

1 What is the complex conjugate of  $\sqrt{-400} + 17$ ?

- A  $20 - 17i$
- B  $20 + 17i$
- C  $17 - 20i$
- D  $17 + 20i$

2 Which expression is equivalent to  $(14x^2 - 9) + (11x + 6)$ ?

- F  $25x^3 - 15$
- G  $25x^3 - 3$
- H  $14x^2 + 11x - 15$
- J  $14x^2 + 11x - 3$

3 Which expression is equivalent to  $\cos 150^\circ$ ?

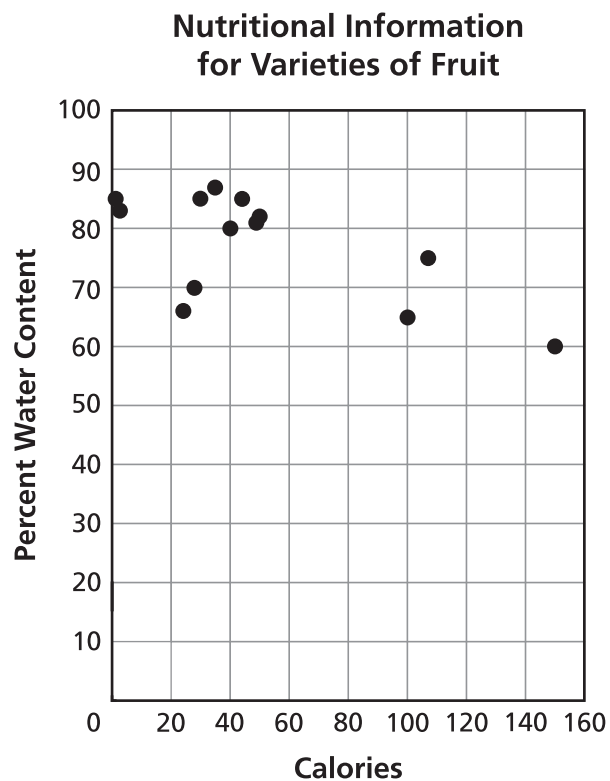
- A  $\cos 30^\circ$
- B  $\cos 330^\circ$
- C  $\cos(-30^\circ)$
- D  $\cos(-210^\circ)$

4 What is the solution set for  $(x + 1)^2 = 49$ ?

- F  $\{-48, 48\}$
- G  $\{-8, 6\}$
- H  $\{-6, 6\}$
- J  $\{-6, 8\}$

- 5 The table and scatterplot below display the calories and water-content percentages for a variety of fruits.

Fruit	Calories per Piece	Water Content
Apple (1 average)	44	85%
Apple (cooked)	35	88%
Apricot	30	85%
Avocado	150	60%
Banana	107	75%
Blackberries (each)	1	85%
Blueberries (100 g)	49	81%
Cherry (each)	2.4	83%
Clementine	24	66%
Damson	28	70%
Grapes (100 g) seedless	50	82%
Grapefruit	100	65%
Mango	40	80%



Which value is the best estimate for the correlation coefficient?

- A  $-0.99$
- B  $-0.65$
- C  $0.65$
- D  $0.99$

- 6 Which table of values best represents the function below?

$$f(x) = 6(0.2)^x$$

F

$x$	$y$
0	1
0.25	1.05
0.5	1.10
0.75	1.15
1	1.2

G

$x$	$y$
0	0.2
0.25	0.31
0.5	0.49
0.75	0.77
1	1.2

H

$x$	$y$
0	6
0.25	4
0.5	2.7
0.75	1.8
1	1.2

J

$x$	$y$
0	6
0.25	1.2
0.5	0.24
0.75	0.05
1	0.01

- 7 Which is equivalent to  $(2 - 5i)(-2 + 5i)$ ?

- A 21  
B  $-29$   
C  $21 + 20i$   
D  $-29 - 20i$

8 Which expression is equivalent to

$$\frac{x^2 - 9x + 8}{x^2 + 9x + 8} \cdot \frac{x + 8}{8x - 8}$$
 if no

denominators equal zero?

F  $\frac{-(x + 8)}{8x - 8}$

G  $\frac{x - 8}{8(x + 1)}$

H  $\frac{x - 8}{8(x - 1)}$

J  $\frac{x - 1}{8(x + 1)}$

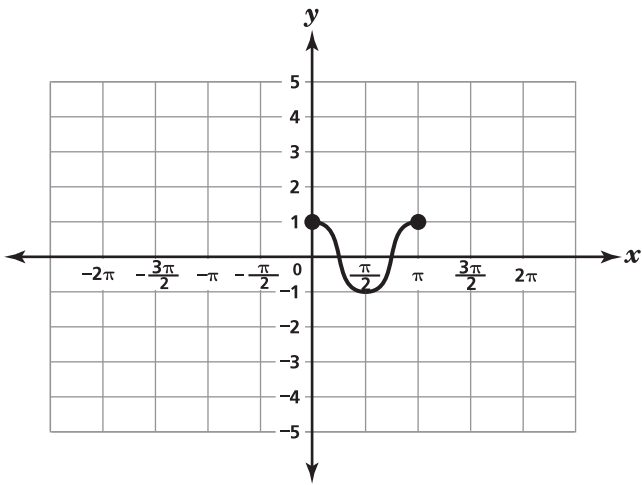
9 The daily high temperatures in degrees Fahrenheit ( $^{\circ}\text{F}$ ) in Chattanooga, Tennessee, for two 1-week periods are listed below.

- 90, 86, 91, 85, 82, 89, 90
- 89, 92, 92, 94, 91, 99, 95

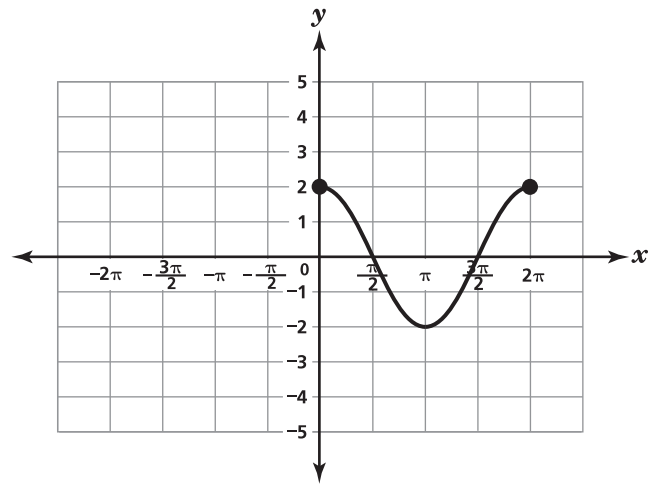
What is the interquartile range for these data over the two weeks?

