the first shelf. The remaining shelf is 5 centimeters longer than the first shelf. The equation below represents this situation, where x is the length of the first shelf, in meters.

$$x + (2x + 0.15) + (x + 0.05) = 1.8$$

Which of the following is the length, in meters, of the first shelf?

- A. 0.40
B. 0.45
C. 0.53
D. 0.96

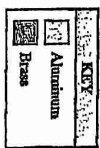
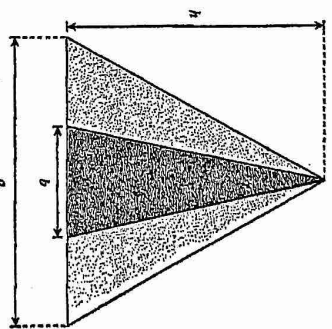
7. Billy is planning to drive from his house to a baseball stadium and arrive in time for the beginning of the championship game. His arrival time depends on the traffic. If traffic is light, he will travel at an average speed of 50 miles per hour and arrive 1 hour early. If traffic is heavy, he will travel at an average of 30 miles per hour and arrive on time. The equation below can be used to model this situation, where t represents Billy's drive time, in hours.

$$50(t - 1) = 30t$$

What value of t makes this equation true?

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8. Carol wants to make a sculpture using brass and aluminum, with the dimensions shown below.



The area of the aluminum section can be found using the equation $A = \frac{1}{2}ah - \frac{1}{2}bh$. Which of the following shows the aluminum section's area formula solved for h ?

- A. $h = 2A(a - b)$
B. $h = \frac{2A}{a - b}$
C. $h = \frac{A}{2(a - b)}$
D. $h = \frac{A(a - b)}{2}$

9. Taylor has a total of \$25 to spend on dinner, which includes a 6.5% sales tax and a 20% tip. Taylor used the inequality shown below to calculate the amount, in dollars, a , she can spend before tax and tip.

$$1.2(a + 0.065a) \leq 25$$

Which of the following shows the solution to this inequality?

- A. $a \leq 22.74$
B. $a \leq 22.34$
C. $a \leq 19.76$
D. $a \leq 19.56$

10. Which graph shows the solution to the inequality shown below?

$$15 \leq 7n - 2(n - 10) < 35$$

- A.
- B.
- C.
- D.

11. The out-of-pocket costs to an employee for health insurance and medical expenses for one year are shown in the chart below.

| Type of Cost | Definition | Cost to Employee |
|--------------|---|------------------|
| Premium | Total amount employee pays insurance company for the policy | \$3,626 |
| Deductible | Amount of medical expenses employee pays before insurance company pays for anything | \$ 500 |
| Copayment | Percentage of medical expenses employee has to pay after the first \$500 | 20% |

According to the plan outlined in the chart, total annual health care costs, C , depend on the employee's medical expenses for that year. If x represents the total medical expenses of an employee on this plan and $x \geq 500$, which of the following equations can be used to determine this employee's total health care costs for that year?

- A. $C = 3626 - 500 + 0.20(x - 500)$
- B. $C = 3626 - 500 + 0.20x$
- C. $C = 3626 + 500 + 0.20(x - 500)$
- D. $C = 3626 + 500 + 0.20x$

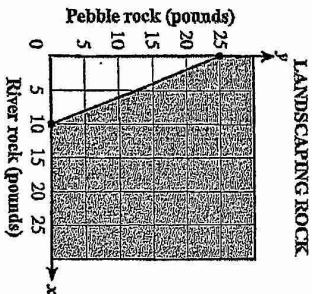
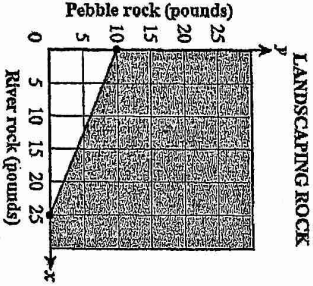
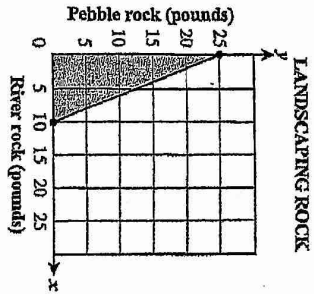
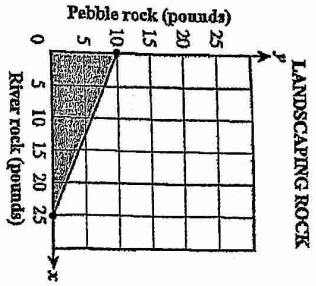
12. Ethan's job at a local home improvement store is to mix paint to make different colors. For a particular customer, he mixed p liters of blue paint, $0.8p$ liters of yellow paint, and $p - 0.4$ liters of orange paint. He then divided the mixture evenly into two cans. If each can contains 1.9 liters of paint, how many liters of blue paint did he use?

$$5x + 2.5y = 20$$

Which of the following shows the graph of this equation?

