1. Which value is equivalent to $9^{\frac{2}{3}}$?

Ⓐ 3

Ⓑ 6

Ⓒ $\sqrt{9^3}$

Ⓓ $\sqrt[3]{9^2}$

2. What is the factored form of the equation $y = t^2 + 2t - 48$?

Ⓐ $y = (t - 6)(t + 8)$

Ⓑ $y = (t - 6)(t - 8)$

Ⓒ $y = (t + 6)(t + 8)$

Ⓓ $y = (t + 6)(t - 8)$

3. A family takes a car trip. On the first day of the trip, they drive a certain distance from home. On the second day of the trip, their distance from home can be modeled by the function $d(t) = 55t + 440$, where d is the distance in miles from their home and t is the number of hours the family has traveled. At the end of the second day, the family is 770 miles from home. How many hours did they drive on the second day?

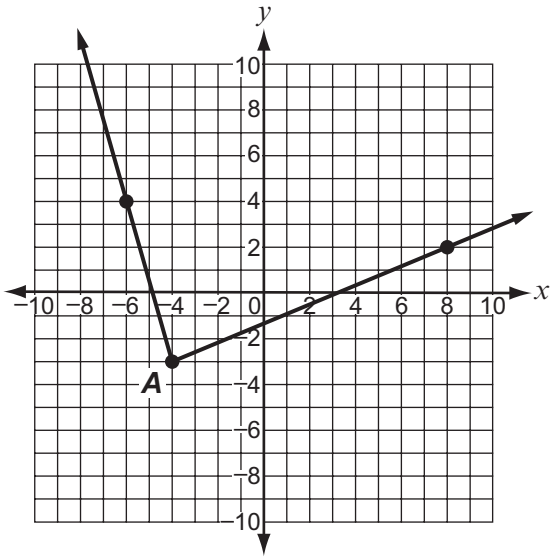
Ⓐ 6

Ⓑ 8

Ⓒ 14

Ⓓ 22

4. The piecewise function $f(x)$, with point A, is shown in the graph.



If a transformation of $f(x - 4) + 5$ is applied to $f(x)$, what are the new coordinates of point A?

Ⓐ $(-9, -7)$

Ⓑ $(-8, 2)$

Ⓒ $(0, 2)$

Ⓓ $(1, -7)$

5. What is the solution to $-4 < -3x + 8 < 14$?

Ⓐ $x < 4$

Ⓑ $x > -2$

Ⓒ $-2 < x < 4$

Ⓓ $x < -2$ or $x > 4$

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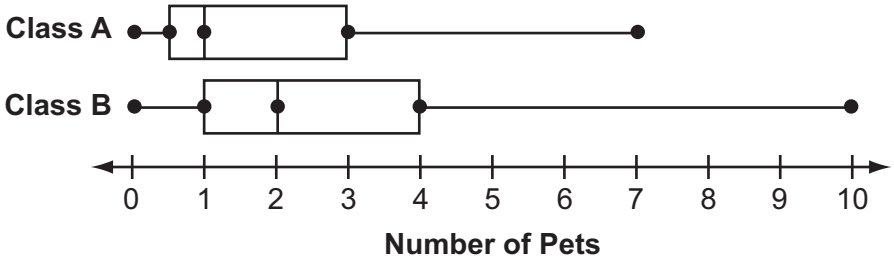
6. Two classes are surveyed to find out how many pets each student has at home. After asking the students in each class how many pets they have, the findings are presented in the box plots shown.



Which statement about the data is correct?

Ⓐ The interquartile range of class A is less than the interquartile range of class B, but the median number of pets for both classes is equal.

Ⓑ The interquartile range of class A is less than the interquartile range of class B, and the median number of pets is also less for class A.

Ⓒ The interquartile range of class A is greater than the interquartile range of class B, but the median number of pets for both classes is equal.

Ⓓ The interquartile range of class A is greater than the interquartile range of class B, and the median number of pets is also greater for class A.

---

7. Which equation, when graphed on the coordinate plane, will result in a line?

Ⓐ $y = \frac{15}{x + 5}$

Ⓑ $y + 4 = 16^x$

Ⓒ $y - 9 = 5x + 72$

Ⓓ $y - 26 = 2(x - 9)^2$

---

8. A shipping company charges a flat rate of \$2.00 per package plus \$0.50 per ounce that the package weighs. If the company charges \$10.50 to ship a package, what is the weight of the package?

