

(12) $x + 33 = y$

$(x + 33)^2 = y$

A solution to the given system of equations is (x, y) . What is a possible value of x ?

- (A) -32
- (B) 0
- (C) 1
- (D) 33

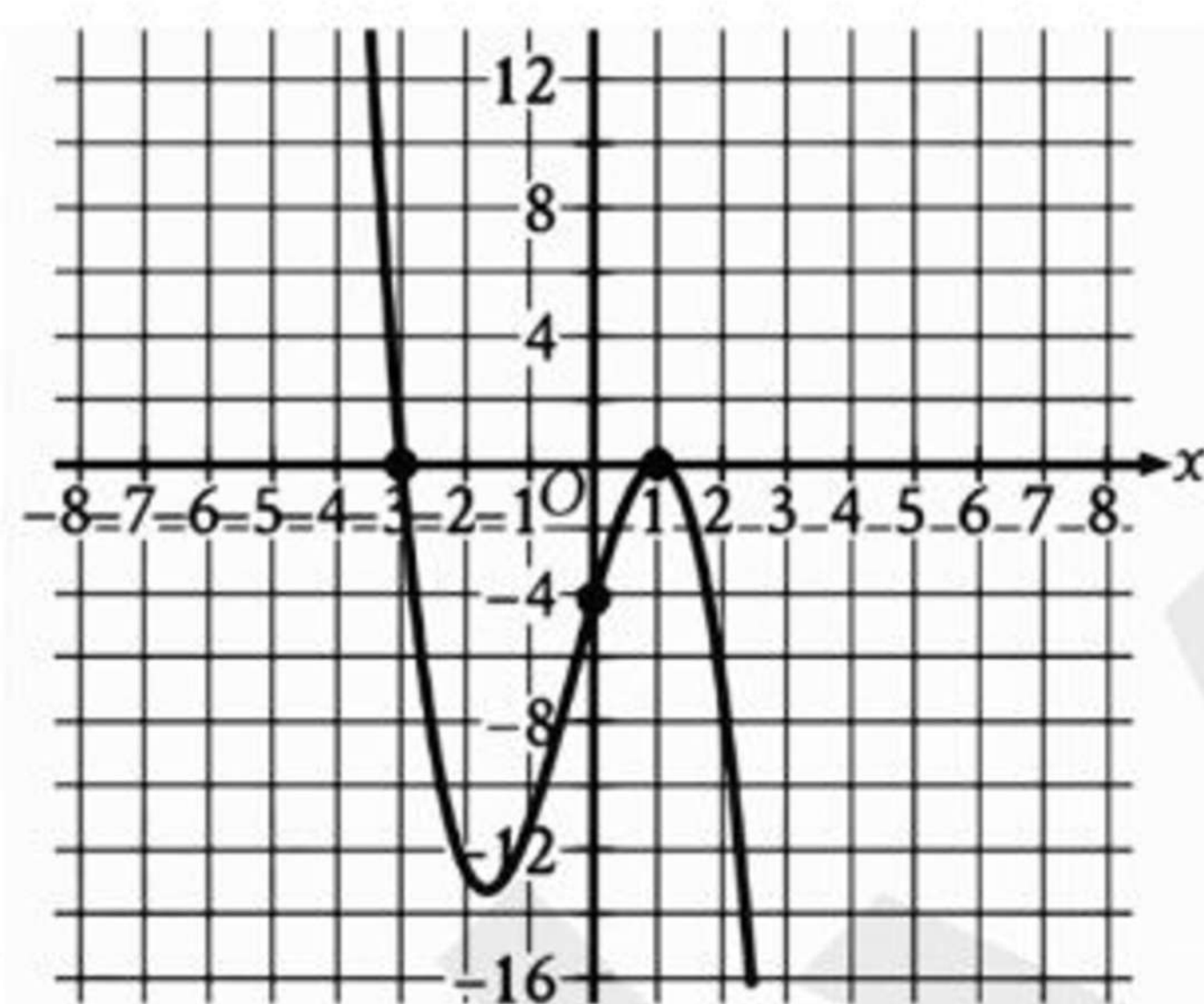
(13) A circle in the xy -plane has the equation $(x - 14)^2 + (y - k)^2 = 36$.

- (A) The center is at $(14, k)$ and the radius is 6 .
- (B) The center is at $(k, 14)$ and the radius is 6 .
- (C) The center is at $(k, 14)$ and the radius is 36 .
- (D) The center is at $(14, k)$ and the radius is 36 .

(14) In the xy -plane, circle M is the graph of the equation $(x - 3)^2 + (y - 6)^2 = 4$.

Circle P has the same center as circle M but has a radius that is twice the radius of circle M . Which equation represents circle P ?

- (A) $(x - 3)^2 + (y - 6)^2 = 8$
- (B) $(x - 3)^2 + (y - 6)^2 = 16$
- (C) $(x - 6)^2 + (y - 12)^2 = 4$
- (D) $(x - 6)^2 + (y - 12)^2 = 8$



