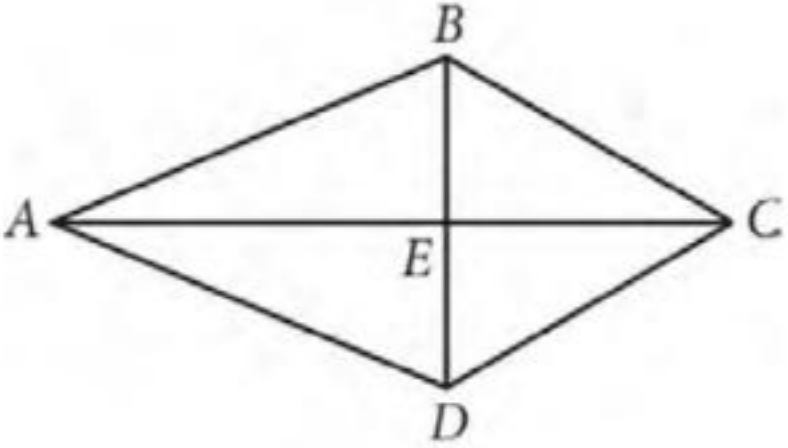
16



In the figure above, $AB = AD$, $BC = CD$, $BE = 2$, $BC = 4$, and $AC = 10$. What is the area of triangle ABD?

A) $40 - 8\sqrt{3}$

B) $30 - 6\sqrt{3}$

C) $20 - 4\sqrt{3}$

D) $10 - 2\sqrt{3}$

30

The expressions $x^2 + bx + 10$ and $(x-3)^2 + c$, where b and c are constants, are equivalent. What is the value of $b + c$?

A) 7

B) 4

C) 3

D) –5

29

$$\frac{1}{3}(x-k)=kx$$

In the given equation, k is a constant. If the equation has no solution, what is the value of k?

