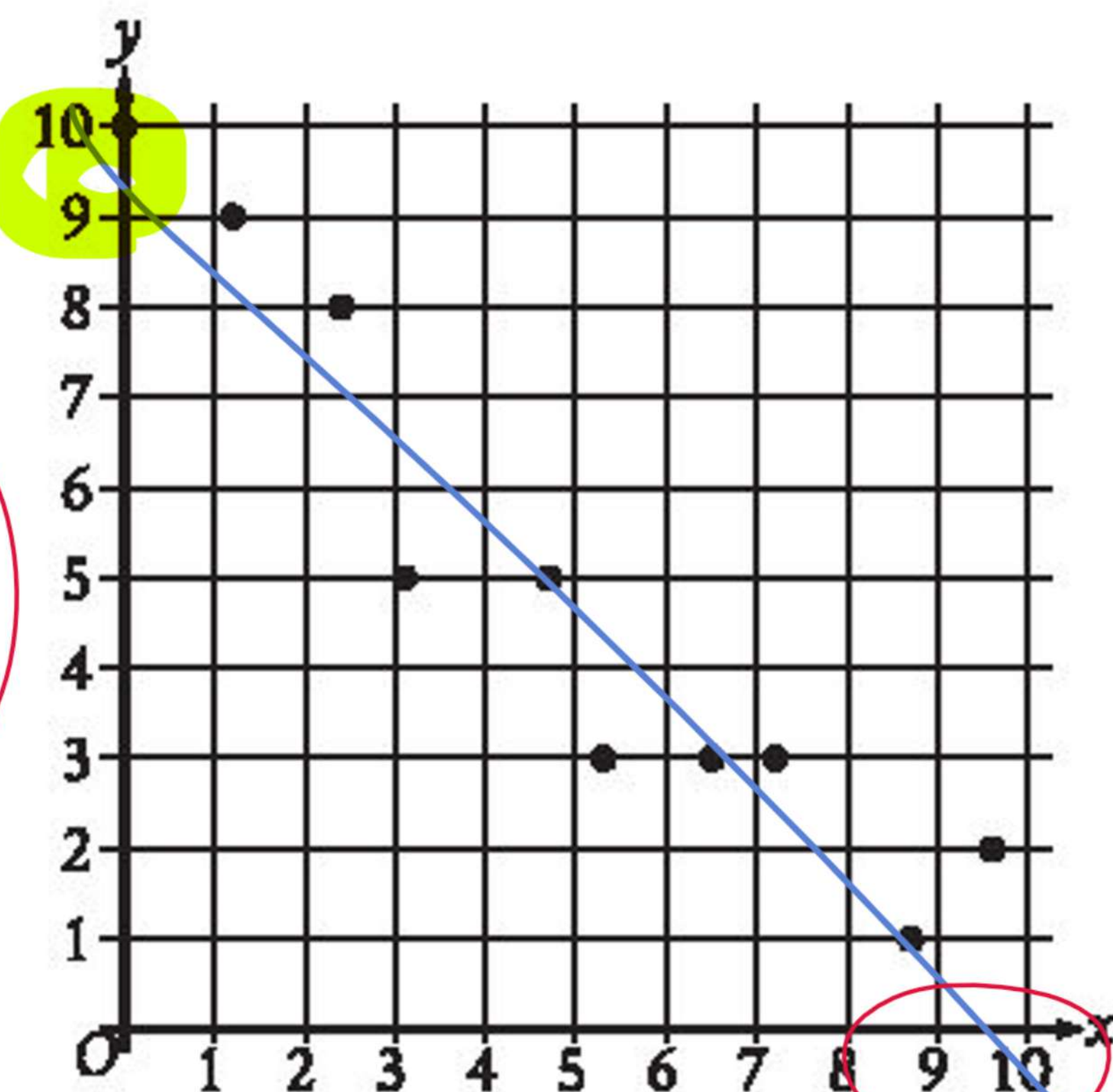**10**

The scatterplot shows the relationship between two variables, x and y.

Which of the following equations is the most appropriate linear model for the data shown?