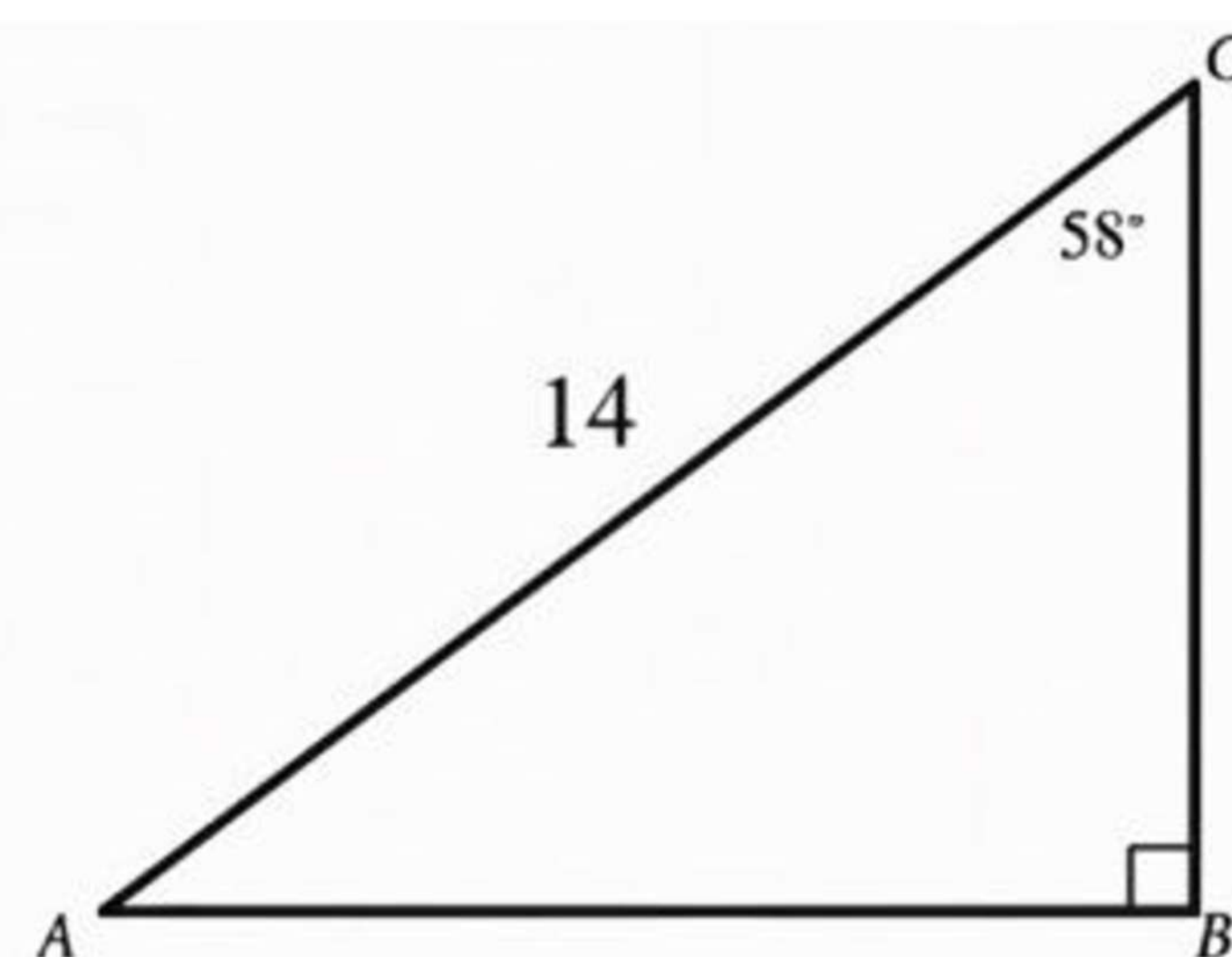
(15)

The graph of $y = f(x)$ is shown where:

$$f(x) = ax^3 + bx^2 + cx + d$$

and a, b, c and d are constants. For how many distinct values of x does $f(x) = 0$?

- (A) One
- (B) Two
- (C) Three
- (D) Four



(16)

Note: Figure not drawn to scale.

Which expression represents the length of line segment AB ?

- (A) $14 \sin 58^\circ$
- (B) $\frac{14}{\sin 58^\circ}$
- (C) $14 \cos 58^\circ$
- (D) $\frac{14}{\cos 58^\circ}$



$$y = a(x - h)^2 + k$$

(h, k)

(17) The town of Fillmore is planning its annual fireworks show.

The equation $y = 16(x - 6.8)^2 + 740$ gives the estimated height y , in feet, of a type of firework x seconds after it is launched into the air. Which of the following is the best interpretation of the vertex of the graph of the equation in the xy -plane?

$(6.8, 740)$
sec ft

- (A) This type of firework reaches an estimated maximum height of 740 feet 16 seconds after it is launched into the air.
- (B) This type of firework reaches an estimated maximum height of 740 feet 6.8 seconds after it is launched into the air.
- (C) This type of firework reaches an estimated maximum height of 16 feet 740 seconds after it is launched into the air.
- (D) This type of firework reaches an estimated maximum height 6.8 feet 740 seconds after it is launched into the air.

(18) The product of a positive number X and the number that is 15 less than X is equal to 286. What is the value of X ?