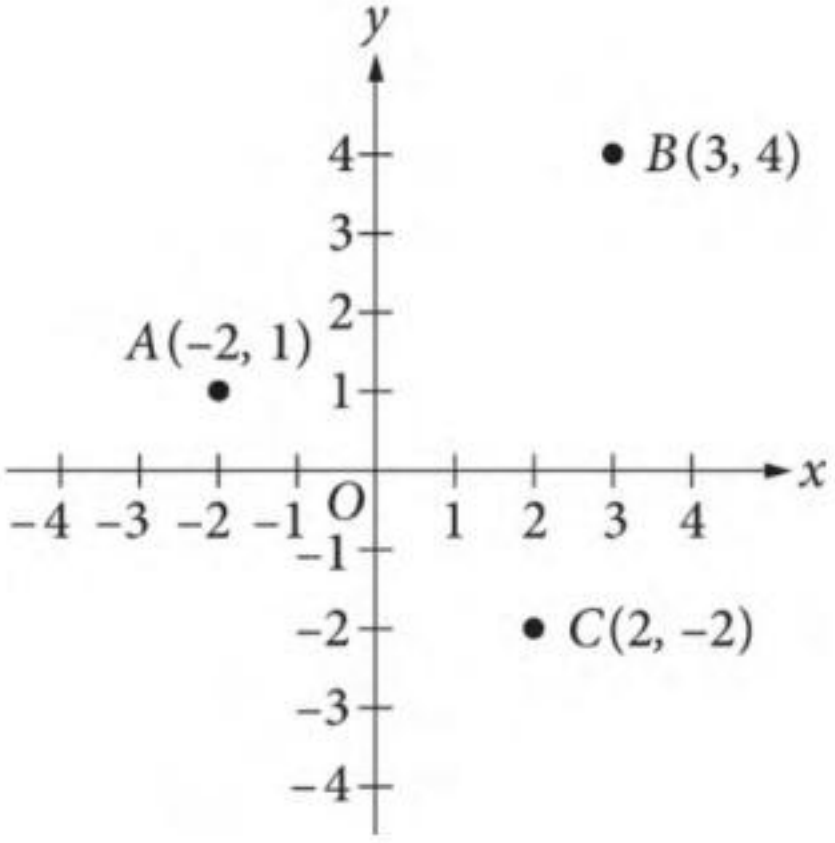
A) -1

B) $-\frac{1}{3}$

C) 0

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

15



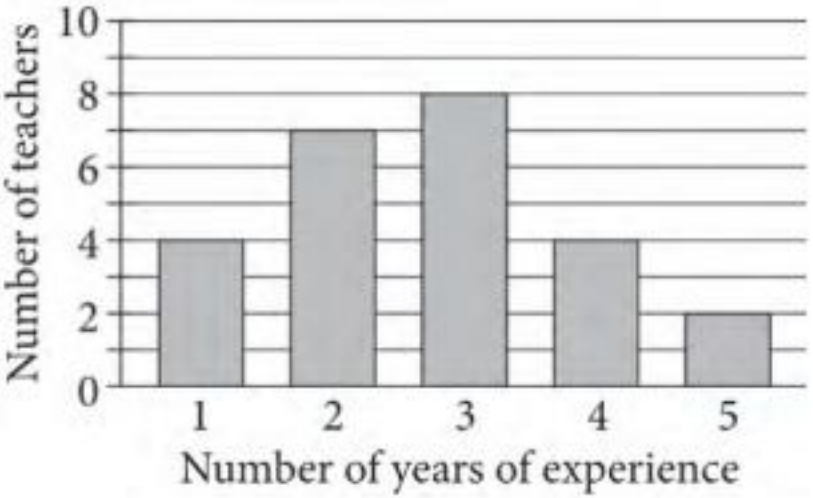
The coordinates of points A, B, and C are shown in the xy-plane above. For which of the following inequalities will each of the points A, B, and C be contained in the solution region?

A) $y > -x - 2$

B) $y \geq -x$

C) $y < x + 3$

D) $x < 3$



The graph above shows the distribution of the number of years of experience for 25 teachers enrolled in an advanced-degree program at a particular university. If a 26th teacher with 2 years of experience is added to the program and to the data set, what will be the effect on the mean and median of the data set?

A) The mean and median will both decrease.

B) The mean and median will both remain the same.

C) The mean will decrease and the median will remain the same.

D) The mean will remain the same and the median will decrease.

18

A sports store had 60 backpacks in stock, some with wheels and some without wheels, before a new shipment of backpacks arrived. The number of wheeled backpacks in the new shipment was twice the number of wheeled backpacks already in stock, and the number of backpacks without wheels in the new shipment was five times the number of backpacks without wheels already in stock. After the new shipment arrived, there were 330 backpacks in the store. Before the shipment, there were x wheeled backpacks and y backpacks without wheels. Which of the following equations can be used with $x + y = 60$ to solve for x and y?

A) $2x + 5y = 330$

B) $2x + 5y = 270$

C) $5x + 2y = 270$

D) $5x + 2y = 330$

14

In the xy-plane, what is the y-coordinate of the y-intercept of the graph of the equation $y = \frac{3x - 12}{x + 2}$?

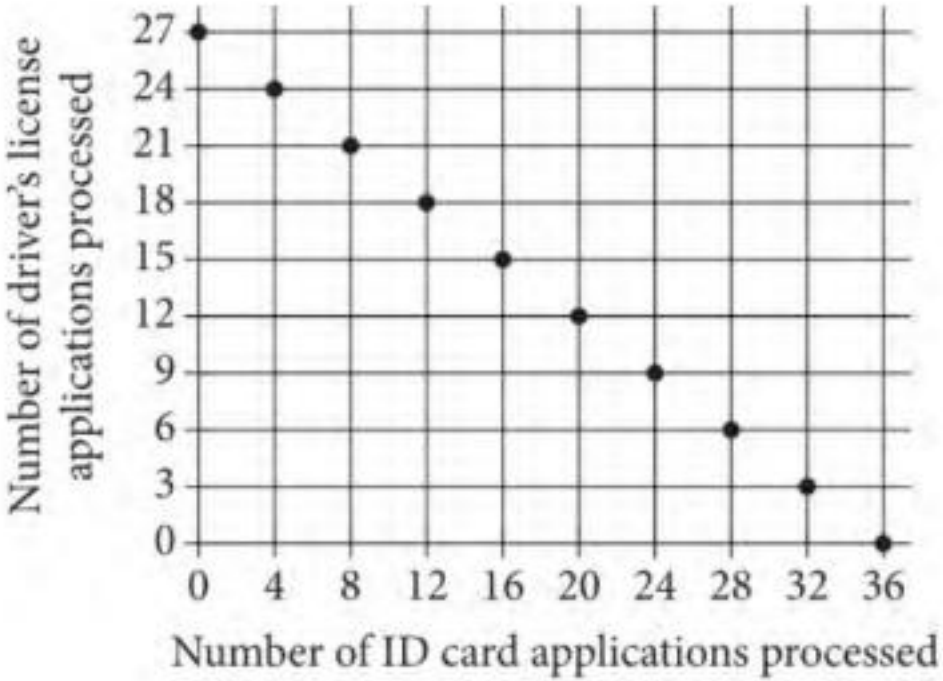
A) -6

B) -2

C) 3

D) 4

13



For her job, Natasha spent a total of n minutes processing ID card applications and driver's license applications. It takes Natasha 15 minutes to process an ID card application and 20 minutes to process a driver's license application. The graph above represents all possible combinations for the number of ID card applications and the number of driver's license applications that Natasha could have processed in the n minutes. What is the value of n?