- A  $3^{\circ}\text{F}$   
B  $5^{\circ}\text{F}$   
C  $10^{\circ}\text{F}$   
D  $13^{\circ}\text{F}$

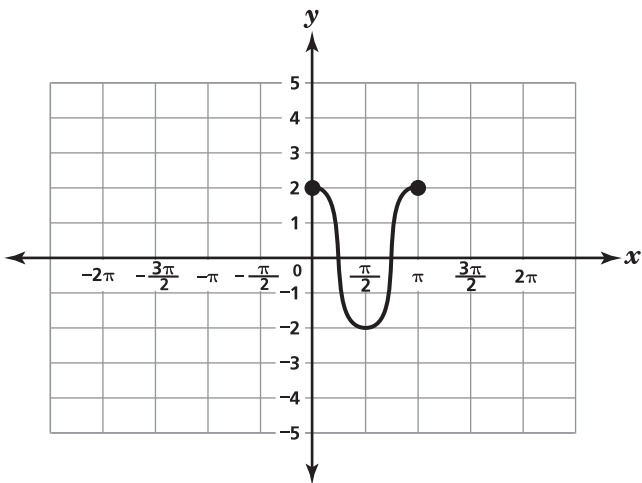
10 Which graph best represents one cycle of  $f(x) = 2 \cos x$ ?



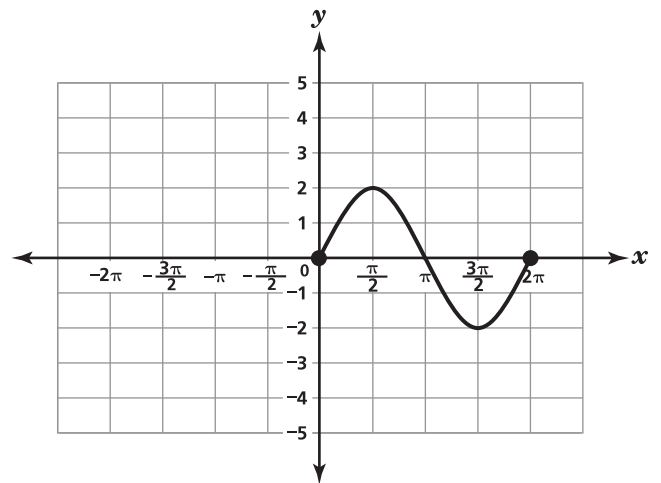
F



H



G



J

- 11** What is the value of  $g(f(-4))$  for these functions?

$$f(x) = x + 6 \text{ and } g(x) = 4x^2$$

- A** 16  
**B** 64  
**C** 70  
**D** 262
- 12** The table shows the amount of oil, in liters, needed to fill a cylindrical can based on the radius, in centimeters, of the can. The height of each can is the same.

**Amount of Oil in Cylindrical Cans**

Radius of Can (in centimeters)	Amount of Oil (in liters)
10	2
15	4.5
20	8
25	12.5

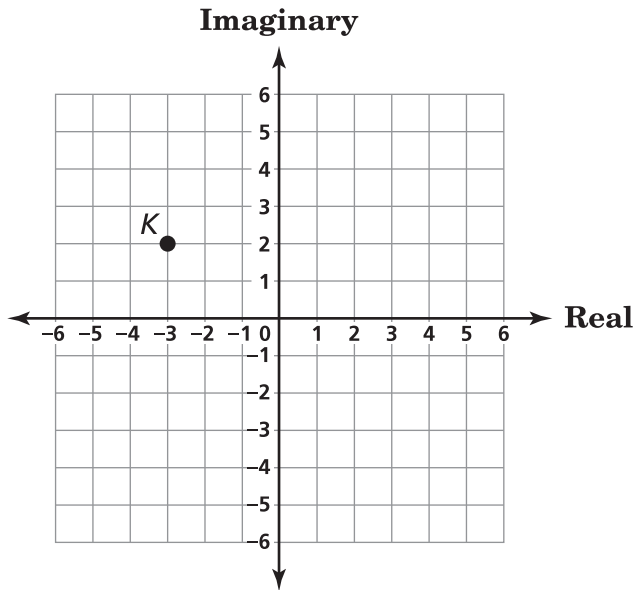
These data are best modeled by which type of function?

- F** cubic  
**G** linear  
**H** quadratic  
**J** logarithmic

- 13** A researcher is studying the effects of aspirin on the sleep patterns of patients. Which scenario describes an observational study?

- A** Find 100 patients who regularly suffer from headaches, 50 of whom regularly use aspirin, and 50 of whom use an alternative medication. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.
- B** Find 100 patients who regularly suffer from headaches. Randomly assign 50 of the patients to an aspirin treatment, and assign the others to an alternative treatment. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.
- C** Find 100 patients who suffer from sleep disorders. Assign 50 of the patients to an aspirin treatment, and assign the others to an alternative treatment. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.
- D** Find 100 patients who regularly take aspirin. Randomly select 50 of the patients to stop their aspirin treatments and to take an alternative medicine instead. Over a 2-month period, collect data on the sleep patterns of the 100 patients, analyze the data, and draw conclusions.

- 14** The grid below represents a complex plane.



Which complex number is best represented by Point  $K$ ?

- F**  $-3 + 2i$
- G**  $-2 + 3i$
- H**  $3 - 2i$
- J**  $2 - 3i$

- 15** A grocery store manager wants to determine how many servings of fresh fruit her adult customers eat per day. She randomly surveys adult customers in the produce aisle of her store about their eating habits. Which statement best explains why her survey could be biased?

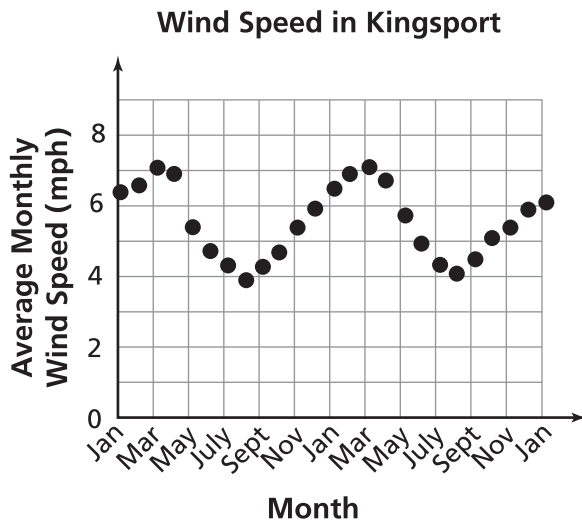
- A** The sample does not include children.
- B** The produce aisle contains more than just fresh fruit.
- C** Adults who do not eat fresh fruit are less likely to shop in a local grocery store.
- D** Adults who do not eat fresh fruit are less likely to be found in the produce aisle.