Ⓐ 5 ounces

Ⓑ 5.25 ounces

Ⓒ 8.50 ounces

Ⓓ 17 ounces

9. Which expression is equivalent to $(12x - 9y)^2$?

Ⓐ $144x^2 - 81y^2$

Ⓑ $144x^2 + 81y^2$

Ⓒ $144x^2 - 216xy - 81y^2$

Ⓓ $144x^2 - 216xy + 81y^2$

---

10. What is the solution to the equation $8x^2 + 16x + 5 = 0$?

Ⓐ $x = -1 \pm \frac{\sqrt{6}}{4}$

Ⓑ $x = 1 \pm \frac{\sqrt{6}}{4}$

Ⓒ $x = -16 \pm \frac{\sqrt{6}}{4}$

Ⓓ $x = 16 \pm \frac{\sqrt{6}}{4}$

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11. A store manager collects data on the number of customers who shop in a new store for 10 consecutive days. The data are represented in the table.

Number of Customers

Day	1	2	3	4	5	6	7	8	9	10
Customers	145	160	180	200	230	275	320	370	430	495

If the trend in the number of customers continues, which statement BEST explains why the given mathematical model will allow the manager to most accurately predict the number of customers in the store on day 15?

Ⓐ an exponential model, because the number of customers increases for each day that passes

Ⓑ a linear model, because the data points would be evenly scattered above and below a line of best fit

Ⓒ an exponential model, because the difference in the number of customers each day has an increasing trend

Ⓓ a linear model, because the difference in the number of customers each day is the same for each day that passes

12. A system of linear inequalities is shown.

$$\begin{cases} y < \frac{1}{2}x - 10 \\ 6y > 7x + 4 \end{cases}$$

For which y-values does the solution to the given system overlap?

Ⓐ $y < -18$

Ⓑ $y < -16$

Ⓒ $y > 14$

Ⓓ $y > 17$

13. The formula for the surface area of a cylinder is $S = 2\pi r^2 + 2\pi rh$, where S is the surface area, r is the radius, and h is the height of the cylinder. Which equation correctly represents the radius of the cylinder in terms of the surface area and the height?

Ⓐ $r = \frac{-h + \sqrt{h^2 + 2S}}{2}$

Ⓑ $r = \frac{h - \sqrt{h^2 + 2S}}{2}$

Ⓒ $r = -\frac{h}{2} + \frac{\sqrt{(\pi h)^2 + 2\pi S}}{2\pi}$

Ⓓ $r = \frac{h}{2} - \frac{\sqrt{(\pi h)^2 + 2\pi S}}{2\pi}$

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14. A carnival charges an entry fee and a set amount per ride. The cost, including the entry fee, for going on 3, 7, and 10 rides is shown in the table.

Total Cost for the Entry Fee and Rides at a Carnival

Number of Rides	Cost of Fee and Rides (in dollars)
3	21.50
7	39.50
10	53.00

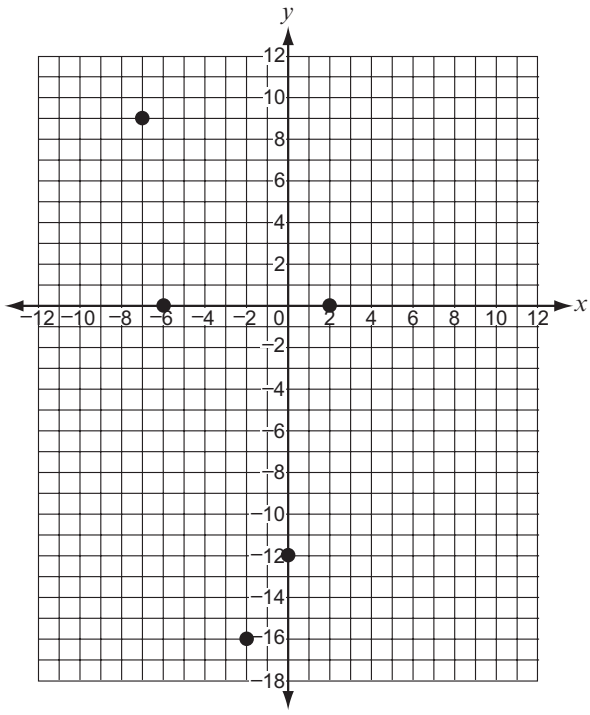
What is the cost per ride at the carnival?