A) 720

B) 540

C) 420

D) 360

Interval	Frequency
1 to 10	7
11 to 20	5
21 to 30	3
31 to 40	8
41 to 50	2

Each of the 25 data values in a data set is a different integer between 1 and 50, inclusive. The table gives the frequency of the data for five intervals. Which of the following intervals contains exactly $\frac{2}{5}$ of the values in the data set?

A) 1 to 20

B) 11 to 30

C) 21 to 40

D) 31 to 50

Number of activities	Percent of students
None	5%
One	30%
Two	55%
More than two	10%

The table above shows the distribution of the number of extracurricular activities that students at a middle school participate in. If the number of students who participate in two extracurricular activities is 120 more than the number of students who participate in one extracurricular activity, what is the total number of students who attend the middle school?

A) 240

B) 480

C) 600

D) 900

9

Based on the 2010 US census, the population of Milwaukee, Wisconsin, was about 96% of the population of Baltimore, Maryland. In 2010, if Milwaukee's population was about 595,000, which of the following is the best approximation of Baltimore's population?

A) 620,000

B) 570,000

C) 300,000

D) 95,000

10

In 1855, Louis Remme traveled from Sacramento, California, to Portland, Oregon, stopping to rest for only 10 hours of the 143 hours it took him to reach Portland. If his average speed while traveling without resting was 5 miles per hour, how many miles did Louis Remme travel?

A) 665

B) 705

C) 715

D) 765

3

American marsupials and Australian marsupials are two primary groups of marsupials. The table shows the number of species in each order of living marsupial, by group.

Group	Order	Number of species
American	Didelphimorphia	93
	Paucituberculata	6
Australian	Microbiotheria	1
	Dasyuromorphia	71
	Peramelemorphia	24
	Notoryctemorphia	2
	Diprotodontia	137

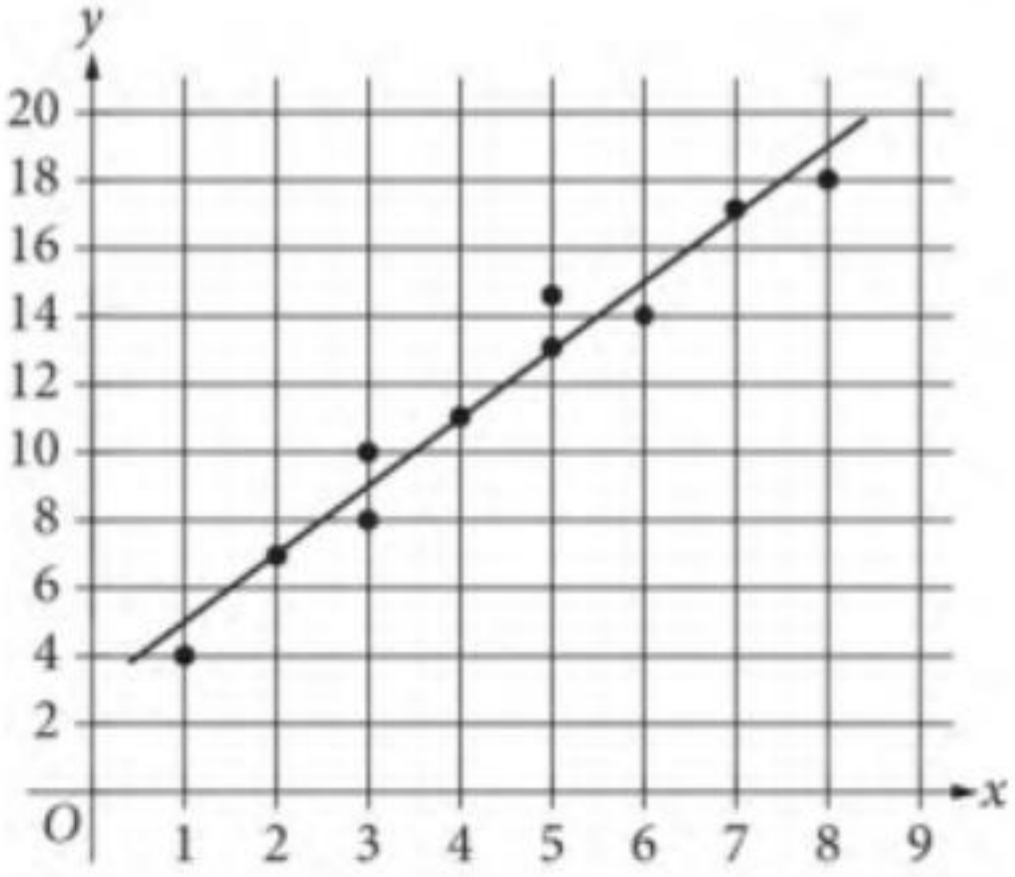
Based on the table, what fraction of the Australian marsupial species are from the order Peramelemorphia?