A) $y = 0.9 + 9.4x$

B) $y = 0.9 - 9.4x$

C) $y = 9.4 + 0.9x$

D) $y = 9.4 - 0.9x$

(handwritten: $y = mx + b$, slope, y-int; +ve, -ve, zero, undefined)
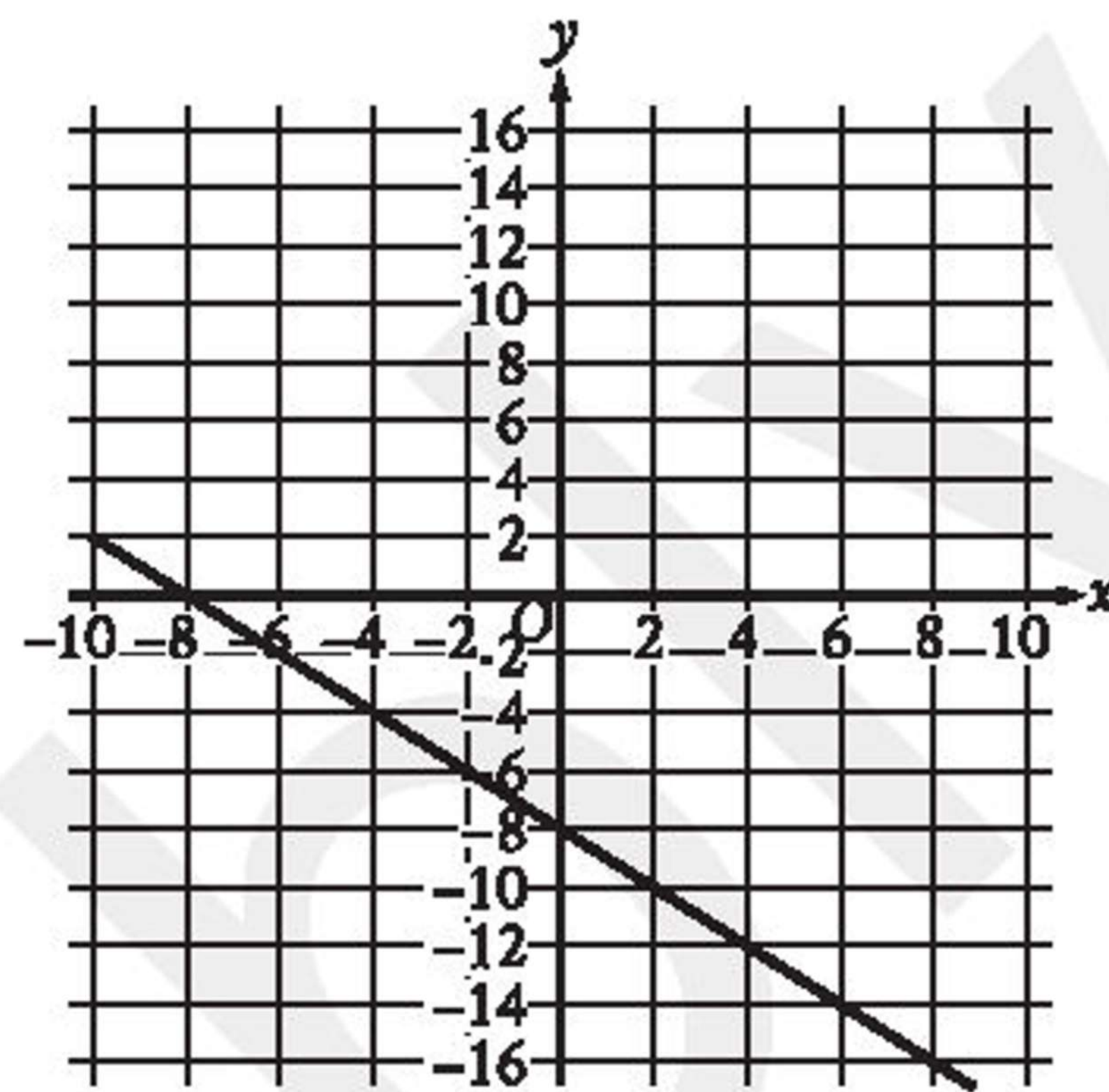
11

$$2.5b + 5r = 80$$

The given equation describes the relationship between the number of birds, b, and the number of reptiles, r, that can be cared for at a pet care business on a given day. If the business cares for 16 reptiles on a given day, how many birds can it care for on this day?

(handwritten: $2.5b + 5(16) = 80$; shift swing)

A) 0

B) 5

C) 40

D) 80

12

What is an equation of the graph shown?