$$x(x - 15) = 286$$

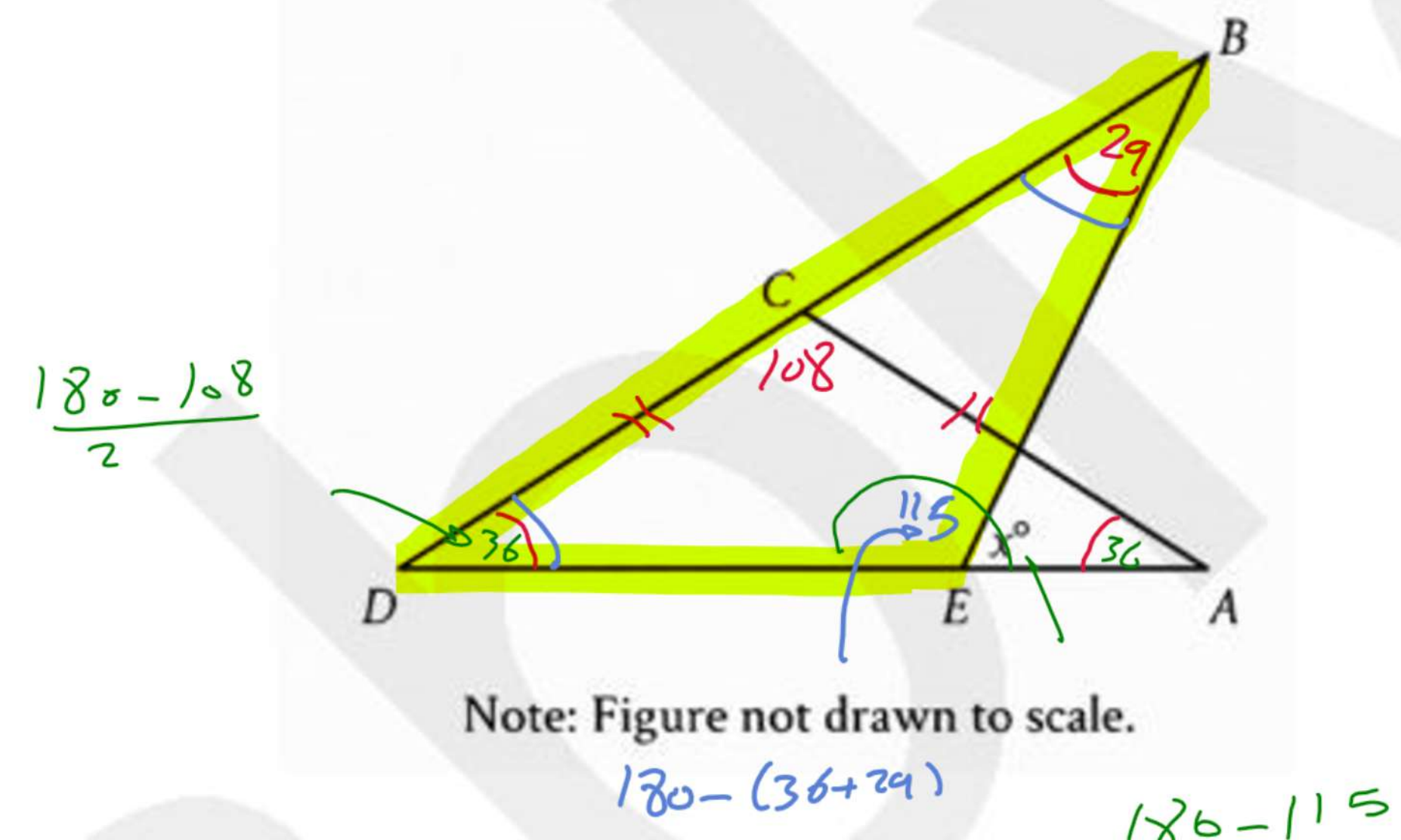
$$x^2 - 15x - 286 = 0$$

Made 53

D

26

(19) In the figure, $AC = CD$. The measure of angle EBC is 29° , and the measure of angle ACD is 108° . What is the value of X ?



65

(20) The positive number a is 2,800% of the number c , and c is 25% of the number b .

If $a - b = wc$, Where w is a constant, what is the value of w ?

$$a = 28c$$

$$a = 2800$$

$$c = 0.25b$$

$$b = 400$$

24

$$2800 - 400 = w(100)$$

shift solve



(21) Line j is defined by $4x + 5y = 55$. Line k is parallel to line j in the xy plane. An equation of line k is $24x + ry = 15$, where r is a constant. If line k passes through the point $(0, b)$, what is the value of b ?

$$\frac{4}{24} = \frac{5}{r}$$

$$r = 30$$

$$24x + 30y = 15$$

$$24(0) + 30b = 15$$

$$\frac{1}{2}$$

$$ax + by = c$$

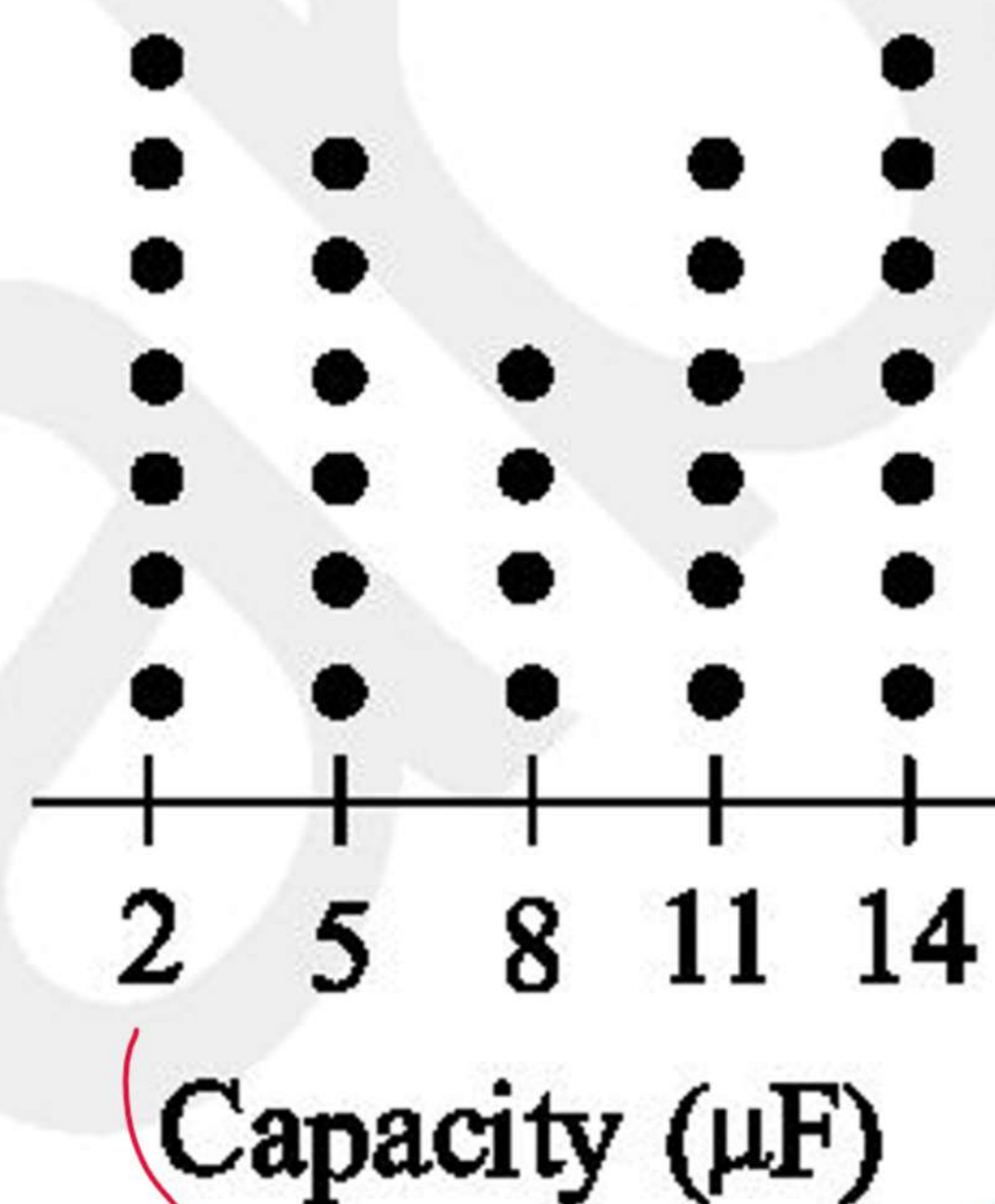
$$dx + ey = f$$

$$0 \quad \frac{a}{d} = \frac{b}{e} //$$

$$1 \quad \frac{a}{d} \neq \frac{b}{e}$$

$$\infty \quad \frac{a}{d} = \frac{b}{e} = \frac{c}{f}$$

(22) The dot plot shows the distribution of capacity for a set of capacitors, set A, which a researcher used for a certain experiment. For another experiment, the researcher used a different set of capacitors, set B. Set B has the same number of capacitors as set A, but the capacity of each capacitor of set B is **17 microfarads (μF) greater than** the capacity of **each** respective capacitor in set A. Which of the following is true about the capacities of the capacitors in set B?