A) $\frac{24}{211}$

B) $\frac{24}{235}$

C) $\frac{24}{334}$

D) $\frac{235}{334}$



Ten data points are in the scatterplot shown, along with a line of best fit. Which of the following best estimates the predicted value of y when $x = 6.5$?

A) 2

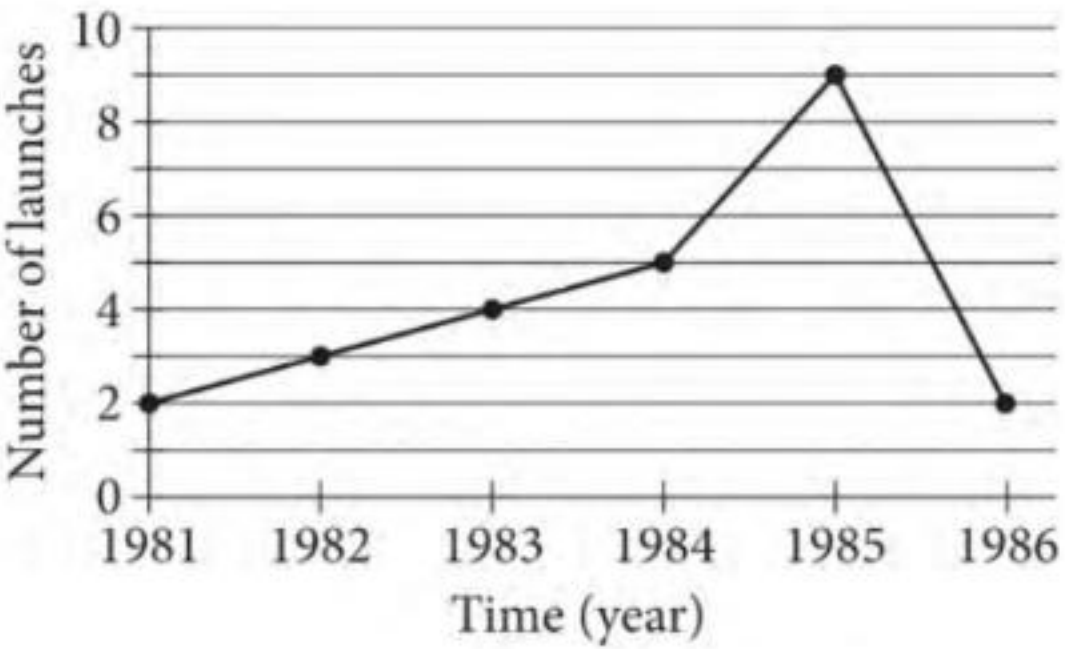
B) 8

C) 13

D) 16

2

The line graph shows the number of space shuttle launches by the United States from 1981 through 1986.



During which year of this time period was the number of space shuttle launches the greatest?

A) 1982

B) 1983

C) 1984

D) 1985

1

If $s = 4$, what is the value of $20s - 15s$?

A) 4

B) 5

C) 15

D) 20

5

What is 120% of 2,000?

A) 240

B) 400

C) 2,400

D) 4,000

6

A field has a perimeter of 960 feet. Of the following, which is closest to the perimeter of the field, in meters? (1 foot = 0.3048 meter)

A) 89

B) 290

C) 3,200

D) 10,000

Speed (km/h)	Pulse (bpm)
4	77
6	87
8	97

The table lists selected values of Sam's walking speed, in kilometers per hour (km/h), and his corresponding pulse, in beats per minute (bpm). There is a linear relationship between Sam's speed, x, and his pulse, $f(x)$. Which of the following equations describes $f(x)$?