A) $y = -2x - 8$

B) $y = x - 8$

C) $y = -x - 8$

D) $y = 2x - 8$

13

If $\dfrac{x}{8} = 5$, what is the value of $\dfrac{8}{x}$?

(handwritten: $x = 8 \times 5 = 40$; $\dfrac{8}{x} = \dfrac{8}{40} = \dfrac{1}{5}$; $\dfrac{1}{5}$)

14

(handwritten: Mode, $\frac{5}{1}$)

$$24x + y = 48$$
$$6x + y = 72$$

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

(handwritten: 80)

15

Line t in the xy-plane has a slope of $-\dfrac{1}{3}$ and passes through the point (9, 10). Which equation defines line t ?

$y = mx + b$

A) $y = 13x - \dfrac{1}{3}$

B) $y = 9x + 10$

C) $y = -\dfrac{x}{3} + 10$ $= -\dfrac{9}{3} + 10 = 7$

D) $y = -\dfrac{x}{3} + 13$

$1957 + 5 = 1962$ $243\$$

16

The function $f(x) = 206(1.034)^x$ models the value, in dollars, of a certain bank account by the end of each year from 1957 through 1972, where x is the number of years after 1957. Which of the following is the best interpretation of "$f(5)$ is approximately equal to 243" in this context?

A) The value of the bank account is estimated to be approximately 5 dollars greater in 1962 than in 1957.

B) The value of the bank account is estimated to be approximately 243 dollars in 1962.

C) The value, in dollars, of the bank account is estimated to be approximately 5 times greater in 1962 than in 1957.

D) The value of the bank account is estimated to increase by approximately 243 dollars every 5 years between 1957 and 1972.

17

For a certain rectangular region, the ratio of its length to its width is 35 to 10. If the width of the rectangular region increases by 7 units, how must the length change to maintain this ratio?

A) It must decrease by 24.5 units.

B) It must increase by 24.5 units.

C) It must decrease by 7 units.

D) It must increase by 7 units.

$l : w$
$35 : 10$
$\Box : 7$

$\dfrac{35 \times 7}{10} = 24.5$

18

Square P has a side length of x inches. Square Q has a perimeter that is 176 inches greater than the perimeter of square P. The function f gives the area of square Q, in square inches. Which of the following defines f ?

A) $f(x) = (x + 44)^2$

B) $f(x) = (x + 176)^2$

C) $f(x) = (176x + 44)^2$

D) $f(x) = (176x + 176)^2$

$4S = \dfrac{176}{4}$

$S = 44 + x$

$A\Box = S^2$
$= (44 + x)^2$

19

$$\frac{14x}{7y} = 2\sqrt{w + 19}$$

The given equation relates the distinct positive real numbers w, x, and y. Which equation correctly expresses w in terms of x and y?

A) $w = \sqrt{\dfrac{x}{y}} - 19$

$\left(\dfrac{x}{y}\right)^2 = \sqrt{w+19}$

B) $w = \sqrt{\dfrac{28x}{14y}} - 19$
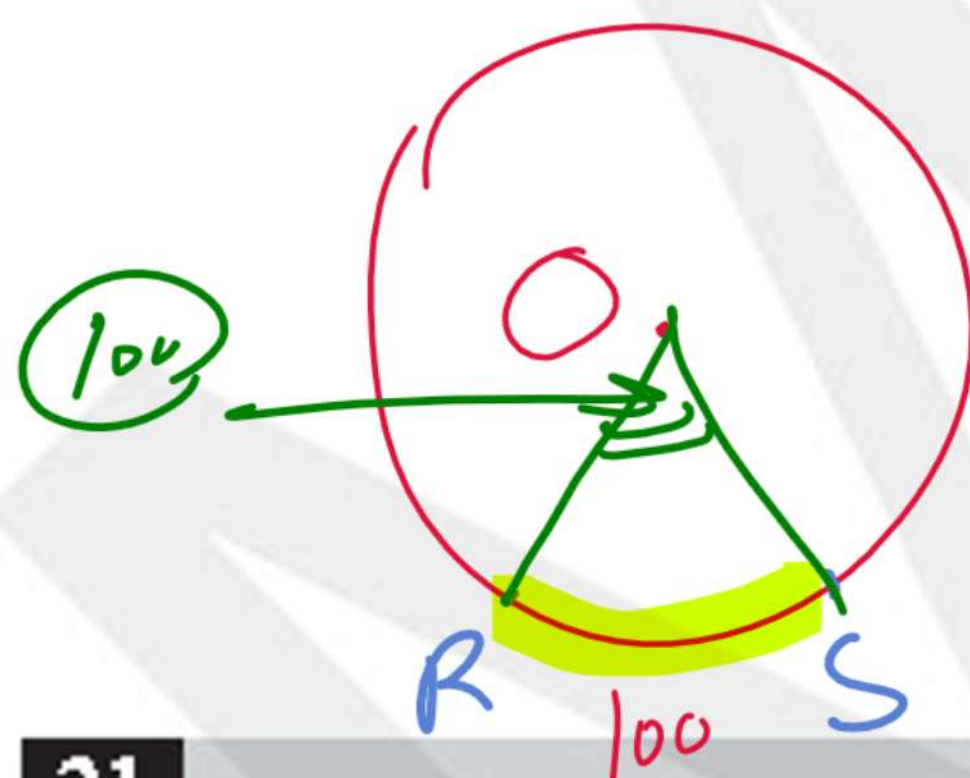
$\left(\dfrac{x}{y}\right)^2 - 19 = w$