$$31 - 19 = 12$$

$$14 - 2 = 12$$

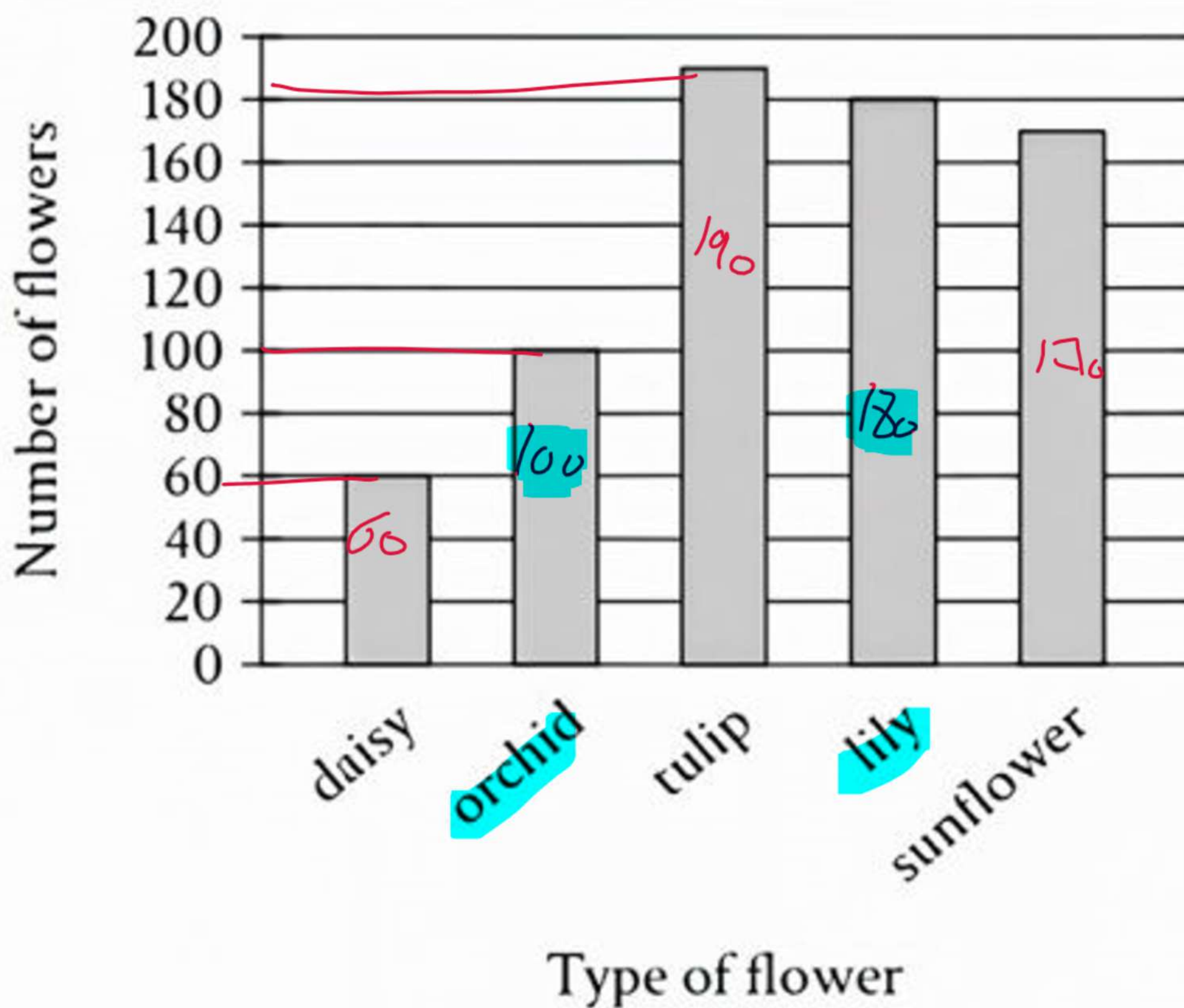
$$19 \quad 22 \quad 25 \quad 28 \quad 31$$

$$+17$$

- (A) The mean capacity is $8 \mu F$, and the range of capacities is $12 \mu F$.
- (B) The mean capacity is $8 \mu F$, and the range of capacities is $29 \mu F$.
- (C) The mean capacity is $25 \mu F$, and the range of capacities is $12 \mu F$.
- (D) The mean capacity is $25 \mu F$, and the range of capacities is $29 \mu F$.



- (1) The bar graph shows the distribution of flower type for the 700 flowers that a florist has in stock.



For which two types of flowers is the total number of flowers of the two types exactly $\frac{2}{5}$ of the florist's stock?

- (A) Daisy and orchid.
(B) Orchid and lily.
(C) Orchid and sunflower.
(D) Lily and sunflower.

$$\frac{2}{5} \times 700 = 280$$

- (2) If $4(2x + 11) - 2(2x - 5) = -9 + 13x$, what is the value of $12x$?