- 16** What is the range of the equation below?

$$y = -|x - 8| + 3$$

- F** all real numbers less than or equal to  $-8$
- G** all real numbers less than or equal to  $3$
- H** all real numbers greater than  $-8$
- J** all real numbers greater than  $3$

- 17** A company analyzes wind patterns to determine whether to install windmills in Kingsport, Tennessee, to generate electricity. The graph below shows the average monthly wind speeds in Kingsport over a two-year period.



A function describing this graph is a transformation of the parent sine function,  $y = \sin x$ . Which value is closest to the amplitude of this transformed function?

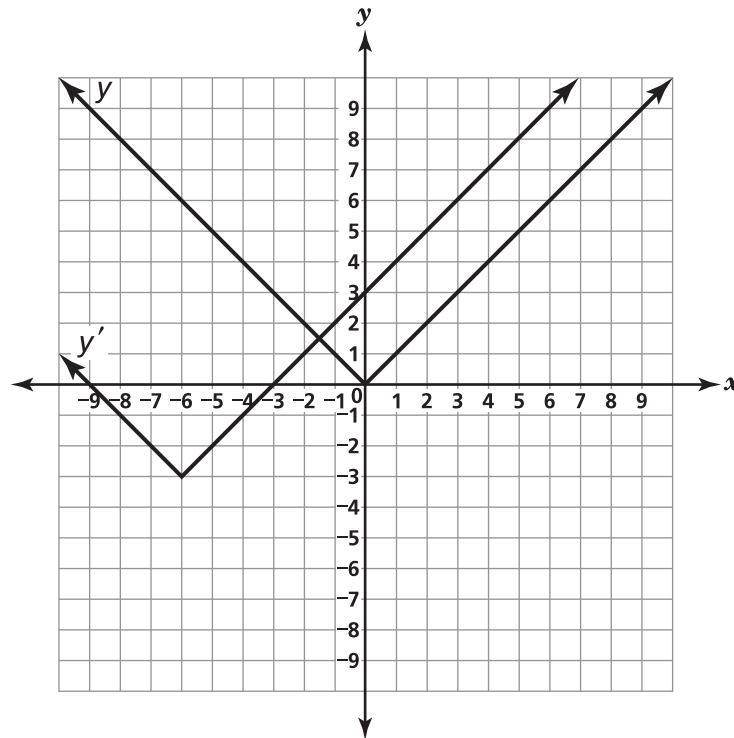
- A** 7.2
- B** 5.6
- C** 3.9
- D** 1.7

- 18** What is the value of  $\sum_{n=3}^8 (15 - 4n)$ ?

- F** -42
- G** -17
- H** 88
- J** 363



- 19 In the grid below, the graph of the equation  $y = |x|$  is transformed to create  $y'$ .



Which equation is best represented by the graph of  $y'$ ?

- A  $y = |x - 6| + 3$
- B  $y = |x + 6| + 3$
- C  $y = |x - 6| - 3$
- D  $y = |x + 6| - 3$

20 Which expression is equivalent to  $(5y - 3)(2y + 5)$ ?

F  $10y^2 + 31y - 15$

G  $10y^2 + 19y - 15$

H  $10y^2 - 19y - 15$

J  $10y^2 - 31y - 15$

21 A building has a square base with an area of 5,625 square feet. A scale model of the building has a base with an area of 0.81 square foot. What is the ratio of the length of the base of the building to the length of the base of the model?

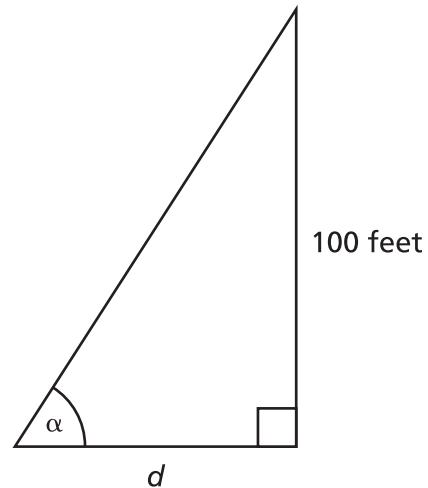
A  $\frac{250}{3}$

B  $\frac{2,500}{27}$

C  $\frac{2,500}{3}$

D  $\frac{62,500}{9}$

22 The figure below represents a tower with a height of 100 feet. It is secured to the ground  $d$  feet from the base of the tower by a wire that makes angle  $\alpha$  with the ground.



Which function can be used to find the distance between the base of the tower and the point at which the wire is attached to the ground?

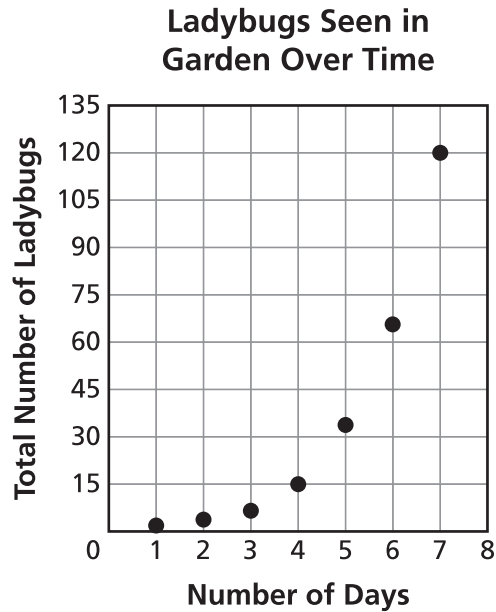
F  $d = 100 \sin \alpha$

G  $d = 100 \cos \alpha$

H  $d = 100 \cot \alpha$

J  $d = 100 \tan \alpha$

- 23 Brittany recorded the total number of ladybugs observed in a garden over a 7-day period. The scatterplot below represents the data she collected.

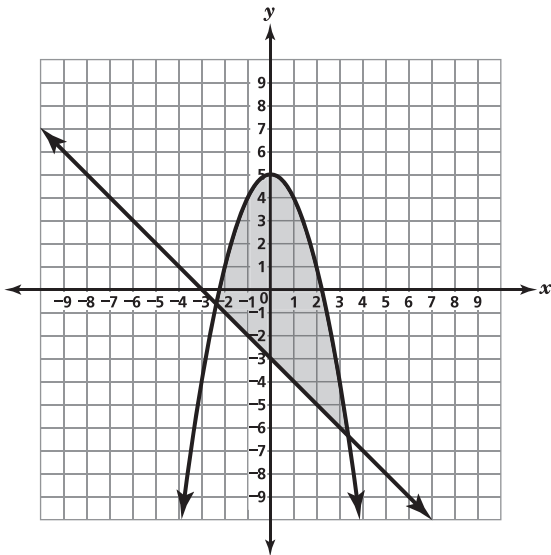


Which type of function do these data points best fit?