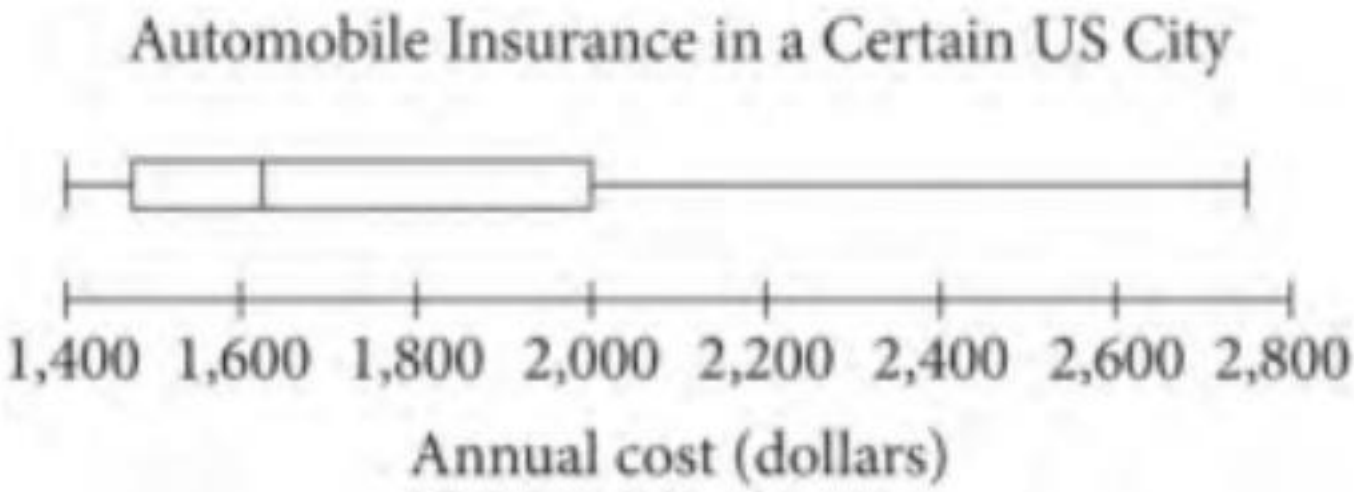
A) $f(x) = x + 57$

B) $f(x) = -x + 97$

C) $f(x) = 5x + 57$

D) $f(x) = -5x + 97$

7



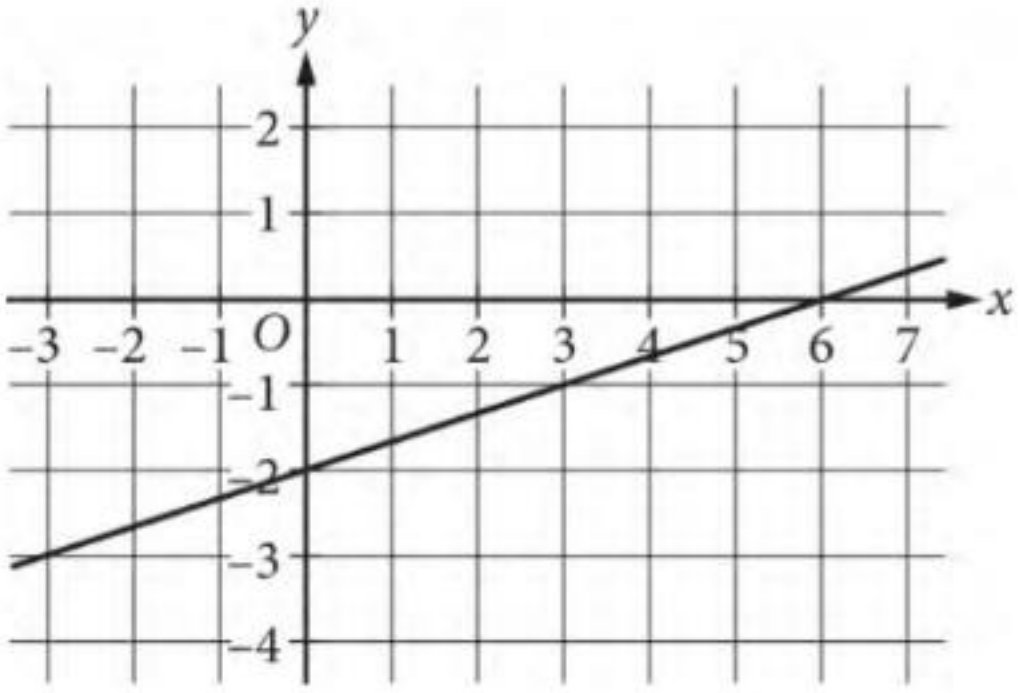
The box plot summarizes the data for the annual cost of automobile insurance for automobile owners in a certain US city. Which of the following could be the median annual cost of automobile insurance for automobile owners in this city?

A) $1,625

B) $2,000

C) $2,100

D) $2,750



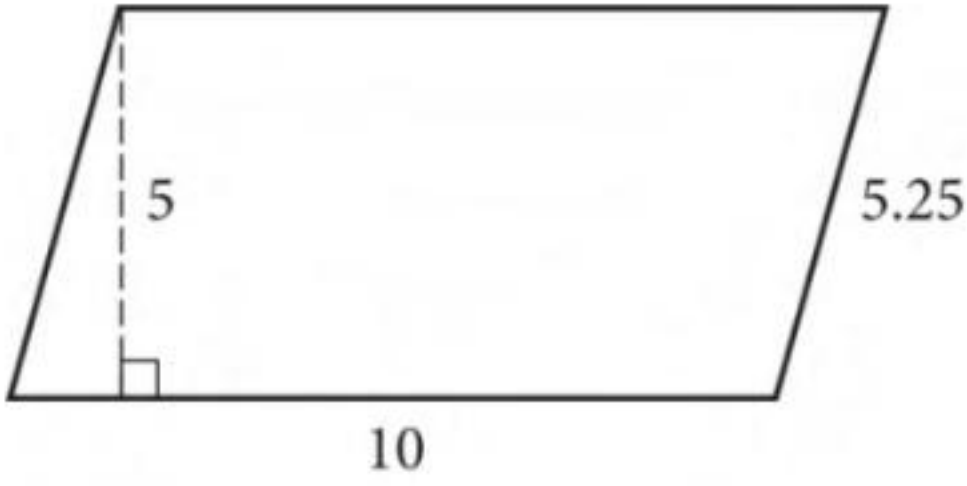
An equation of the graph shown is $ax + by = 6$, where a and b are constants. What is the value of b?