- A.
- B.
- C.
- D.

14. Kristen can spend up to \$50 on rock to landscape her yard. She decides to use both pebble rock and river rock. Pebble rock costs \$2 per pound, and river rock costs \$5 per pound. The inequality $5x + 2y \leq 50$ models the possible number of pounds of pebble rock and river rock that Kristen can purchase. Which graph represents the inequality?



15. An architect designed an outdoor staircase for a house. The relationship between the height of the steps and the length of the tread is modeled by the equation $57x - 95y = 0$. Which of the following represents the slope of the equation?
- A. $\frac{5}{3}$ C. $\frac{3}{5}$
 B. $\frac{3}{2}$ D. $\frac{2}{3}$

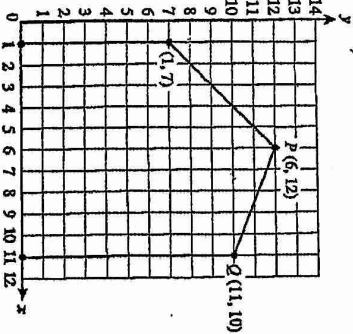
16. Brianna plotted the two points (20, 75) and (45, 150) on a graph. What is the x-coordinate of the x-intercept of the line that contains these two points?
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17. Samuel graphed the equation shown below.
- $$70x + 50y = 630$$

What is the y-intercept of the line?

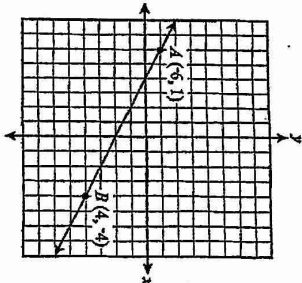
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18. In a technical drawing class, students are analyzing the side view of a house that has been positioned on a coordinate grid, as shown below.



- Which of the following equations best represents the line that contains \overline{PQ} ?
- A. $y = -\frac{5}{2}x + 14.4$ C. $y = -\frac{2}{5}x + 14.4$
 B. $y = \frac{5}{2}x + 27$ D. $y = \frac{2}{5}x + 27$

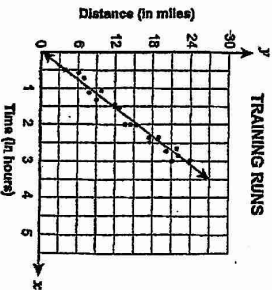
19. The line AB is graphed on the coordinate grid below.



What is the x -intercept of the line that is perpendicular to line AB at point B ?

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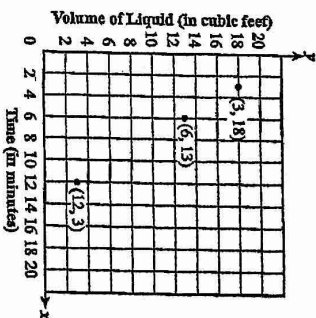
20. David is training for a marathon. He writes down the time and distance for each training run and then records the data on a scatter plot. He has drawn a line of best fit on the scatter plot, as shown below.



Which statement best expresses the meaning of the slope as a rate of change for this line of best fit?

- A. The slope represents the number of miles he will have to run to finish the marathon.
- B. The slope represents the average speed, in miles per hour, of his training runs.
- C. The slope represents the number of hours he will need to finish the marathon.
- D. The slope represents the distances, in miles, that he ran while he was training.

21. A tank containing water is being drained at a constant rate. The points on the grid below represent the volume of water remaining in the tank as a function of time.



At what rate, in cubic feet per minute, is the volume of the water changing?

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22. Russ bought 3 medium sandwiches and 2 large sandwiches for a total of \$29.95. Stacy bought 4 medium sandwiches and 1 large sandwich for a total of \$28.45.

Which statement shows the cost of each medium sandwich and each large sandwich?