(A) $\frac{7}{12}$

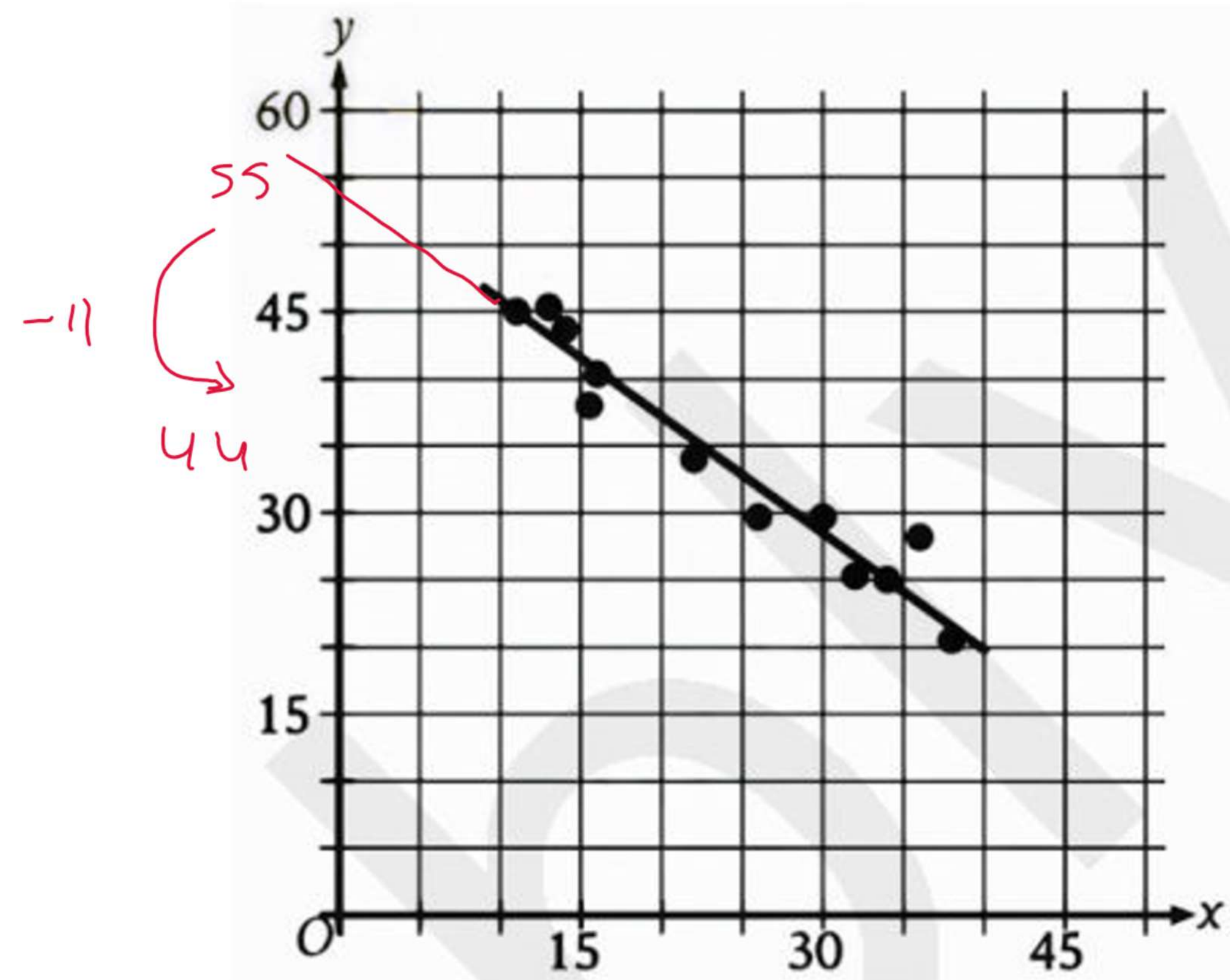
(B) 7

(C) 12

(D) 84

$$12(7) = 84$$

- (3)

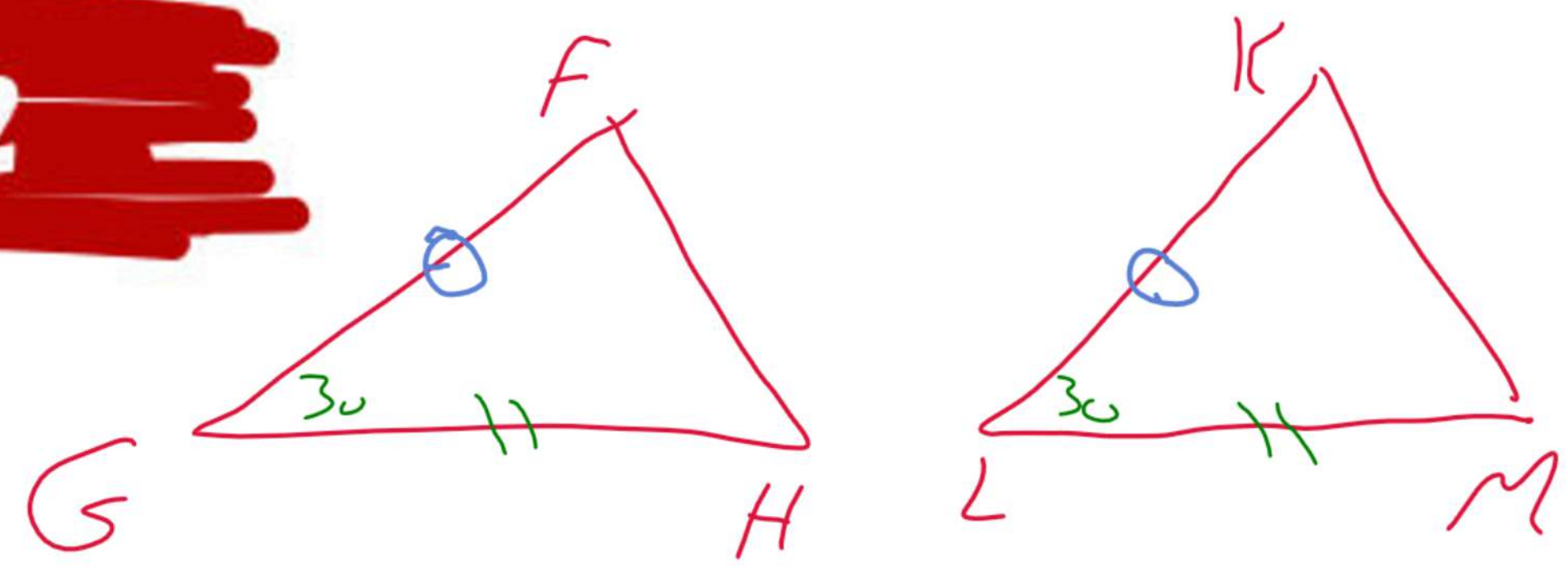


The scatterplot shows the relationship between two variables, x and y , for data set A. A line of best fit for the data is also shown. Data set B is created by subtracting 11 units from the value of y for each data point from data set A.