C) $w = \left(\dfrac{x}{y}\right)^2 - 19$

$\left(\dfrac{2}{4}\right)^2 - 19 = -\dfrac{75}{4}$

D) $w = \left(\dfrac{28x}{14y}\right)^2 - 19$

$x = 2$, $y = 4$

$\dfrac{14(2)}{7(4)} = 2\sqrt{w+19}$

$-\dfrac{75}{4}$

20

Point O is the center of a circle. The measure of arc RS on this circle is $100°$. What is the measure, in degrees, of its associated angle ROS?

21

The expression $6\sqrt[5]{3^5 x^{45}} \cdot \sqrt[8]{2^8 x^1}$ is equivalent to ax^b, where a and b are positive constants and $x > 1$.

What is the value of $a + b$?

$6 \cdot 3^{5/5} x^{45/5} \cdot 2^{8/8} x^{1/8}$

$\dfrac{45}{5} + \dfrac{1}{8}$

$36 \ x$

$36 \ x^{73/8} = a \ x^b$
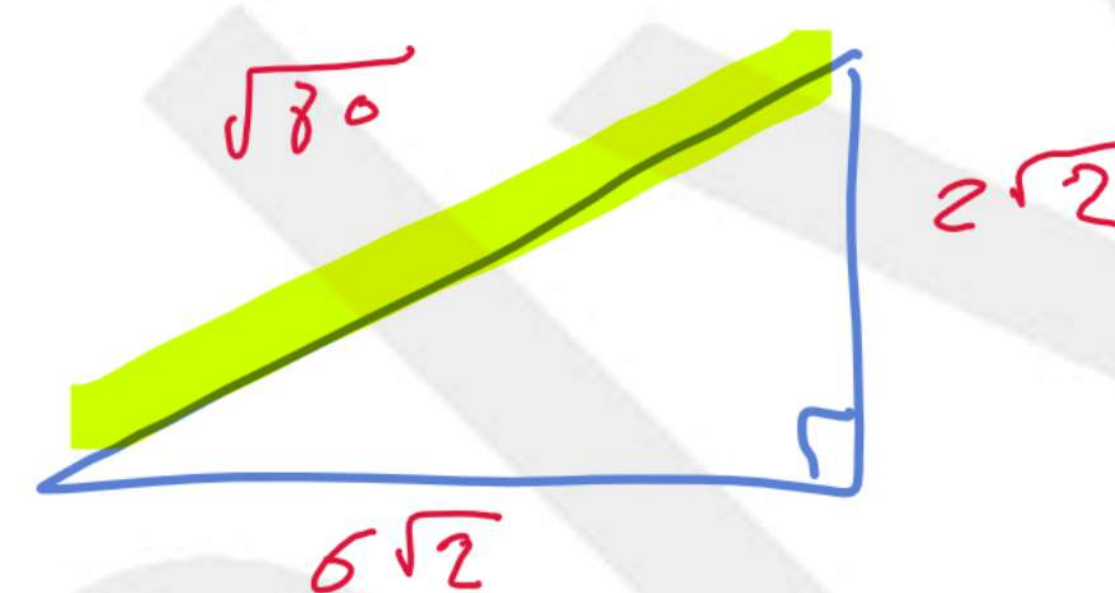
$a + b$

$36 + \dfrac{73}{8}$

$= 45.125$

22

A right triangle has sides of length $2\sqrt{2}$, $6\sqrt{2}$, and $\sqrt{80}$ units. What is the area of the triangle, in square units?