A) -3

B) -1

C) 1

D) 3



The length, in meters, of the sides and the height of a parallelogram are shown in the figure. What is the area, in square meters, of the parallelogram?

The linear function f is defined by $f(x) = cx + d$, where c and d are constants. If $f(50) = 27{,}000$ and $f(100) = 38{,}000$, what is the value of c?

$$W(L) = 0.04(1.22)^L$$

The function W gives the estimated weight $W(L)$, in pounds, of a rainbow trout based on its length L, in inches. Which of the following is the best interpretation of the number 1.22 in this context?

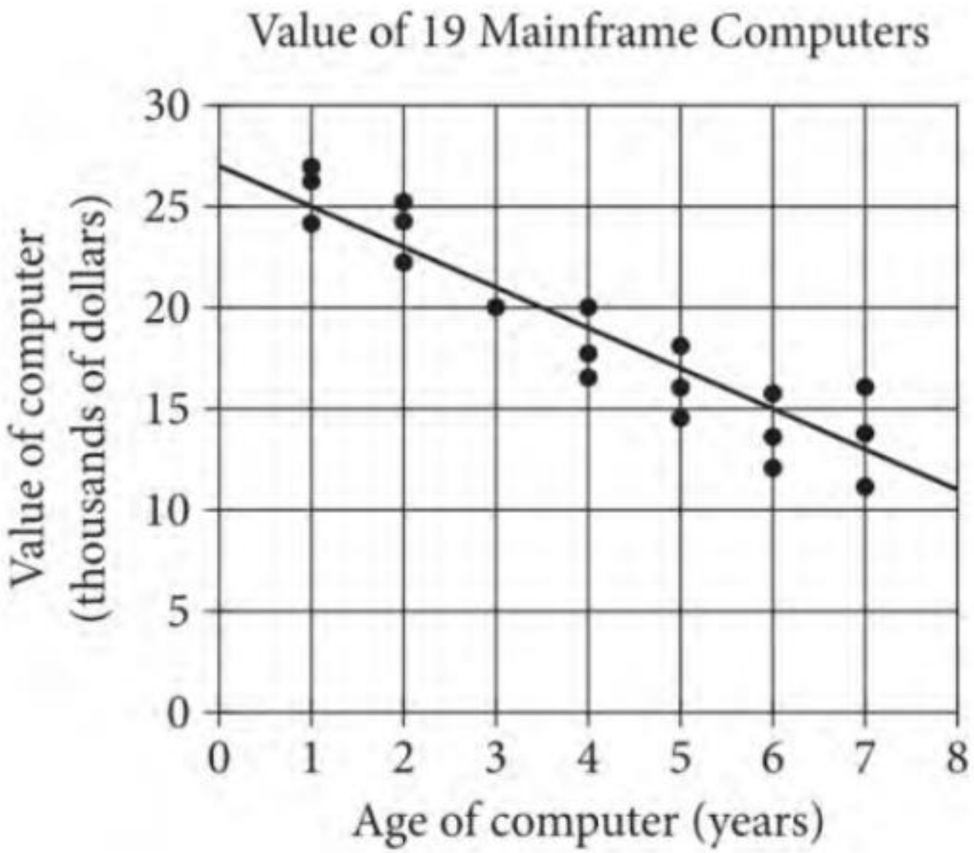
A) For each increase of 1 pound in weight, the estimated length of the trout, in inches, increases by 22%.

B) For each increase of 1 inch in length, the estimated weight of the trout, in pounds, increases by 22%.

C) For each increase of 1 pound in weight, the estimated length of the trout increases by 1.22 inches.

D) For each increase of 1 inch in length, the estimated weight of the trout increases by 1.22 pounds.

Questions 37 and 38 refer to the following information.



A large company has 19 mainframe computers of a certain class. The scatterplot above shows the value and age for each of the 19 computers. A line of best fit for the data is also shown.

38

What is the number of computers for which the line of best fit predicts a value less than the actual value?