Which of the following is closest to the y coordinate of the y intercept of the line of best fit for data set B?

- (A) 62.75
(B) 53.75
(C) 42.75
(D) 31.75





- (4) An object has a mass of **308 grams** and volume of **28 cubic centimeters**. What is the density, in **grams per cubic centimeter**, of the object?

- (A) 11
(B) 280
(C) 336
(D) 8,624

$$d = \frac{m}{v} = \frac{308}{28} = 11$$

- (5) In the xy -plane, which of the following does **NOT** contain any points that are part of the solution set to $3x - 7y > 21$?

- (A) The region where $x < 0$ and $y > 0$
(B) The region where $x < 0$ and $y < 0$
(C) The region where $x > 0$ and $y > 0$
(D) The X -axis

$$x - ne \quad y + re$$

- (6) In triangle FGH and triangle KLM , the measures of angles G and L are each 30° . The lengths of GH and LM are each 34 centimeters, and $\frac{GH}{GF} = \frac{LM}{LK}$. Which additional piece of information would be necessary to prove that triangle FGH is congruent to triangle KLM ?

- (A) The lengths of FG and KM are each 17 centimeters.
(B) The measures of angles H and M are each 60° .
(C) The measures of angles F and K are each 90° .
(D) No additional information is necessary.

$$\begin{aligned} (7) \quad y &= 3x + 9 & -3x + y &= 9 \\ 3y &= 8x - 6 & -8x + 3y &= -6 \end{aligned}$$

The solution to the given system of equations is (x, y) . What is the value of $x - y$?

$$x = -33 \quad y = -90$$

- (A) -123
(B) -33
(C) 3
(D) 57

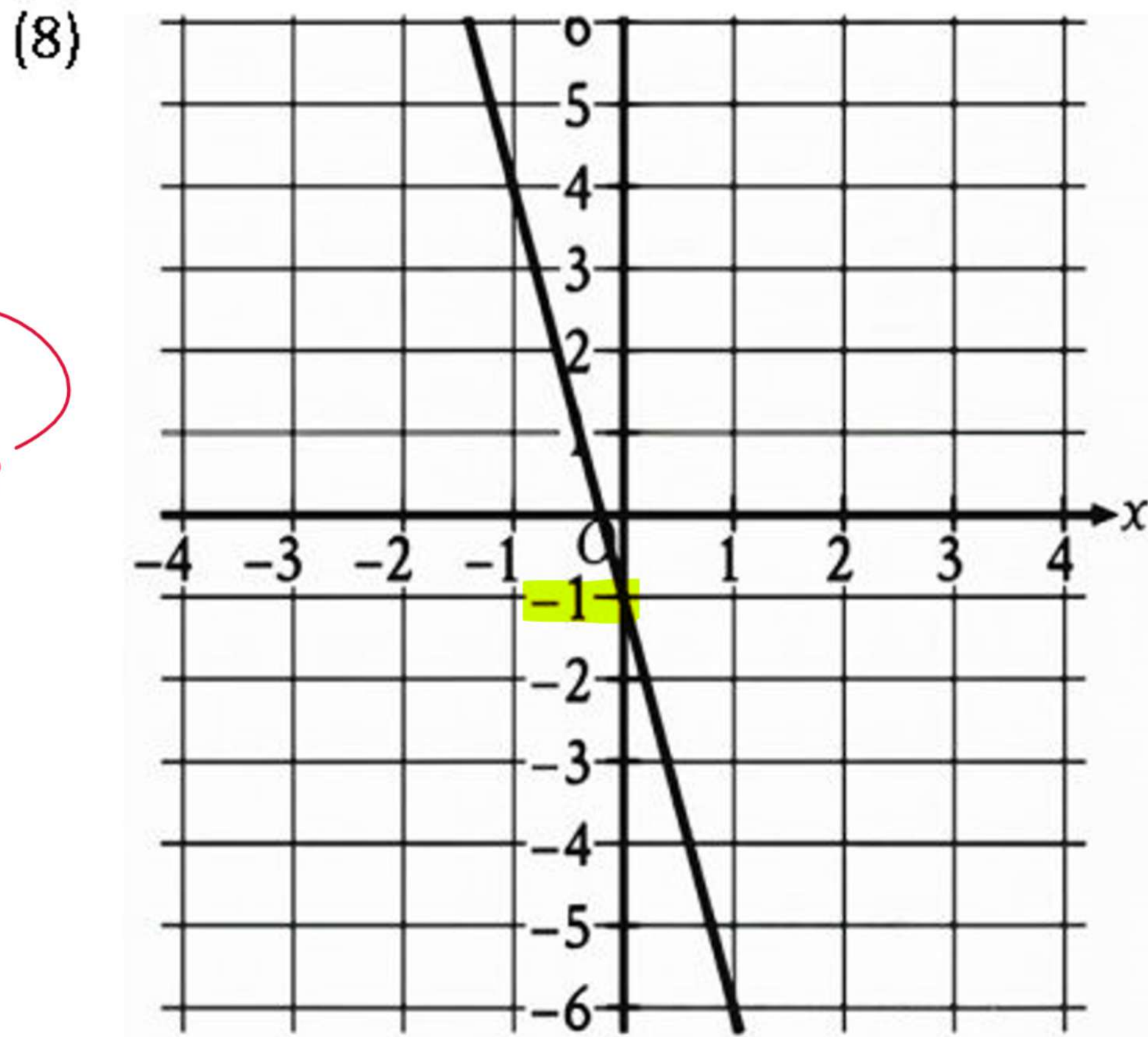
$$x - y = -33 - (-90) = 57$$

SSS

SAS

ASA





Which equation defines the linear function f ?

- (A) $f(x) = -14x - 9$
 (B) $f(x) = -5x - 1$
 (C) $f(x) = 5x + 8$
 (D) $f(x) = 14x - 8$

(9) An exponential function f is defined by $f(x) = c^x$, where c is a constant greater than 1. If $f(6) = 9 \cdot f(4)$, what is the value of c ?