A) $8\sqrt{2} + \sqrt{80}$

B) 12

C) $24\sqrt{80}$

D) 24

$A\triangle = \frac{1}{2} b \cdot h$

$\frac{1}{2}(6\sqrt{2})(2\sqrt{2})$

$= 12$

23

The expression $4x^2 + bx - 45$, where b is a constant, can be rewritten as $(hx + k)(x + j)$, where h, k, and j are integer constants. Which of the following must be an integer?

A) $\dfrac{b}{h}$

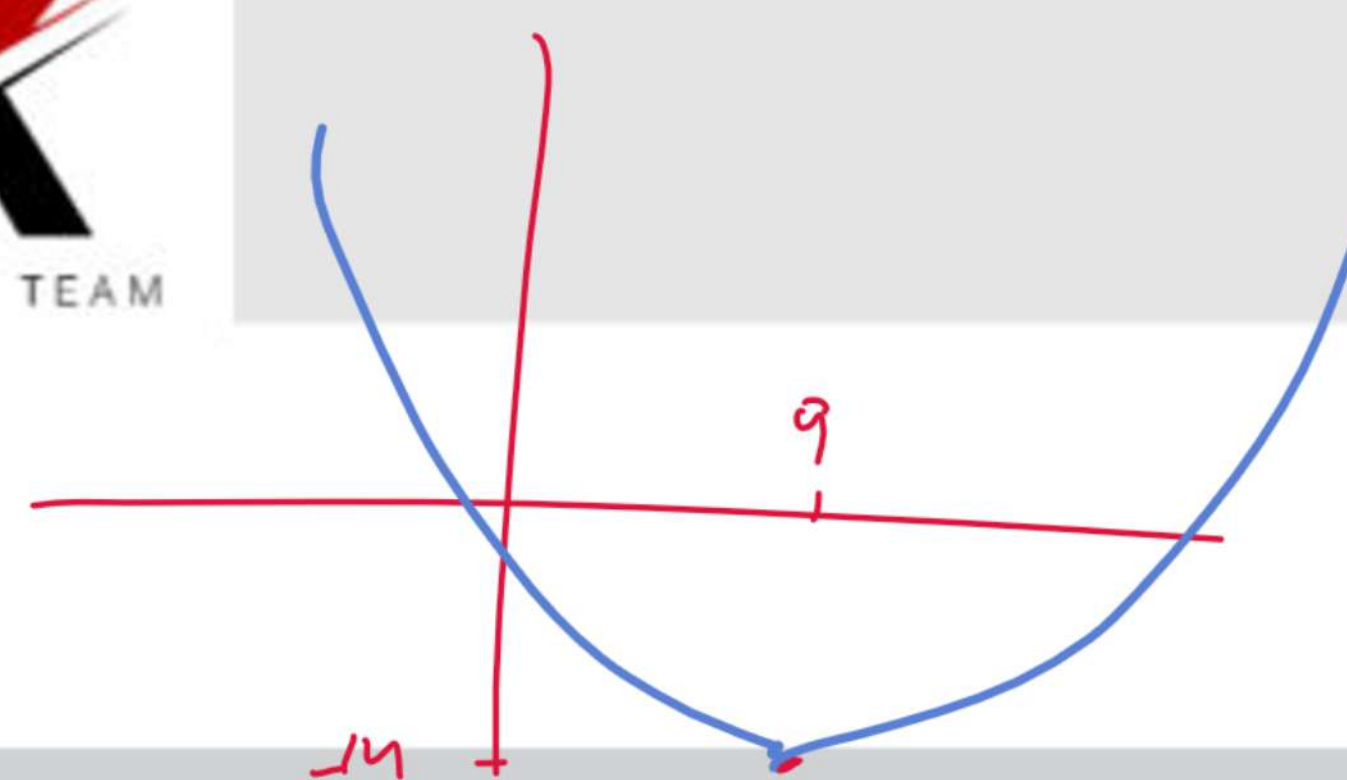B) $\dfrac{b}{k}$