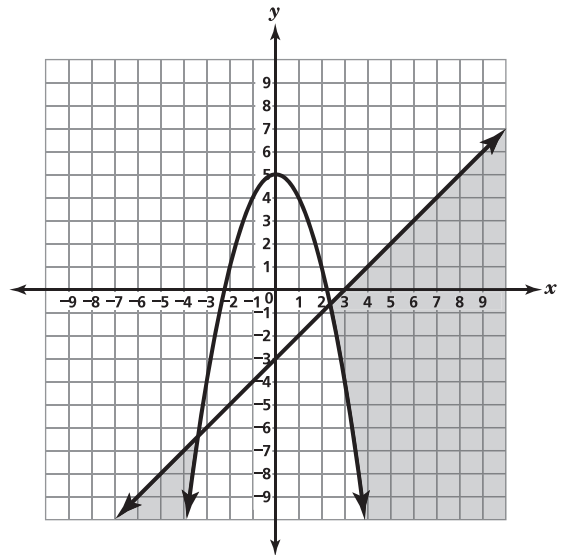
- A cubic
- B exponential
- C linear
- D quadratic

24 Which graph best represents this system of inequalities?

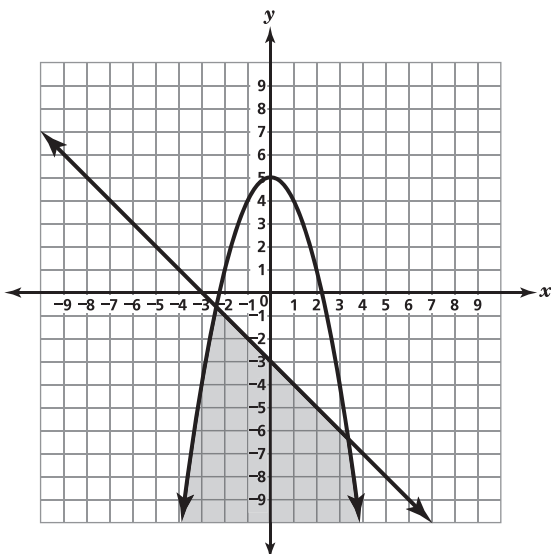
$$\begin{cases} x - y \leq 3 \\ x^2 + y \leq 5 \end{cases}$$



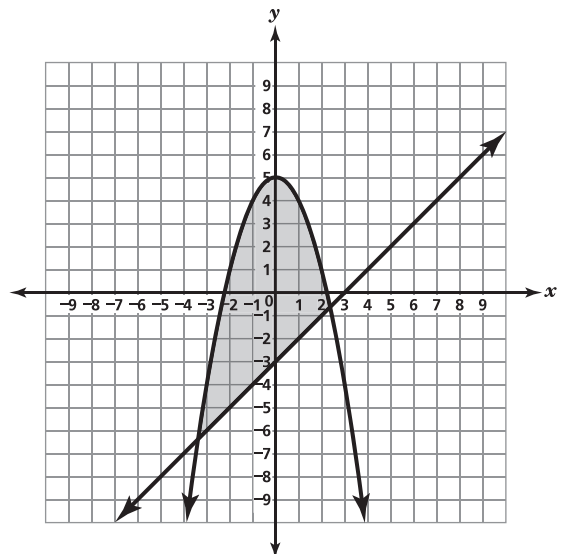
F



H



G

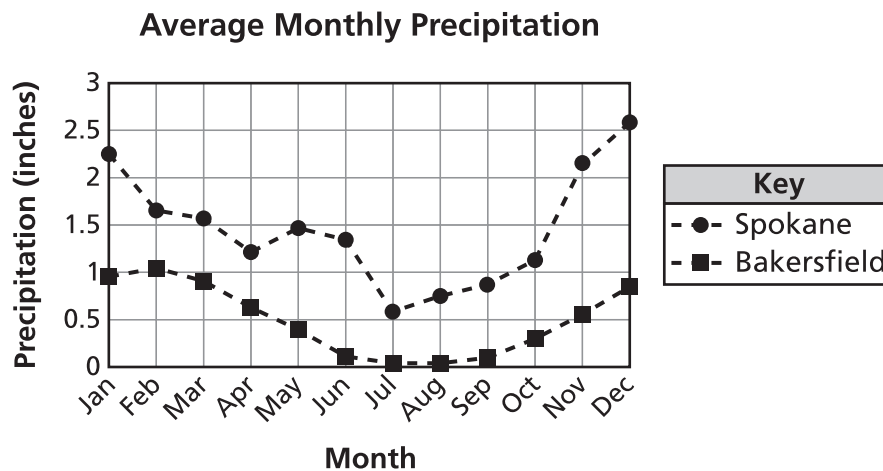


J

25 Which function does not have an inverse function?

- A  $f(x) = 2x + 7$
- B  $f(x) = \sqrt{x} + 12$
- C  $f(x) = \sqrt{-6x + 9}$
- D  $f(x) = 8 - 3x^2$

26 The graph shows average monthly precipitation data for Spokane, Washington, and Bakersfield, California.



Which statement about the data shown is true?

- F Spokane has a greater range of precipitation values than Bakersfield.
- G Bakersfield receives its greatest amount of precipitation in December.
- H Bakersfield has a greater annual average precipitation than Spokane.
- J Spokane receives its greatest amount of precipitation in January.

- 27** Dylan performed an experiment by tossing pennies onto a table. He removed the pennies that landed face-up, recorded the number of pennies remaining, and then tossed the remaining pennies onto the table. The chart below shows the number of pennies Dylan had remaining on the table after 4 tosses.

Penny Tossing Experiment

Number of Tosses, $t$	0	1	2	3	4
Number of Pennies Remaining, $p$	500	232	120	63	30

Which regression equation best fits these data?

- A**  $p = -111t + 411$
- B**  $p = 458t^{\frac{1}{2}}$
- C**  $p = 263t^{-1.4}$
- D**  $p = 485\left(\frac{1}{2}\right)^t$

- 28** A system of equations is given below.

$$2x + y - 3z = -8$$

$$x - 4y + 5z = -13$$

$$x + y + z = -3$$

What is the solution to this system of equations?