3

$$c^6 = 9c^4$$

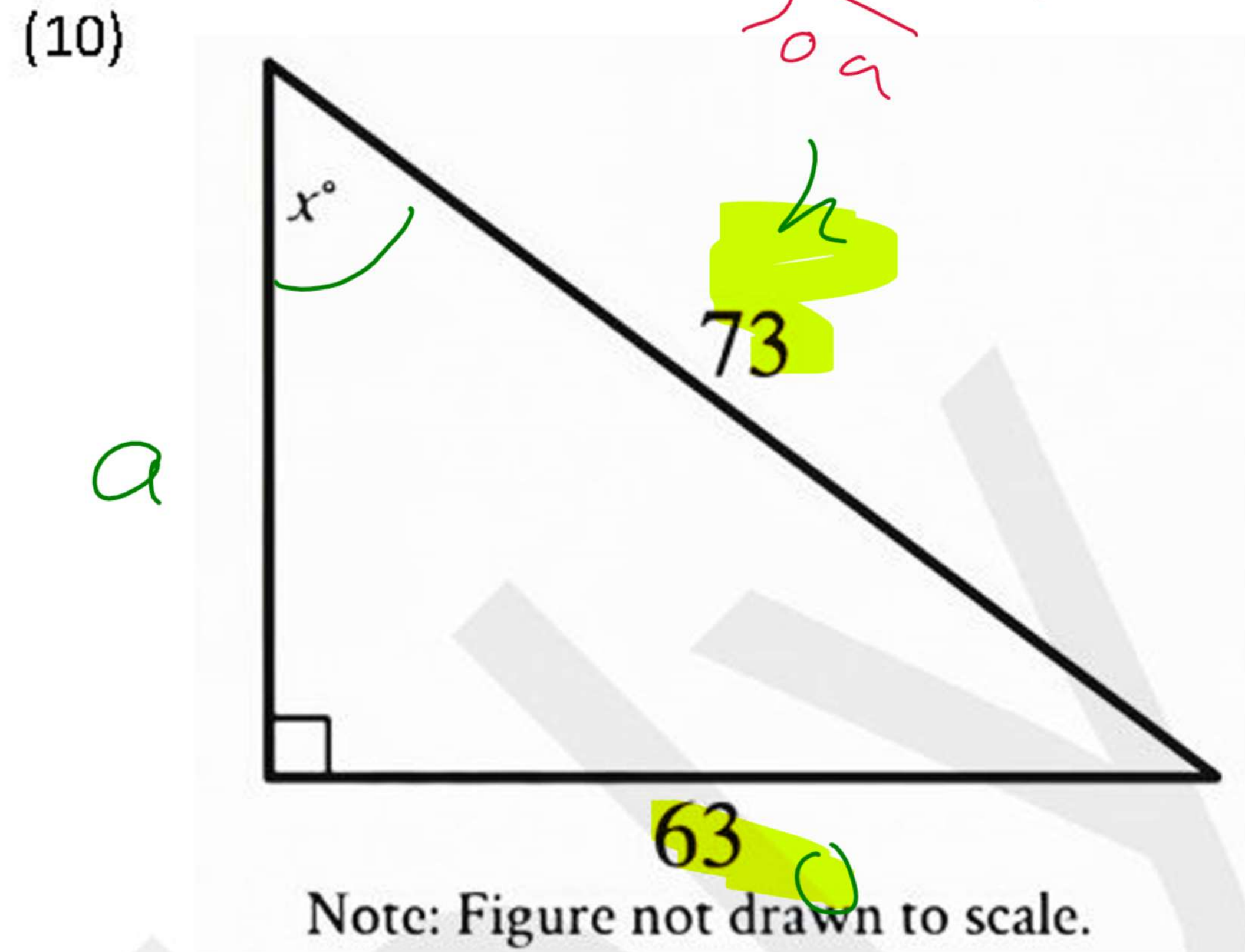
$$\frac{c^6}{c^4} = 9$$

$$c^2 = 9$$

$$c = \pm\sqrt{9}$$

$$c = \pm 3$$

(D)



In the right triangle shown, what is the value of $\sin X$?

- (A) $\frac{1}{73}$
 (B) $\frac{10}{73}$
 (C) $\frac{63}{73}$
 (D) $\frac{136}{73}$

(11) $-x - wy = -337$
 $2x - wy = 47$

In the given system of equations, W is a constant. In the xy -plane, the graphs of these equations intersect at the point $(q, 19)$, where q is a constant.

What is value of W ?

11



(12)

	Site A	Site B	Total
Red maple	35	15	50
Chestnut oak	31	20	51
Total	66	35	101

The table shows the distribution of two types of trees at two different sites. If a tree represented in the table is selected at random, what is the probability of selecting tree from site A, given that the tree is a red maple? (Express your answer as a decimal or fraction, not as a percent)

$$\frac{7}{15} \left\{ 0.7 \right.$$

$$\frac{\text{Part}}{\text{Total}} = \frac{35}{50}$$

(13) A beaker containing a liquid is placed on a table. The function $g(t) = 295 + (361 - 295)(272)^{-0.104t}$ gives the approximate temperature, in kelvins, of the liquid t minutes after the beaker was placed on the table. According to this function, what was the approximate temperature, in kelvins, of the liquid when the beaker was placed on the table?

$$361$$

(14) For the exponential function f , the value of $f(1)$ is K , where K is a constant. Which of the following equivalent forms of the function f shows the value of K as the coefficient or the base?

- (A) $f(x) = 50(1.7)^{x+1}$
 (B) $f(x) = 85(1.7)^x$
 (C) $f(x) = 144.5(1.7)^{x-1}$
 (D) $f(x) = 245.65(1.7)^{x-2}$