Change in Value of 50 Stocks

	Increased in July	Decreased in July	Total
Increased in August	21	9	30
Decreased in August	4	16	20
Total	25	25	50

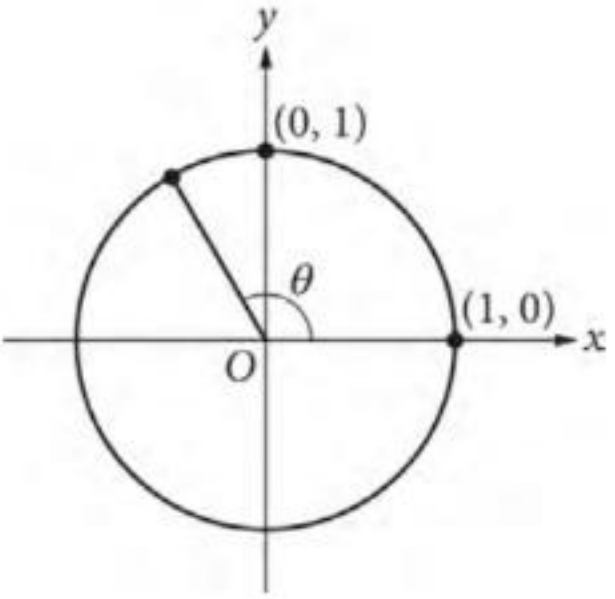
The two-way table categorizes the change in value in July and August for 50 stocks. If one of the stocks that increased in value in August is chosen at random, what is the probability that the stock also increased in value in July?

A) 0.42

B) 0.60

C) 0.70

D) 0.84



In the given figure, θ is an angle. If $\sin\theta = \frac{\sqrt{3}}{2}$, what is $\cos\theta$?

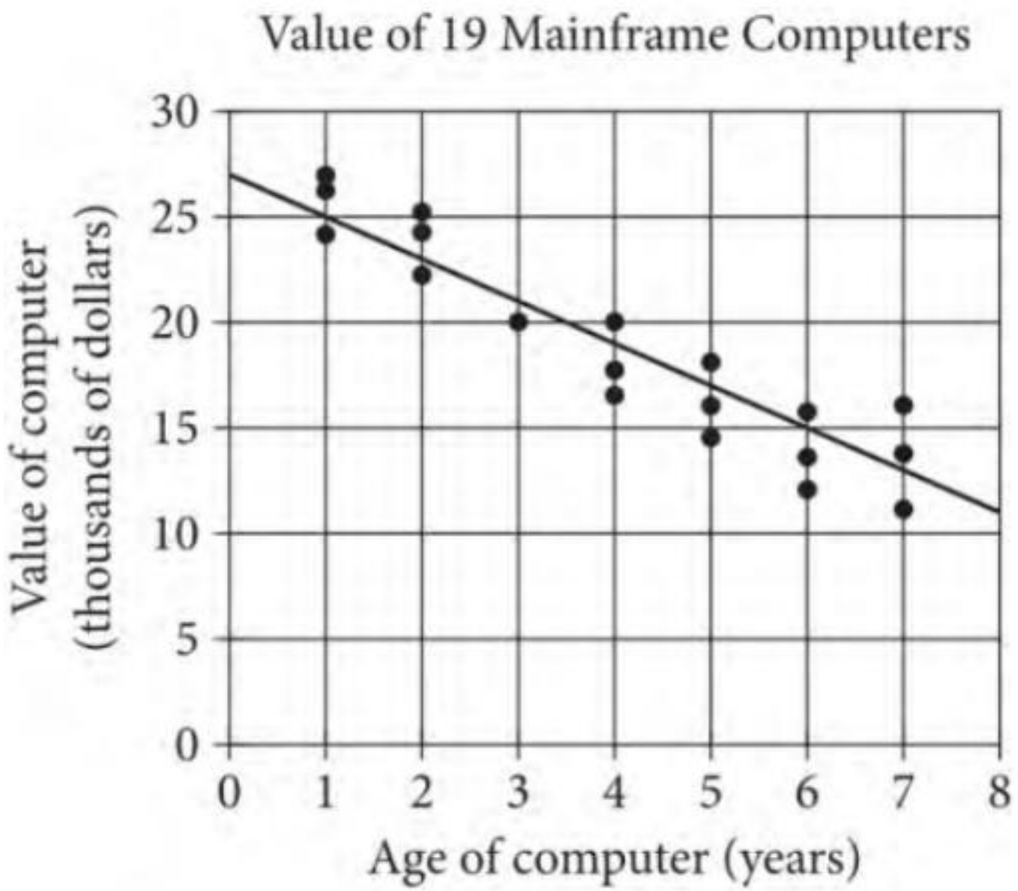
A) $\frac{\sqrt{3}}{2}$

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

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

D) $-\frac{\sqrt{3}}{2}$

Questions 37 and 38 refer to the following information.



A large company has 19 mainframe computers of a certain class. The scatterplot above shows the value and age for each of the 19 computers. A line of best fit for the data is also shown.

37

Based on the line of best fit, the estimated value of a 6-year-old computer is k thousand dollars, where k is an integer. What is the value of k?

33

$$4x + y = 4$$
$$8x + y = 5$$

If (x, y) is the solution of the system of equations above, what is the value of x ?

