

Questions 9 and 10 refer to the following information.

$$a = 1,052 + 1.08t$$

The speed of a sound wave in air depends on the air temperature. The formula above shows the relationship between  $a$ , the speed of a sound wave, in feet per second, and  $t$ , the air temperature, in degrees Fahrenheit ( $^{\circ}\text{F}$ ).

9

Which of the following expresses the air temperature in terms of the speed of a sound wave?

A)  $t = \frac{a - 1,052}{1.08}$

B)  $t = \frac{a + 1,052}{1.08}$

C)  $t = \frac{1,052 - a}{1.08}$

D)  $t = \frac{1.08}{a + 1,052}$

$$a - 1,052 = 1.08t$$

$$\frac{a - 1,052}{1.08}$$

10

At which of the following air temperatures will the speed of a sound wave be closest to 1,000 feet per second?

A)  $-46^{\circ}\text{F}$

B)  $-48^{\circ}\text{F}$

C)  $-49^{\circ}\text{F}$

D)  $-50^{\circ}\text{F}$

$$1,000 = 1,052 + 1.08t$$

Solve +  
Sub

11

Which of the following numbers is NOT a solution of the inequality  $3x - 5 \geq 4x - 3$ ?

A)  $-1$

B)  $-2$

C)  $-3$

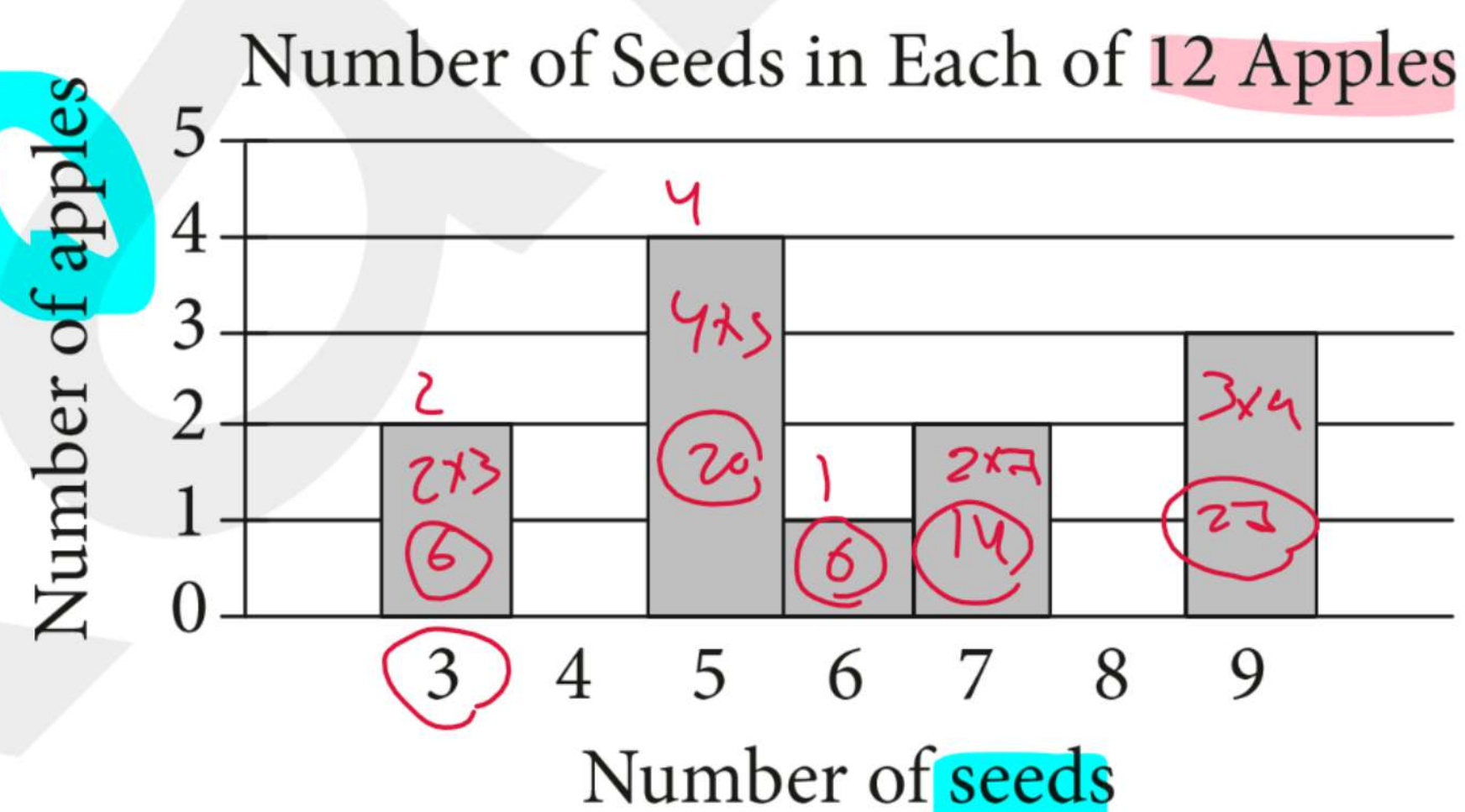
D)  $-5$

$$3x - 4x \geq -3 + 5$$

$$-x \geq 2$$

$$x \leq -2$$

12



Based on the histogram above, of the following, which is closest to the average (arithmetic mean) number of seeds per apple?

A) 4

B) 5

C) 6

D) 7

$$\text{Mean} = \frac{\text{Sum}}{\text{no.}} = \frac{6 + 20 + 6 + 14 + 27}{12}$$

$$= 6.08$$





13

		Course			Total
		Algebra I	Geometry	Algebra II	
Gender	Female	35	53	62	150
	Male	44	59	57	160
	Total	79	112	119	310

A group of tenth-grade students responded to a survey that asked which math course they were currently enrolled in. The survey data were broken down as shown in the table above. Which of the following categories accounts for approximately 19 percent of all the survey respondents?