- $x = -20$
- F**  $y = 29$   
 $z = -24$
- $x = -5$
- G**  $y = 2$   
 $z = 0$
- $x = 232$
- H**  $y = 377$   
 $z = 87$
- $x = -32$
- J**  $y = 41$   
 $z = -44$

- 29** Javier placed the same three ads in a monthly paper for each of the last 10 months. The monthly number of responses he received to each ad are listed below.

Ad 1: 0, 0, 1, 2, 3, 4, 4, 6, 7, 11

Ad 2: 0, 1, 2, 3, 3, 4, 5, 8, 10, 10

Ad 3: 2, 2, 3, 4, 4, 5, 6, 7, 8, 11

Javier used this information to calculate the interquartile range for each ad. Which lists the ads in order from least to greatest interquartile range?

- A** Ad 1, Ad 2, Ad 3
- B** Ad 1, Ad 3, Ad 2
- C** Ad 3, Ad 1, Ad 2
- D** Ad 3, Ad 2, Ad 1

- 30** Which equation can be used to graph a circle with a radius of 4 and a center at  $(5, -3)$ ?

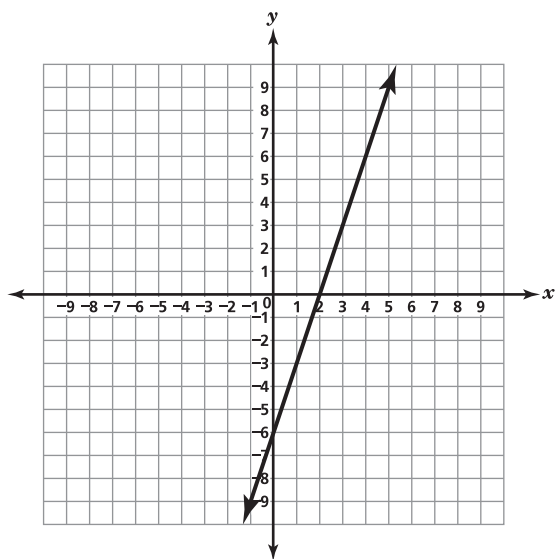
**F**  $(x - 5)^2 + (y + 3)^2 = 4$

**G**  $(x - 5)^2 + (y + 3)^2 = 16$

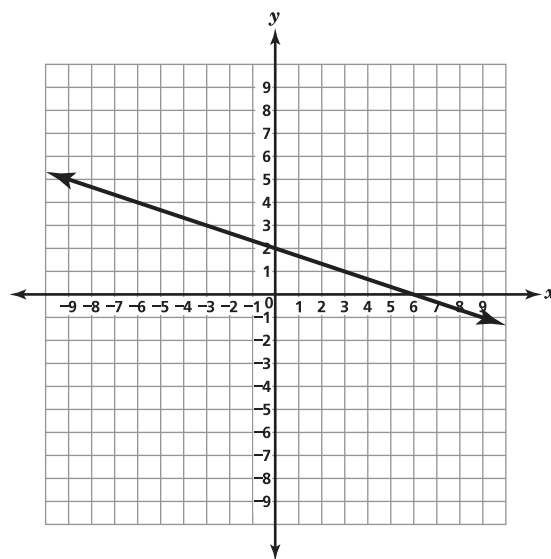
**H**  $(x + 5)^2 + (y - 3)^2 = 4$

**J**  $(x + 5)^2 + (y - 3)^2 = 16$

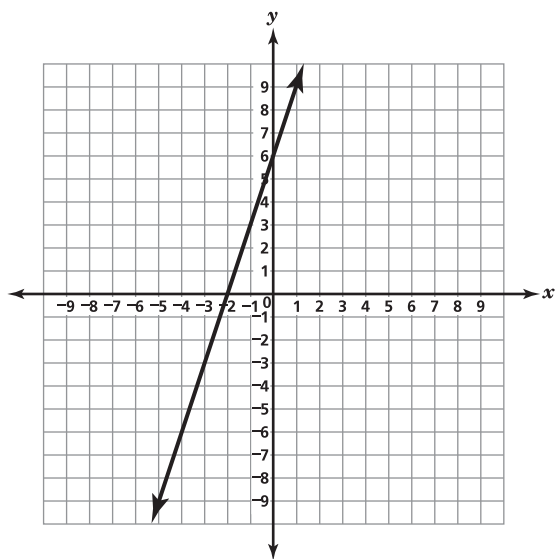
31 Which graph represents the inverse of  $h(x) = -3x + 6$ ?



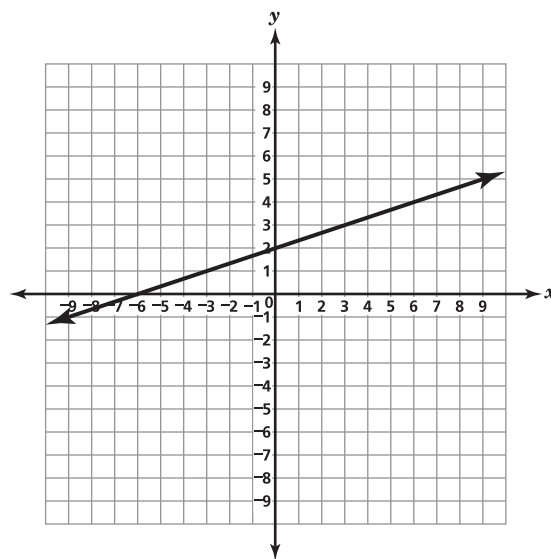
A



C



B



D



**32** A report showed that 20% of the batteries produced in a factory were faulty. What is the probability that a box of 10 batteries produced in this factory will contain exactly 2 faulty batteries?

- F**  $(0.20)^2$
- G**  $(0.20)^2(0.80)^8$
- H**  $2(0.20)^2(0.80)^8$
- J**  $45(0.20)^2(0.80)^8$

**33** In a large neighborhood, the values of the homes are normally distributed with a mean of \$102,000 and a standard deviation of \$17,000. There is a 47.5% probability that the value of a randomly selected home in the neighborhood is greater than \$102,000 and less than  $d$  dollars. Which is closest to the value of  $d$ ?

- A** \$110,075
- B** \$119,000
- C** \$125,750
- D** \$136,000

**34** The table shows carbon dioxide concentration levels measured at Mauna Loa, Hawaii.

**Atmospheric Carbon Dioxide  
at Mauna Loa**

Year	Carbon Dioxide (in parts per million)
1960	316.9
1970	325.6
1980	338.7
1990	354.2
2000	369.4

Using the line of best fit for these data, which is the best estimation of the carbon dioxide concentration level, measured in parts per million, at Mauna Loa in 2010?

- F** 362
- G** 381
- H** 385
- J** 389

- 35 If  $f(x) = \sqrt{x^2 - 1}$  and  $g(x) = \sqrt{x - 1}$ , which expression represents  $\frac{f(x)}{g(x)}$ , for  $x > 1$ ?