Ⓐ $4.30
Ⓑ $4.50
Ⓒ $5.30
Ⓓ $5.70

15. The first six terms of an arithmetic sequence starting at a_0 are 6.5, 7.75, 9, 10.25, 11.5, and 12.75. What is the explicit rule for finding the nth term of the sequence?

Ⓐ $a_n = 1.25n$
Ⓑ $a_n = n + 6.5$
Ⓒ $a_n = 6.5n + 1.25$
Ⓓ $a_n = 1.25n + 6.5$

16. A scatter plot is shown in the graph.



Which quadratic equation best fits the data?

Ⓐ $y = x^2 - 4x + 12$
Ⓑ $y = x^2 + 4x - 12$
Ⓒ $y = 2x^2 - 4x + 12$
Ⓓ $y = 2x^2 + 4x - 12$

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17. Which expression is equivalent to $(\sqrt{80})(\sqrt{45})$?

Ⓐ $7\sqrt{5}$

Ⓑ $12\sqrt{5}$

Ⓒ 60

Ⓓ 300

18. Elena is buying food for a school picnic and has \$40.00 to spend on sandwiches. She can buy 5 turkey sandwiches and 5 avocado sandwiches for \$40.00, or she can buy 6 turkey sandwiches and 3 avocado sandwiches for \$39.00. Based on the prices of these two options, what is the cost for 1 turkey sandwich and 2 avocado sandwiches?

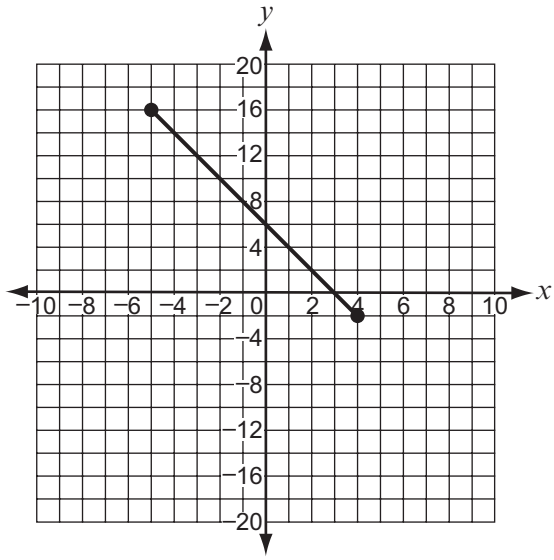
Ⓐ \$8.00

Ⓑ \$11.00

Ⓒ \$13.00

Ⓓ \$16.00

19. A line segment is shown in the graph.



Which statement gives the correct domain and range of the line segment?

Ⓐ The domain is $-5 \leq x \leq 4$, and the range is $-2 \leq y \leq 16$.

Ⓑ The domain is $-2 \leq x \leq 16$, and the range is $-5 \leq y \leq 4$.

Ⓒ The domain is $-5 \leq x < \infty$, and the range is $-2 \leq y < \infty$.

Ⓓ The domain is $-5 \leq x \leq 4$, and the range is $-\infty < y < \infty$.

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20. One hour after departure, an airplane is 2,178 kilometers away from its destination. Three hours after departure, the airplane is 934 kilometers from its destination. If the airplane continues to fly at the same rate toward its destination, which function correctly models the relationship between the distance in kilometers from the airplane's destination, $f(x)$, and the number of hours that have passed since departure, x?

Ⓐ $f(x) = -622x$
Ⓑ $f(x) = -622x + 934$
Ⓒ $f(x) = -622x + 2{,}178$
Ⓓ $f(x) = -622x + 2{,}800$

21. Which is equivalent to the expression $8^{0.5x} \cdot 8^{2x}$?

Ⓐ 8^x
Ⓑ $8^{2.5x}$
Ⓒ 64^x
Ⓓ $64^{2.5x}$

22. What is the solution to $|4x + 2| + 6 \leq 20$?

Ⓐ $x \leq 3$
Ⓑ $x \leq 6$
Ⓒ $-7 \leq x \leq 6$
Ⓓ $-4 \leq x \leq 3$

23. A grocery store owner is comparing the popularity of leafy green vegetables grown using non-organic and organic growing methods. The number of bags of spinach and kale sold in one month are recorded in the chart.

		Growing Method		
		Non-Organic	Organic	Total
Bags Sold	Spinach	175	45	220
	Kale	210	65	275
	Total	385	110	495

What is the joint relative frequency of bags of spinach sold that were grown using organic growing methods?