27

The function f is defined for all real numbers, and the graph of $y = f(x)$ in the xy-plane is a line with a negative slope. Which of the following must be true?

I. If $a < b$, then $f(a) > f(b)$.
II. If $a < 0$, then $f(a) > 0$.
III. If $a > 0$, then $f(a) < 0$.

A) I only

B) II only

C) I and III only

D) II and III only

28

$$y = bx(x - a)(x - a)(x + b)(x - b)$$

In the equation above, a and b are positive constants and $a \neq b$. How many distinct x-intercepts does the graph of the equation in the xy-plane have?

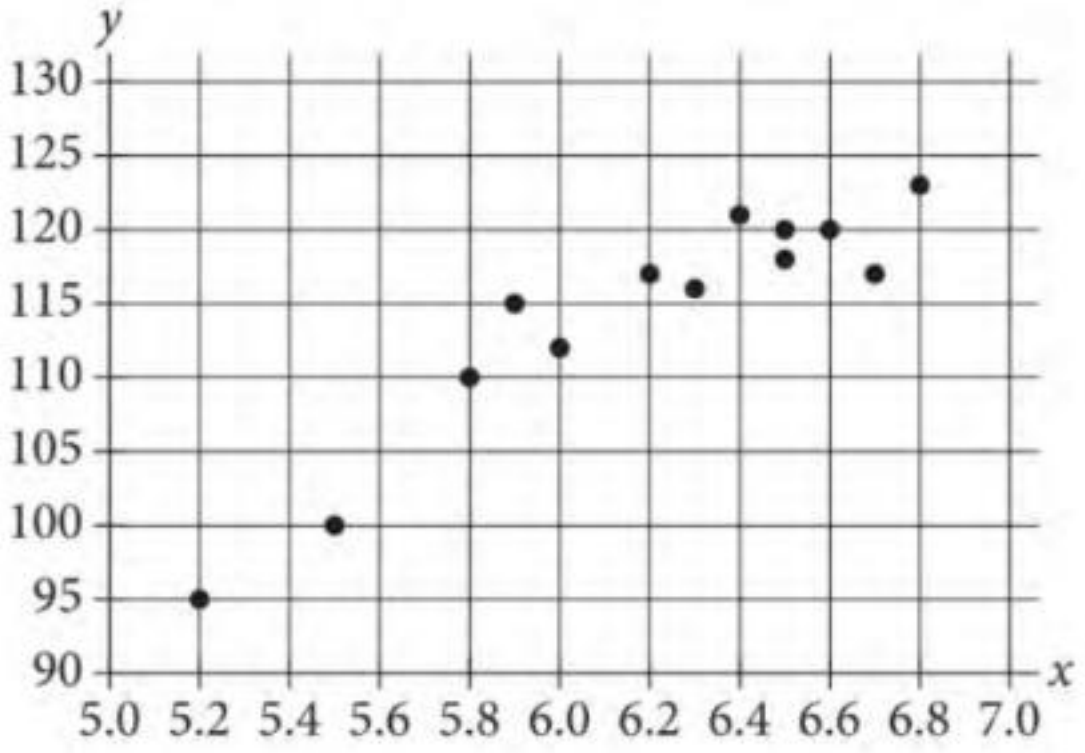
A) Two

B) Three

C) Four

D) Five

One serving of a certain brand of microwave popcorn provides 150 calories, 90 of which are from fat. One serving of a certain brand of low-sodium pretzels provides 120 calories, 12 of which are from fat. How many more calories from fat are provided by a 100-calorie serving of the microwave popcorn than are provided by a 100-calorie serving of the pretzels?



A set of data is represented by the scatterplot in the portion of the xy-plane shown. Which of the following linear equations best fits the data?

A) $y = -15.2 + 1.6x$

B) $y = 15.2 + 1.6x$

C) $y = -15.2 + 16x$

D) $y = 15.2 + 16x$

$$x^2 + bx + 16 = 0$$

In the quadratic equation shown, b is a constant. For what values of b does the equation have only one solution?

A) –4 only

B) –8 only

C) –4 and 4

D) –8 and 8

$$4, 13, 5, 8, R, 5, 11$$

In the data set shown, R is an integer. If the median of the data set is 8 and $R < 11$, what is a possible value of R?

$$(x-3)^4 = 0$$

What value of x makes the equation above true?

25

Minato drove 390 miles. Part of the drive was along local roads, where his average speed was 20 miles per hour, and the rest was along a highway, where his average speed was 60 miles per hour. The drive took 8 hours. What distance, in miles, did Minato drive along local roads?

A) 30

B) 45

C) 90

D) 120

19

$$h(x) = (x - 5)(x + 5)$$

The function h is defined as shown. For what value of x does the function h reach its minimum value?

A) -25

B) -5

C) 0

D) 5