- A  $\sqrt{x}$
- B  $\sqrt{x - 1}$
- C  $\sqrt{x + 1}$
- D  $\frac{1}{\sqrt{x + 1}}$

- 36 The period for a pendulum to complete one swing is  $t$ , the time in seconds. The period can be approximated by the formula  $t = 2\pi\sqrt{\frac{l}{9.81}}$ , where  $l$  is the length of the pendulum in meters. If the period of a pendulum is 2.5 seconds, which is closest to the length of the pendulum?

- F 1.55 meters
- G 3.17 meters
- H 3.90 meters
- J 9.76 meters

- 37 Which value of  $x$  makes this equation true?

$$9(x - 7)^{\frac{4}{3}} = 9$$

- A 1
- B 7
- C 8
- D 34

- 38** Sharan owns stores in both Memphis and Nashville. The number of years of experience for the managers of her stores in the two cities are listed below.

Memphis: 8, 8, 10, 10, 16, 19, 20, 22, 22, 22, 25

Nashville: 11, 11, 13, 13, 15, 17, 18, 19, 20, 20, 21, 25, 26, 28, 28

Which statement about the two sets of data is true?

- F** The median of the data for the Memphis stores is less than the median of the data for the Nashville stores.
- G** The standard deviation for the data for the Memphis stores is greater than the standard deviation of the data for the Nashville stores.
- H** The mean of the data for the Memphis stores is greater than the mean of the data for the Nashville stores.
- J** The interquartile range in the data for the Memphis stores is less than the interquartile range in the data for the Nashville stores.

- 39 What is the solution to the following system of equations?

$$\begin{bmatrix} -3 & 2 & 5 \\ 2 & 7 & 4 \\ 1 & 0 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -9 \\ 5 \\ 2 \end{bmatrix}$$

A  $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} \frac{1}{4} \\ -1 \\ 1 \end{bmatrix}$

B  $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 47 \\ 25 \\ -13 \end{bmatrix}$

C  $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 39 \\ 17 \\ -29 \end{bmatrix}$

D  $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ -1 \\ 1 \end{bmatrix}$

- 40 This table displays the results of an experiment on exponential growth.

$x$	$y$
0	6
1	9.6
2	15.4
3	24.6
4	39.3
5	62.9

Based on these results, which is closest to the value of  $y$  when  $x = -2$ ?

- F -23  
G 0.04  
H 2.34  
J 19

- 41** Sonya and Alex shared their work on the equation  $|2x + 3| = 13$ , as shown below.

Sonya's Work

$$\begin{aligned} |2x + 3| &= 13 \\ -2x + 3 &= 13 \text{ or } 2x + 3 = 13 \\ -2x &= 10 \text{ or } 2x = 10 \\ x &= -5 \text{ or } x = 5 \end{aligned}$$

Alex's Work

$$\begin{aligned} |2x + 3| &= 13 \\ 2x + 3 &= 13 \text{ or } 2x + 3 = -13 \\ 2x &= 10 \text{ or } 2x = -16 \\ x &= 5 \text{ or } x = -8 \end{aligned}$$

Which statement is true?

- A** Alex solved the equation correctly.
- B** Sonya solved the equation correctly.
- C** The only solution for the original equation is 5.
- D** Neither Alex nor Sonya solved the equation correctly.

- 42** What is the inverse of

$$g(x) = \sqrt{5x - 2} + 1, \text{ for all } x \geq \frac{2}{5}?$$

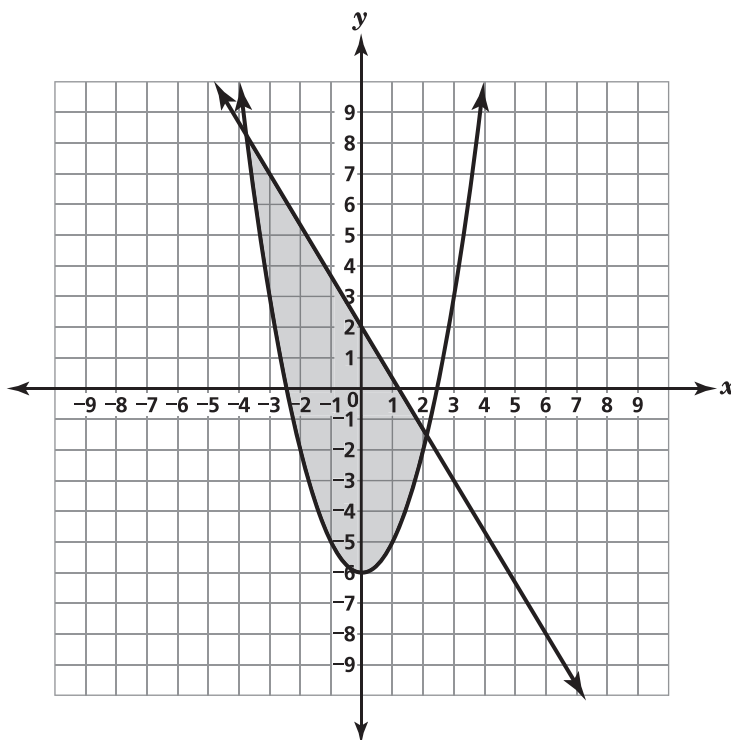
**F**  $g^{-1}(x) = \frac{(x-1)^2 + 2}{5}$

**G**  $g^{-1}(x) = \frac{(x-1)^2}{5} + 2$

**H**  $g^{-1}(x) = \frac{(x+1)^2 - 2}{5}$

**J**  $g^{-1}(x) = \frac{(x+1)^2}{5} - 2$

- 43 Which system of inequalities is best represented by the shaded region of this graph?



- A  $\begin{cases} 3x + 5y \leq 10 \\ x^2 - y \leq 6 \end{cases}$
- B  $\begin{cases} 5x + 3y \leq 6 \\ x^2 - y \leq 6 \end{cases}$
- C  $\begin{cases} 3x + 5y \leq 10 \\ x^2 - y \geq 6 \end{cases}$
- D  $\begin{cases} 5x + 3y \leq 6 \\ x^2 - y \geq 6 \end{cases}$

- 44** The sum of two complex numbers is  $-3 + 5i$ . If one of these complex numbers is  $1 - 8i$ , what is the other number?