Ⓐ 9.1%
Ⓑ 13.1%
Ⓒ 20.5%
Ⓓ 40.9%

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24. What is the product of $(16r^2 - 7)(r^3 - 4r + 9)$?

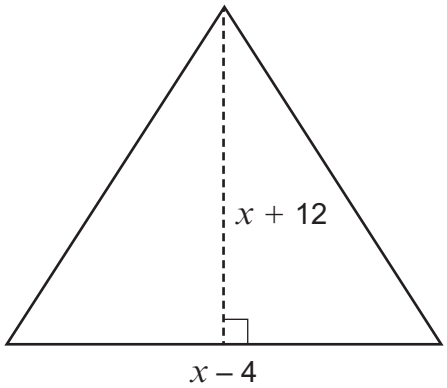
Ⓐ $16r^5 - 71r^3 + 144r^2 + 28r - 63$
Ⓑ $16r^5 - 71r^3 + 144r^2 - 28r + 63$
Ⓒ $16r^5 - 57r^3 + 144r^2 + 28r - 63$
Ⓓ $16r^5 - 57r^3 + 144r^2 - 28r + 63$

25. What is the explicit rule for the nth term of the geometric sequence?

{2, 10, 50, 250, …}

Ⓐ $a_n = 2^{5n-1}$
Ⓑ $a_n = 5^{2n-1}$
Ⓒ $a_n = 2 \cdot 5^{n-1}$
Ⓓ $a_n = 5 \cdot 2^{n-1}$

26. A triangle has the base and height shown.



What is the area of the triangle?

Ⓐ $x^2 - 48$ square units
Ⓑ $\frac{1}{2}x^2 - 24$ square units
Ⓒ $x^2 + 8x - 48$ square units
Ⓓ $\frac{1}{2}x^2 + 4x - 24$ square units

27. The function $f(x) = 80(1.1)^x$ is first reflected over the x-axis and then translated down 8 units. What is the equation for the new function, $g(x)$?

Ⓐ $g(x) = -80(1.1)^x - 8$
Ⓑ $g(x) = -80(1.1)^x + 8$
Ⓒ $g(x) = 80\left(\frac{1}{1.1}\right)^x - 8$
Ⓓ $g(x) = 80\left(\frac{1}{1.1}\right)^x + 8$

28. What is the factored form of the equation $y = 4x^2 + 23x - 35$?

Ⓐ $y = (2x - 5)(2x + 7)$
Ⓑ $y = (2x + 5)(2x - 7)$
Ⓒ $y = (4x - 5)(x + 7)$
Ⓓ $y = (4x + 5)(x - 7)$

29. What is the inverse, y, of the function $f(x) = \frac{9}{7}x + \frac{1}{7}$?

Ⓐ $y = \frac{7}{9}x + 7$
Ⓑ $y = \frac{7}{9}x - \frac{1}{9}$
Ⓒ $y = -\frac{7}{9}x - \frac{1}{9}$
Ⓓ $y = -\frac{9}{7}x - \frac{1}{7}$

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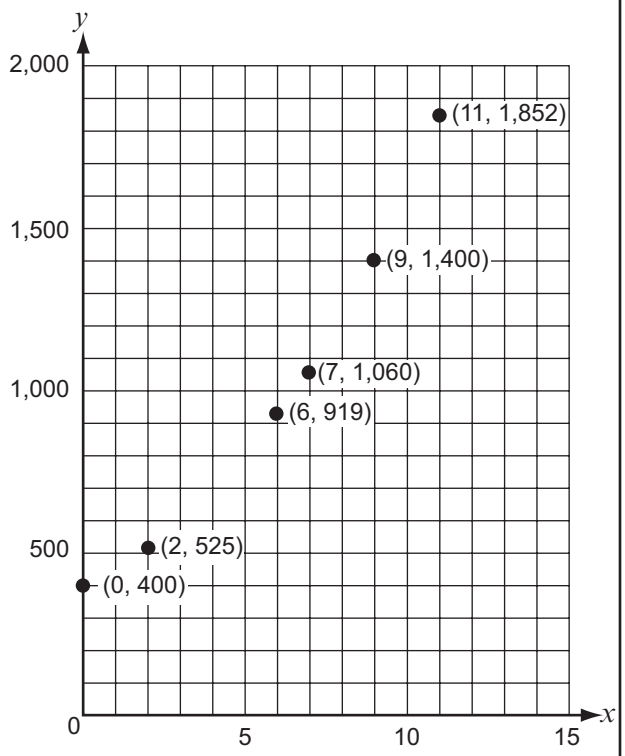
30. A scatter plot is shown.