$$(15) y = 9\left(\frac{a}{6}\right)^{x+c} - b$$

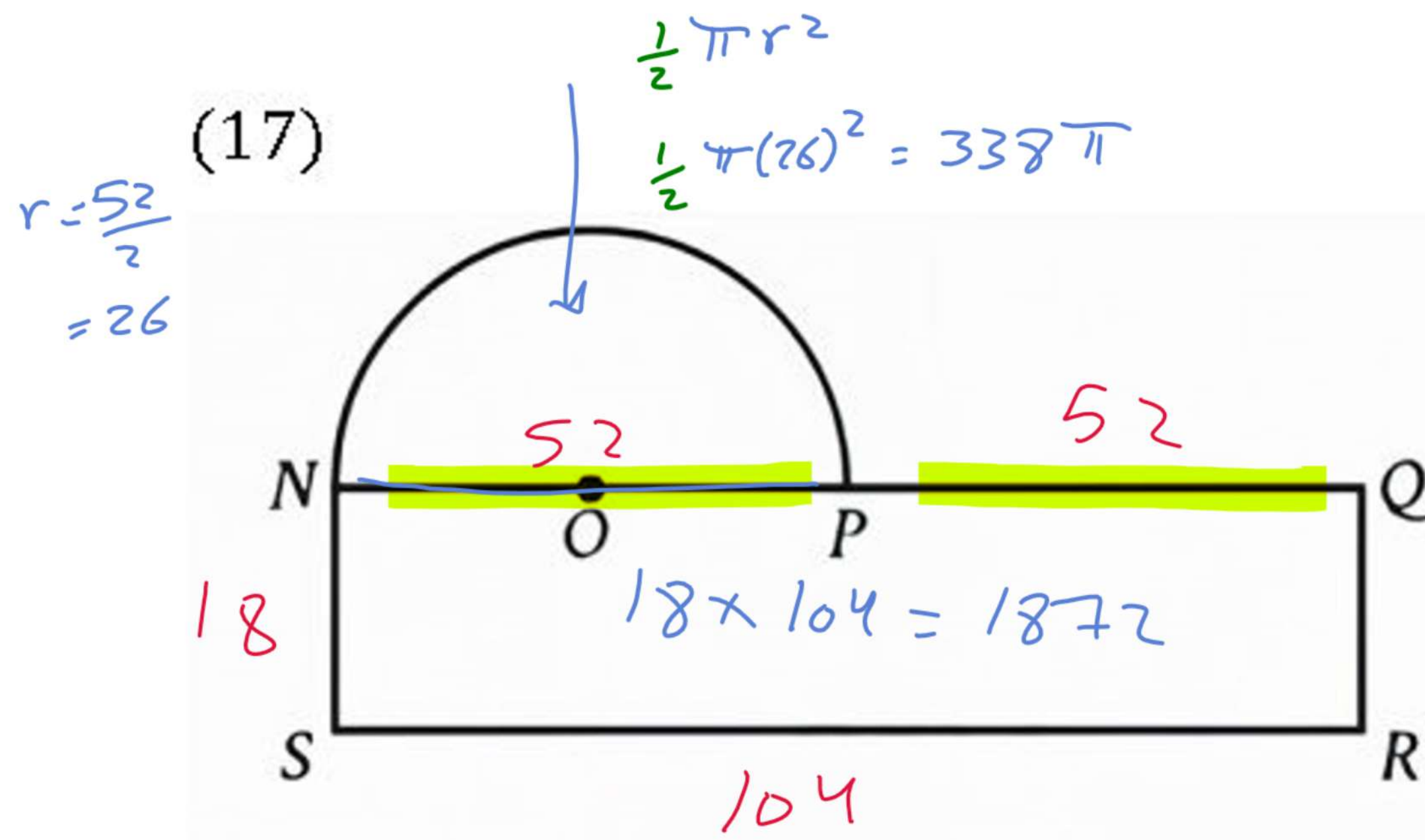
How many times does the graph of the given equation in the xy -plane cross the x -axis, where a , b and c are positive constants such that $a > 6$ and $b > c$?

- (A) Zero
 (B) One
 (C) Two
 (D) Three

(16) For a polynomial function f , the graph of $y = f(x)$ in the xy -plane contains the points $(-6, 0)$, $(7, 0)$, $(0, 0)$, and $(4, 0)$. Which of the following must be a factor of $f(x)$?

- (A) $x^2 - 2x - 24$
 (B) $x^2 - x + 42$
 (C) $x^2 - 11x - 28$
 (D) $x^2 - 7x$





Note: Figure not drawn to scale.

$a\pi + b = 1872 + 338\pi$

In the given figure, \overline{NP} is the diameter of semicircle O . Angles Q , R and S are right angles, and point P is the midpoint of \overline{NQ} . If $PQ = 52$ feet and $NS = 18$ feet, the area of the figure can be expressed as $a\pi + b$ square feet, where a and b are integers. What is the value of $a - b$?

$338 - 1872$

-1534

(18) $\frac{1}{xyz} + xyz = \frac{1}{xyz}$

In the given equation x , y and z are positive numbers. Which expression is equivalent to y ?

(A) $\frac{5x-4z}{20x^2z^2}$

(B) $\sqrt{\frac{5x-4z}{20x^2z^2}}$

(C) $\frac{1}{4xz^2-5x^2-z}$

(D) $\sqrt{\frac{1}{4xz^2-5x^2-z}}$

$4z + 20x^2y^2z^2 = 5x$

$20x^2y^2z^2 = \frac{5x-4z}{20x^2z^2}$

$x = 2$

$z = 5$

(19) The equation $2|x - 5| = k$, where K is a constant, has exactly one solution. Which of the following could be the value of $\frac{k}{2}$?

$|x - 5| = \frac{k}{2}$

- (A) -5 only
(B) -5 or 5
(C) 0 only
(D) 5 only

$|x - 5| = 0$

$x - 5 = 0$

$x - 5 = 0$

(20) The percent increase in mass of a certain red kangaroo from 80 days old to 160 days old was 676%. If this red kangaroo's mass was K grams at 80 days old, which expression represents its mass, in grams, at 160 days old?

$100 + 676$

$= 776\%$

- (A) $7.76k$
(B) $6.76k$
(C) $1.08k$
(D) $0.08k$



(21)

x	$g(x)$
-21	2
-9	0
15	4

$$g(x) = \frac{mx + b}{x + 3}$$

The table shows three values of x and their corresponding values of $g(x)$, where $g(x) = \frac{f(x)}{x+3}$ and f is a linear function.

What is the y-intercept of the graph of $y = f(x)$ in the xy-plane?

- (A) (0, -9)
- (B) (0, 3)
- (C) (0, 9)
- (D) (0, 27)

(22) For groups of 25 or more people, a museum charges \$28 per person for the first 25 people and \$17 for each additional person. Which function f gives the total charge, in dollars, for a tour group with n people, where $n \geq 25$?

$$n = 30$$

$$25 \times 28 + 5 \times 17 = 785$$

- (A) $f(n) = 17n + 275$
- (B) $f(n) = 17n + 28$
- (C) $f(n) = 17n + 700$
- (D) $f(n) = 45n - 425$

$$17(30) + 275 = 785$$