**F**  $-4 + 13i$   
**G**  $-4 - 3i$   
**H**  $-2 + 13i$   
**J**  $-2 - 3i$

- 45** If  $g \neq 0$  and  $h \neq 0$ , which expression represents this quotient?

$$\frac{15g^8h^4 - 18g^8h^2 + 15g^5h^3}{3g^5h^2}$$

**A**  $5g^3h^2 - 6g^3 + 5h$   
**B**  $5g^3h^2 - 6g^3h + 5gh$   
**C**  $12g^3h^2 - 15g^3 + 12h$   
**D**  $12g^{13}h^6 - 15g^{13} + 12h^5$

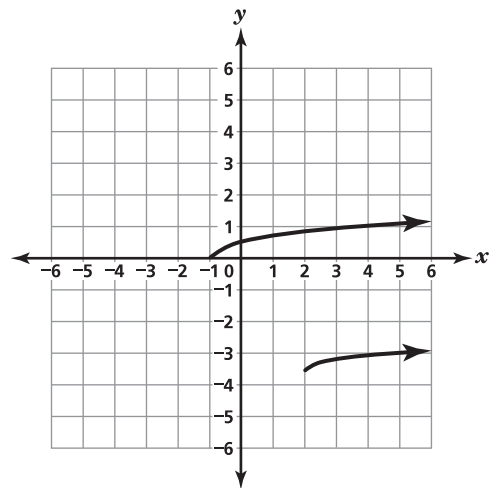
- 46** Which ordered pair is a solution to this system of equations?

$$y = x^2 - 6x + 11$$

$$y = -3x + 9$$

**F** (6, 1)  
**G** (4, 0)  
**H** (2, 3)  
**J** (1, 0)

- 47** The graph of the equation  $y = \log(2x + 3)$  is translated right 3 units and down 3.5 units to form a new graph. Which equation best represents the new graph?

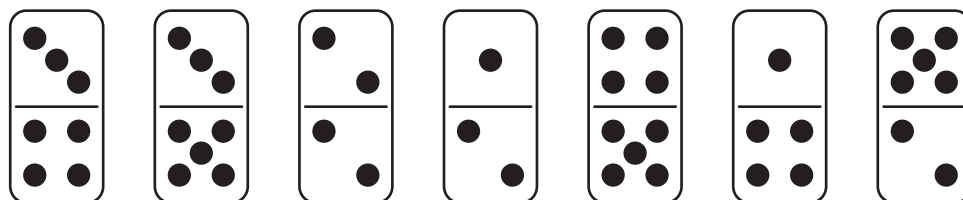


**A**  $y = \log(2x + 9) + 3.5$   
**B**  $y = \log(2x + 9) - 3.5$   
**C**  $y = \log(2x - 3) + 3.5$   
**D**  $y = \log(2x - 3) - 3.5$

- 48** What is the value of  $\sum_{k=2}^6 -8\left(\frac{1}{2}\right)^k$ ?

**F**  $-3.875$   
**G**  $-0.125$   
**H** 3,280  
**J** 4,096

- 49 Carlos is playing a game using tiles. Each tile is divided into two groups of dots. He needs to select a tile with a group of 3 dots or a group of 5 dots to be able to play. The tiles he can choose from are shown below.



Carlos will randomly select one tile at a time, without replacement, until he selects a tile with either a group of 3 dots or a group of 5 dots. What is the probability that he will need to select a total of 4 tiles in order to play?

- A  $\frac{3}{7}$
- B  $\frac{5}{11}$
- C  $\frac{1}{35}$
- D  $\frac{3}{32}$



**50** Which set contains all the real numbers

that are not part of the domain of

$$f(x) = \frac{x + 4}{x^2 + 4x - 32}?$$

- F** {8}
- G** {-4}
- H** {-4, 8}
- J** {-8, 4}

**51** The principal of an elementary school that has a total of 650 students wants to determine which cereal is preferred among the students. Which method of data collection will give the most accurate results?

- A** assign a number to each student in the library and ask which cereal is preferred
- B** assign a number to each student and ask every third grader with a number that is a multiple of 5 which cereal is preferred
- C** assign a number to each classroom and ask all students in 1 selected classroom per grade level which cereal is preferred
- D** assign a number to each classroom and ask the girls in 5 selected classrooms which cereal is preferred

**52** Which expression is equivalent to

$$\frac{y^{\frac{1}{2}}}{8x^{\frac{4}{3}}} \div \frac{x^{\frac{1}{3}}y^{\frac{5}{2}}}{6} \text{ for all } x, y \neq 0?$$

**F**  $\frac{1}{2x^{\frac{5}{6}}y^2}$

**G**  $\frac{3}{4x^{\frac{5}{3}}y^2}$

**H**  $\frac{3y^2}{4x^9}$

**J**  $\frac{y^3}{48x^4}$

53 Which is a correct binomial expansion of  $\left(x^{20} + \frac{1}{4}x^5\right)^4$ ?

A  $x^{80} + \frac{1}{256}x^{20}$

B  $x^{80} + x^{25} + \frac{1}{256}x^{20}$

C  $x^{80} + x^{65} + \frac{3}{8}x^{50} + \frac{1}{16}x^{35} + \frac{1}{256}x^{20}$

D  $x^{80} + \frac{1}{4}x^{65} + \frac{1}{16}x^{50} + \frac{1}{64}x^{35} + \frac{1}{256}x^{20}$

54 Nancy made the following statement:

The range of  $f(x) = ax + b$  is the set of all real numbers, given  $a$  and  $b$  are real numbers.

Which produces a counterexample to her statement?

F  $a = 0$

G  $b = 0$

H  $a < 0$

J  $b < 0$

55 Three friends paid the same price per pound for each type of fruit. The number of pounds (lb) of each type of fruit bought and the total price paid by each friend are shown below.

- Rosa bought 2 lb of bananas, 3 lb of peaches, and 1 lb of grapes for \$5.94.
- Zack bought 1 lb of bananas, 2 lb of peaches, and 1 lb of grapes for \$4.56.
- Kim bought 1 lb of bananas and 1 lb of grapes for \$2.78.

What was the price per pound for the bananas, peaches, and grapes they bought?