C) $\dfrac{45}{h}$

D) $\dfrac{45}{k}$

$KJ = \dfrac{-45}{K}$

Math is Root of Knowledge

MATH = √KNOWLEDGE

24

$$y = 2x^2 - 21x + 64$$
$$y = 3x + a$$
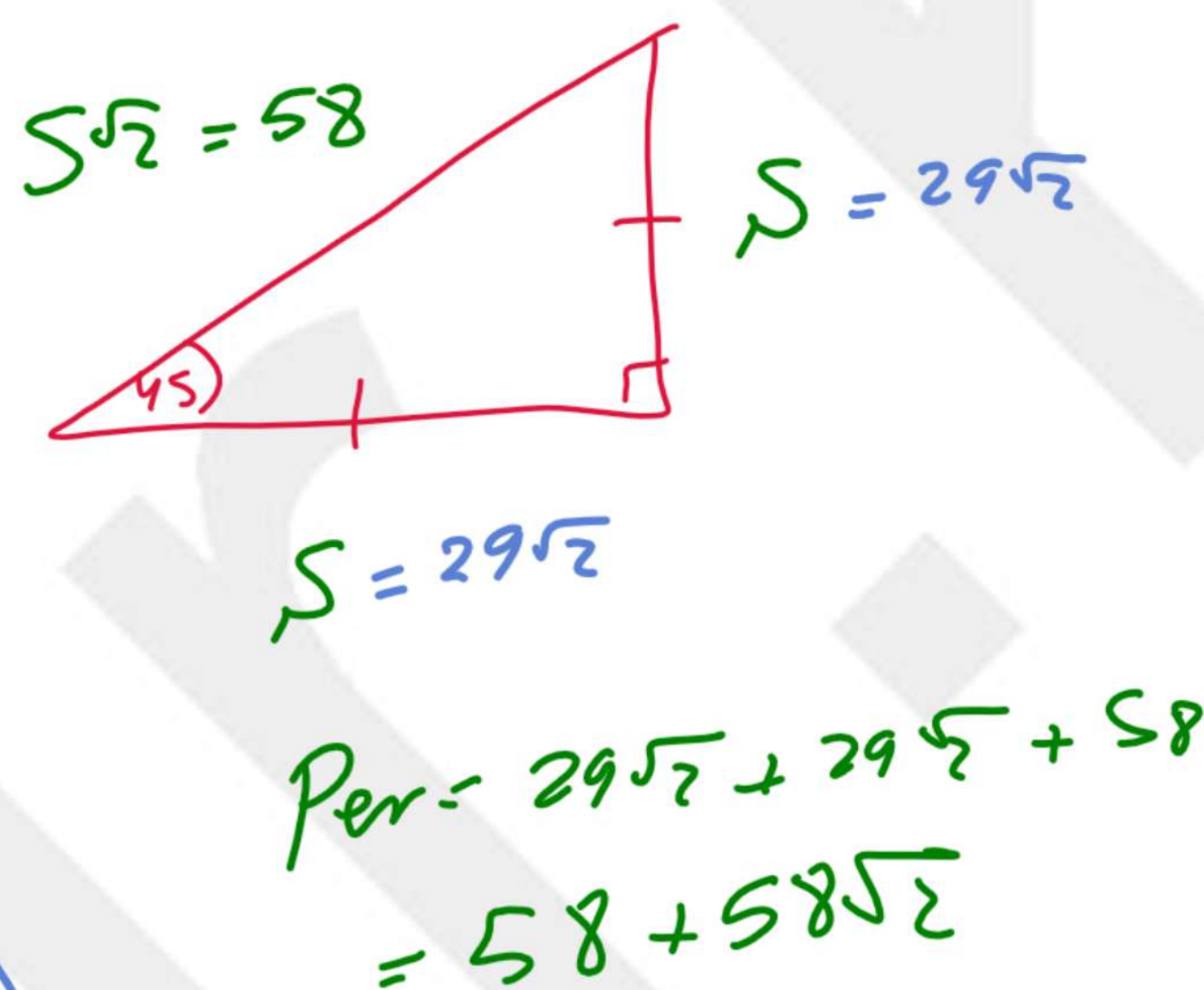
In the given system of equations, a is a constant. The graphs of the equations in the given system intersect at exactly one point, (x, y), in the xy-plane. What is the value of x?