- A. Each medium sandwich costs \$5.69, and each large sandwich costs \$6.89.
- B. Each medium sandwich costs \$5.69, and each large sandwich costs \$6.39.
- C. Each medium sandwich costs \$5.39, and each large sandwich costs \$6.89.
- D. Each medium sandwich costs \$5.39, and each large sandwich costs \$6.39.

23. A website that sells songs for downloading increased its price per song from \$0.99 to \$1.29. Ariana spent \$15.36 downloading songs before and after the price increase. She downloaded 4 more songs at \$0.99 than at \$1.29. The set of equations below represents the situation where x is the number of songs Ariana downloaded at \$0.99 and y is the number of songs she downloaded at \$1.29.

$$\begin{aligned} x &= y + 4 \\ 0.99x + 1.29y &= 15.36 \end{aligned}$$

What is the exact number of songs Ariana downloaded at the \$0.99 price?

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24. The expression $(m^6 n^5 q^3)^2$ is equivalent to which of the following?

- A. $m^{12} n^{10} q^6$
- B. $m^{36} n^{25} q^9$
- C. $2m^8 n^7 q^5$
- D. $2m^{12} n^{10} q^6$

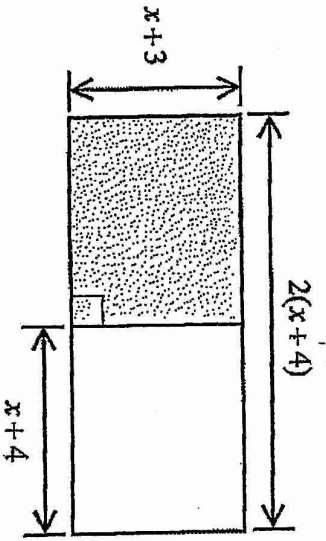
25. Mina simplified the expression shown below.

$$(a^3 b^{-4}) (a^2 b^2)$$

Her final answer was in the form $a^m b^n$. If she simplified the expression correctly, what is the value of n , the exponent of b ?

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26. Which expression is equivalent to the perimeter of the shaded portion of the rectangle?



- A. $2x+10$
- B. $2x+12$
- C. $4x+14$
- D. $8x+28$

27. New photo-imaging techniques on computers allow artists to distort an image from its original shape. Figure 1 is a square image. Figure 2 is stretched 4 units wider and shrunk 4 units shorter than Figure 1.

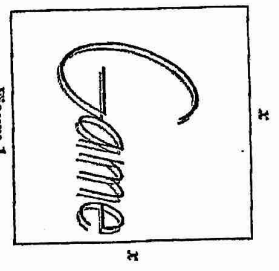


Figure 1

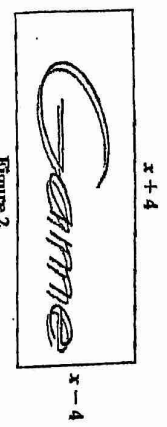


Figure 2

How many square units greater is the area of Figure 1 than the area of Figure 2?

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28. The area of a rectangle is $2x^2 - 7x - 15$. Which of the following shows possible dimensions of the rectangle?

- A. $(2x+3)$ and $(x-5)$
- B. $(2x-3)$ and $(x+5)$
- C. $(2x+3)$ and $(2x-10)$
- D. $(2x-3)$ and $(2x+10)$

29. If $x \neq 3$, which of the following shows the expression below in simplest form?

$$\frac{3x^2 - 27}{x - 3}$$

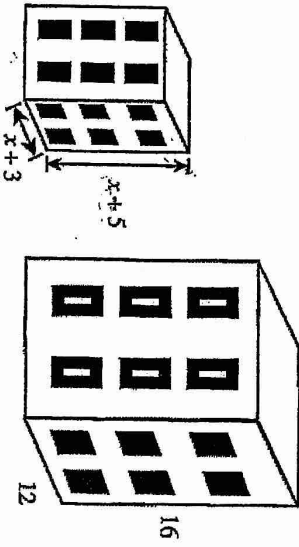
- A. $3(x+3)$
- B. $3(x-3)$
- C. $3(x+9)$
- D. $3(x-9)$

30. If $x \neq 0$ and $y \neq 0$, which expression is equivalent to the expression shown below?

$$(6x^6y^2 - 12x^4y^3 + 3x^2y) + (3x^2y)$$

- A. $2x^4y - 4x^2y^2$ C. $3x^3y^2 - 9x^2y^3$
 B. $2x^4y - 4x^2y^2 + 1$ D. $3x^3y^2 - 9x^2y^3 + 1$

31. Tammy made similar models of a building, with the dimensions, in inches, shown in the diagram below.



Tammy used the information to set up the following proportion.

$$\frac{x+5}{16} = \frac{x+3}{12}$$

What is the value, in inches, of x ?