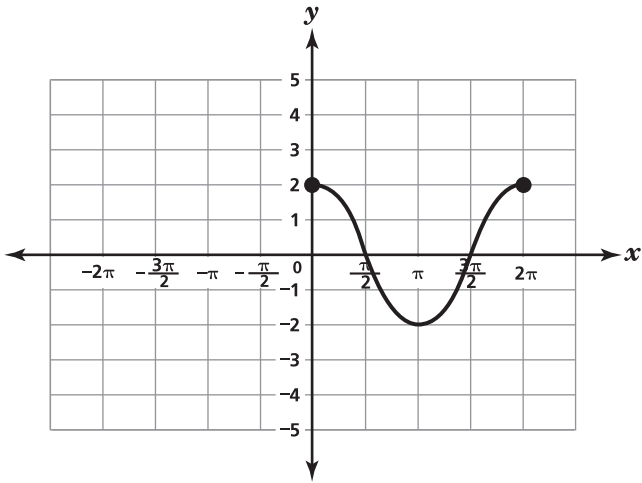
A bananas: \$0.75; peaches: \$0.85; grapes: \$1.89

B bananas: \$1.09; peaches: \$0.69; grapes: \$1.69

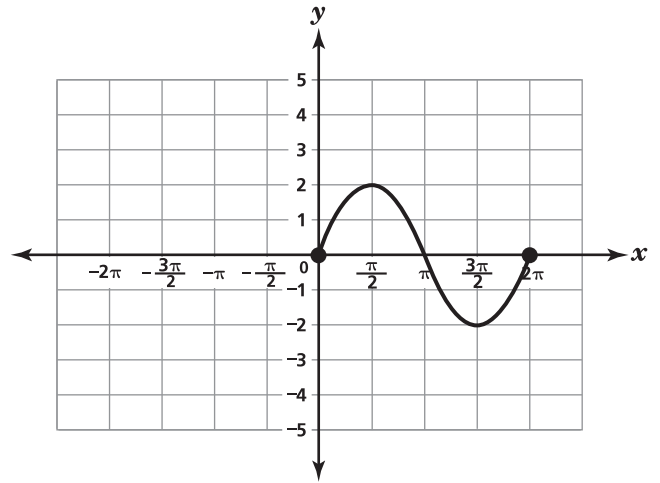
C bananas: \$1.39; peaches: \$0.89; grapes: \$1.39

D bananas: \$0.49; peaches: \$0.89; grapes: \$2.29

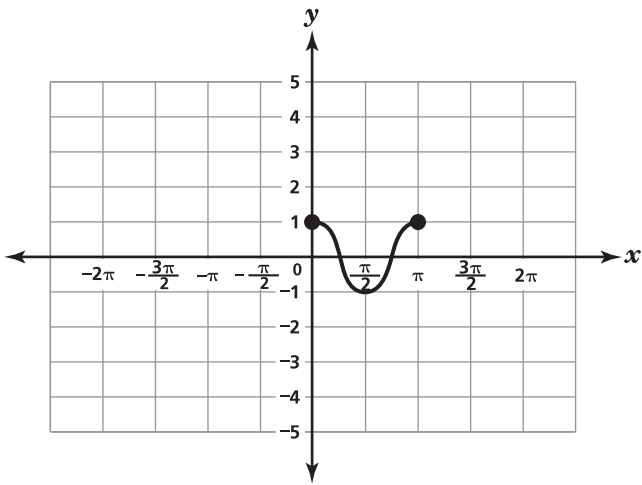
56 Which graph best represents one cycle of  $y = \cos 2x$ ?



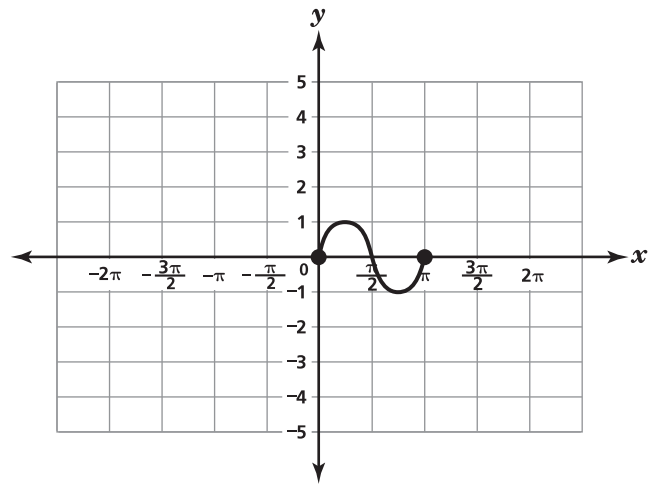
F



H



G



J

- 57** The scores from a math quiz are shown in the table.

Math Quiz Scores

Score	Frequency
10	1
20	3
30	7
40	10
50	4

Which is closest to the value of the standard deviation of these scores?

- A** 105.0  
**B** 35.2  
**C** 10.2  
**D** 5.9
- 58** Which is equivalent to  $(8 - 12i) - (-1 + 2i)$ ?
- F**  $9 - 10i$   
**G**  $9 - 14i$   
**H**  $7 - 10i$   
**J**  $7 - 14i$

- 59** Simplify  $\frac{9}{x^{-1} + 1}$  for all values of  $x$  for which the expression is defined.

- A**  $\frac{9}{2}$   
**B**  $\frac{9x}{2}$   
**C**  $\frac{9}{x + 1}$   
**D**  $\frac{9x}{x + 1}$

- 60 A researcher used a linear regression of the data in this table to determine the relationship between a city's distance from the equator and its average maximum temperature in January.

City	Distance from Equator (miles)	Temperature (°C)
Madrid, Spain	2,781	9
Tokyo, Japan	2,454	8
Guatemala City, Guatemala	1,005	23
New Delhi, India	1,965	21
Oslo, Norway	4,130	-2
Mexico City, Mexico	1,333	19

Which best describes the linear correlation between a city's distance from the equator and its average maximum temperature in January?

- F strong negative correlation
- G strong positive correlation
- H weak negative correlation
- J weak positive correlation

**61** The mileages of the vehicles in a government fleet are normally distributed with a mean of 60,000 miles and a standard deviation of 8,000 miles. If a vehicle from the fleet is randomly selected, which is closest to the probability that the mileage is greater than 44,000 miles?

- A** 0.48
- B** 0.68
- C** 0.95
- D** 0.98

**62** The volume of a cylinder with a radius of  $r$  centimeters and a height that is 3 centimeters shorter than the radius is represented by the function  $V(t)$ .

$$V(t) = \pi r^2(r - 3)$$

What is the range of  $V(t)$  in this situation?

- F** all real numbers
- G** all real numbers less than  $-3$
- H** all real numbers greater than 3
- J** all real numbers greater than 0

**63** What are all the roots of  $x^3 - 3x^2 - x + 3 = 0$ ?

- A** -1 and 1
- B** 1 and 3
- C** -1, 1, and 3
- D** 1, -1, and -3

**64** Which expression must be subtracted from  $(10r - 7)$  to result in  $(3r + 11)$ ?

- F**  $7r - 18$
- G**  $7r - 4$
- H**  $13r - 18$
- J**  $13r + 4$

**65** Which degree measure is equivalent to

$\frac{7\pi}{12}$  radians?

- A**  $210^\circ$
- B**  $105^\circ$
- C**  $30^\circ$
- D**  $15^\circ$