A) -8

B) -6

C) 6

D) 8

25

An isosceles right triangle has a hypotenuse of length 58 inches. What is the perimeter, in inches, of this triangle?

A) $29\sqrt{2}$

B) $58\sqrt{2}$

C) $58 + 58\sqrt{2}$

D) $58 + 116\sqrt{2}$

Handwritten work:
$S\sqrt{2} = 58$
$S = 29\sqrt{2}$
45
$S = 29\sqrt{2}$
$\dfrac{S\sqrt{2}}{\sqrt{2}} = \dfrac{58}{\sqrt{2}}$
$S = 29\sqrt{2}$
Per $= 29\sqrt{2} + 29\sqrt{2} + 58$
$= 58 + 58\sqrt{2}$

26

In the xy-plane, a parabola has vertex $(9, -14)$ and intersects the x-axis at two points. If the equation of the parabola is written in the form $y = ax^2 + bx + c$, where a, b, and c are constants, which of the following could be the value of $a + b + c$?

A) -23

B) -19

C) -14

D) -12

Handwritten work:
$+ve$ x^2 U
$-x^2$ ∩
$y = K(x-9)^2 - 14$
$ax^2 + bx + c = K(x-9)^2 - 14$
$x = 1$
$a + b + c = K(1-9)^2 - 14$
$a + b + c = 64K - 14$
$-23 = 64K - 14$ (shift solve)
$-12 = 64K - 14$
$K = \frac{1}{32}$

27

Function f is defined by $f(x) = -a^x + b$, where a and b are constants. In the xy-plane, the graph of $y = f(x) - 15$ has a y-intercept at $\left(0, -\dfrac{99}{7}\right)$. The product of a and b is $\dfrac{65}{7}$. What is the value of a?

Handwritten work:
$y = -a^x + b - 15$
$-\dfrac{99}{7} = -a^0 + b - 15$
$-\dfrac{99}{7} = -1 + b - 15$
$b = \dfrac{13}{7}$
$ab = \dfrac{65}{7}$
$a\left(\dfrac{13}{7}\right) = \dfrac{65}{7}$
$a = 5$

STOP

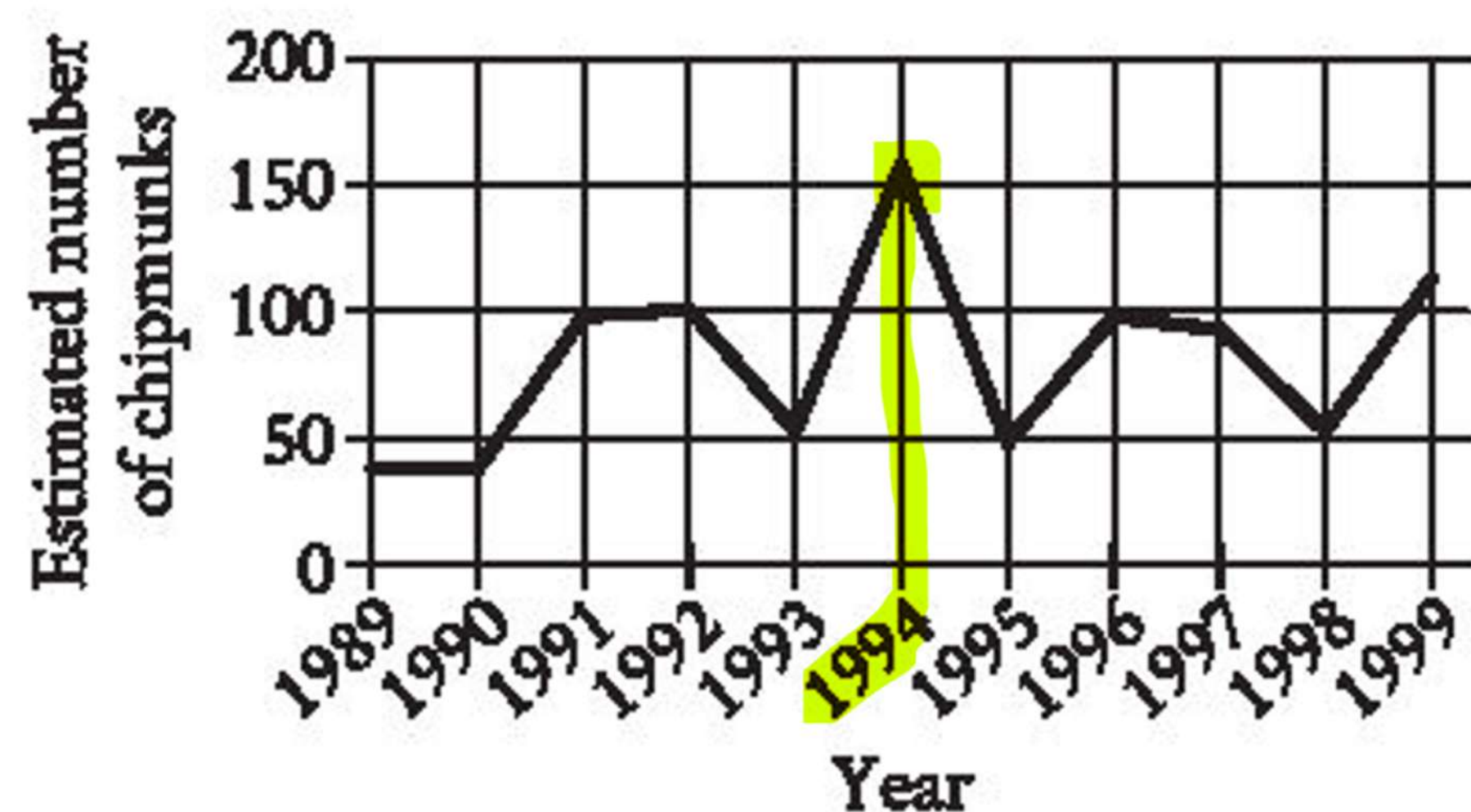**If you finish before time is called, you may check your work on this module only.**
Do not turn to any other module in the test.