- A. 3 C. 5
 B. 4 D. 6

32. If $x \neq 0$ and $x \neq 14$, what is the solution of the equation below?

$$\frac{2}{x-14} = \frac{3}{4x}$$



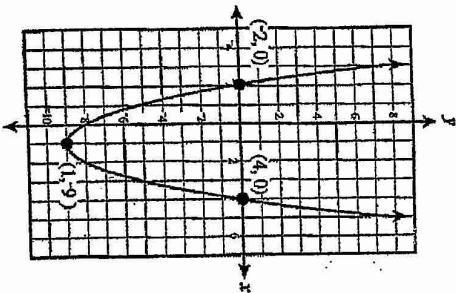
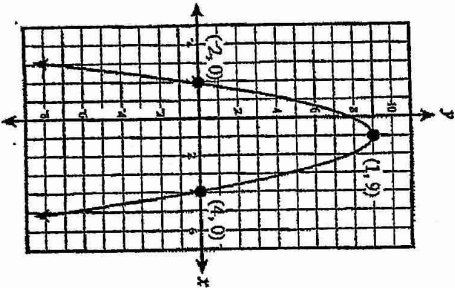
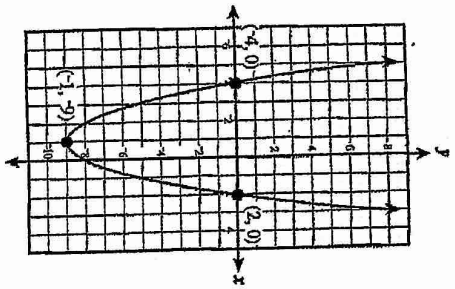
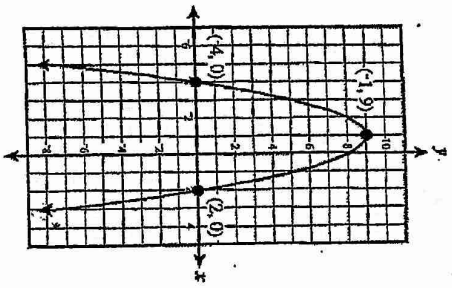
33. In the expression below, $x > 0$.

$$\sqrt{\frac{16x^7}{2x^2}}$$

Which of the following is equivalent to this expression?

- A. $2\sqrt{x^5}$ C. $4x^3\sqrt{2x}$
 B. $2x^2\sqrt{2x}$ D. $8\sqrt{x^3}$

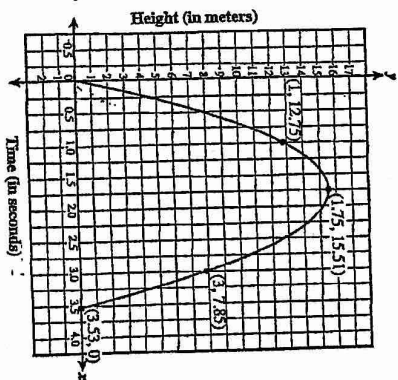
34. Which of the following is the graph of $y = x^2 + 2x - 8$?



35. Timmy and Kelli had a water balloon launcher. When launched, the water balloon's height could be modeled by the quadratic equation

$$y = -4.9x^2 + 17.15x + 0.5$$

The graph shown below represents the water balloon's height



Which of the following is true about the water balloon?

- A. The water balloon reaches a height of 16 meters.
 B. The water balloon reaches the height of 7.85 meters twice.
 C. The water balloon has a maximum height of 17.15 meters.
 D. The water balloon travels for 4.9 seconds before it hits the ground.

36. Jeannie solved the quadratic equation shown below by factoring.

$$x^2 + 2x - 8 = 0$$

Which of the following is a step in solving the equation above?

- A. $(x+2)(x+4) = 0$ C. $(x-2)(x+4) = 0$
 B. $(x+2)(x-4) = 0$ D. $(x-2)(x-4) = 0$