If an exponential function, $f(x)$, is used to model the data, what is the best estimate for $f(x)$ when $x = 13$?

Ⓐ 2,127
Ⓑ 2,304
Ⓒ 2,446
Ⓓ 2,812

31. Sophia and Marcus are participating in a book drive. Sophia has 24 books by the first Friday of the drive, and she collects 6 more books each following day. Marcus has 52 books by the first Friday of the drive, and he collects 2 more books each following day. How many days after the first Friday of the book drive will the students have the same number of books?

Ⓐ 4
Ⓑ 7
Ⓒ 28
Ⓓ 38

32. What are the coordinates of the vertex for the parabola defined by the function $f(x) = 7\left(x - \frac{4}{5}\right)^2 + 19$?

Ⓐ $\left(\frac{4}{5}, 19\right)$
Ⓑ $\left(-\frac{4}{5}, 19\right)$
Ⓒ $\left(\frac{4}{5}, -19\right)$
Ⓓ $\left(-\frac{4}{5}, -19\right)$

33. In the equation $x^2 + 8x + 2 = (x + 4)^2 + C$, what is the value of C?

Ⓐ -14
Ⓑ -2
Ⓒ 6
Ⓓ 18

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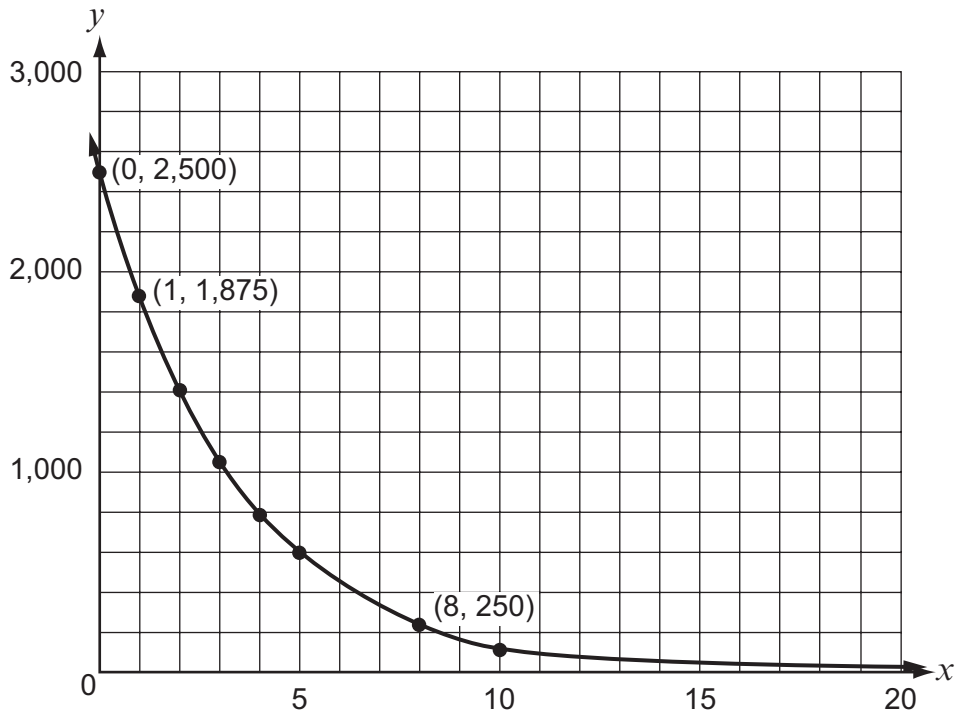
34. Which function is shown in the graph?



Ⓐ $f(x) = 2{,}500(0.25)^x$

Ⓑ $f(x) = 2{,}500(0.75)^x$

Ⓒ $f(x) = 2{,}500(-0.25)^x$

Ⓓ $f(x) = 2{,}500(-0.75)^x$

---

35. A system of equations is shown.

$$\begin{cases} y - x = -4 \\ y = x^2 - 4x - 18 \end{cases}$$

What are the y-values of the ordered pairs that are solutions to the given system of equations?

Ⓐ $y = -7, y = 2$

Ⓑ $y = 7, y = -2$

Ⓒ $y = -3, y = 6$

Ⓓ $y = 3, y = -6$

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