ELKABLY TEAM

1

The line graph shows the estimated number of chipmunks in a state park on April 1 of each year from 1989 to 1999.

Based on the line graph, in which year was the estimated number of chipmunks in the state park the greatest?

A) 1989

B) 1994

C) 1995

D) 1998

2

A fish swam a distance of 5,104 yards. How far did the fish swim, in miles? (1 mile = 1,760 yards)

A) 0.3

B) 2.9

C) 3,344

D) 6,864

x — 5104

$\dfrac{1 \times 5104}{1760} = 2.9$

3

Which expression is equivalent to $12x^3 - 5x^3$?

A) $7x^6$

B) $17x^3$

C) $7x^3$

D) $17x^6$

$7x^3$

$x = 2$ $12(2)^3 - 5(2)^3 = 56$

$7(2)^3 = 56$

4

$$x + y = 18$$
$$5y = x$$

What is the solution (x, y) to the given system of equations?

A) $(15, 3)$

B) $(16, 2)$

C) $(17, 1)$

D) $(18, 0)$

$x \quad y$

$15 + 3 = 18$

$5(3)$

$15 = x$

5

The point **(8, 2)** in the xy-plane is a solution to which of the following systems of inequalities?

A) $x > 0$
   $y > 0$

B) $x > 0$
   $y < 0$

C) $x < 0$
   $y > 0$

D) $x < 0$
   $y < 0$

6

$$|x - 5| = 10$$

What is one possible solution to the given equation?

$x - 5 = 10$
$x = 15$

$x - 5 = -10$
$x = -5$

7

$$f(x) = 7x + 1$$

The function gives the total number of people on a company retreat with **x managers**. What is the total number of people on a company retreat with **7 managers**?

$7(7) + 1$

$= 50$

8

$$h(x) = x^2 - 3$$

$(1)^2 - 3 = -2$

Which table gives three values of x and their corresponding values of $h(x)$ for the given function h?

A)

x	1	2	3
$h(x)$	4	5	6

B)

x	1	2	3
$h(x)$	−2	1	6

C)

x	1	2	3
$h(x)$	−1	1	3

D)

x	1	2	3
$h(x)$	−2	1	3

9

The function f is defined by $f(x) = 270(0.1)^x$. What is the value of $f(0)$?

A) 0

B) 1

C) 27

D) 270

$270(0.1)^0$

270