- A) Females taking Geometry  
 B) Females taking Algebra II  
 C) Males taking Geometry  
 D) Males taking Algebra I

$$0.19 \times 310 = 58.9$$

14

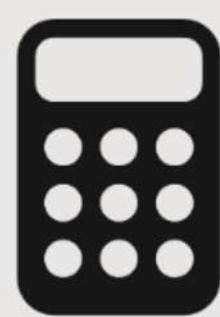
Lengths of Fish (in inches)						
8	9	9	9	10	10	11
11	12	12	12	12	13	13
13	14	14	15	15	16	24

The table above lists the lengths, to the nearest inch, of a random sample of 21 brown bullhead fish. The outlier measurement of 24 inches is an error. Of the mean, median, and range of the values listed, which will change the most if the 24-inch measurement is removed from the data?

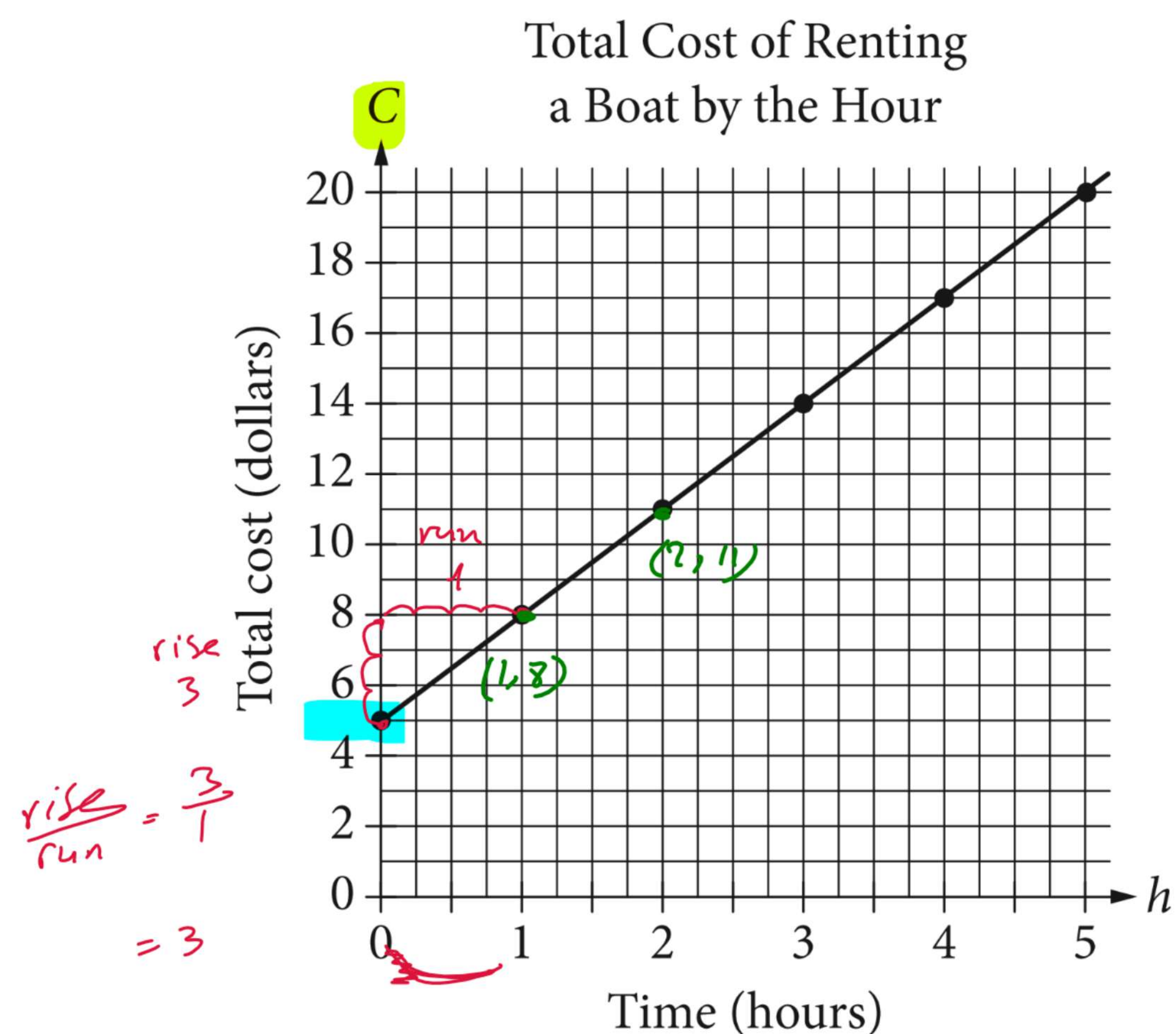
- A) Mean  
 B) Median  
 C) Range  
 D) They will all change by the same amount.

Mean =  $\frac{\text{sum}}{\text{how}}$   
 Mode = Most repeated  
 Median = Middle "arrange"  
 Range =  $\text{G} - \text{S}$





Questions 15 and 16 refer to the following information.



The graph above displays the total cost  $C$ , in dollars, of renting a boat for  $h$  hours.

15

What does the **C-intercept** represent in the graph?

- A) The initial cost of renting the boat
- B) The total number of boats rented
- C) The total number of hours the boat is rented
- D) The increase in cost to rent the boat for each additional hour

$y = mx + b$

$\rightarrow$  slope  
Average rate  
per unit

$\rightarrow$  y-int  
initial  
starting  
at  $x=0$

16

Which of the following represents the relationship between  $h$  and  $C$ ?

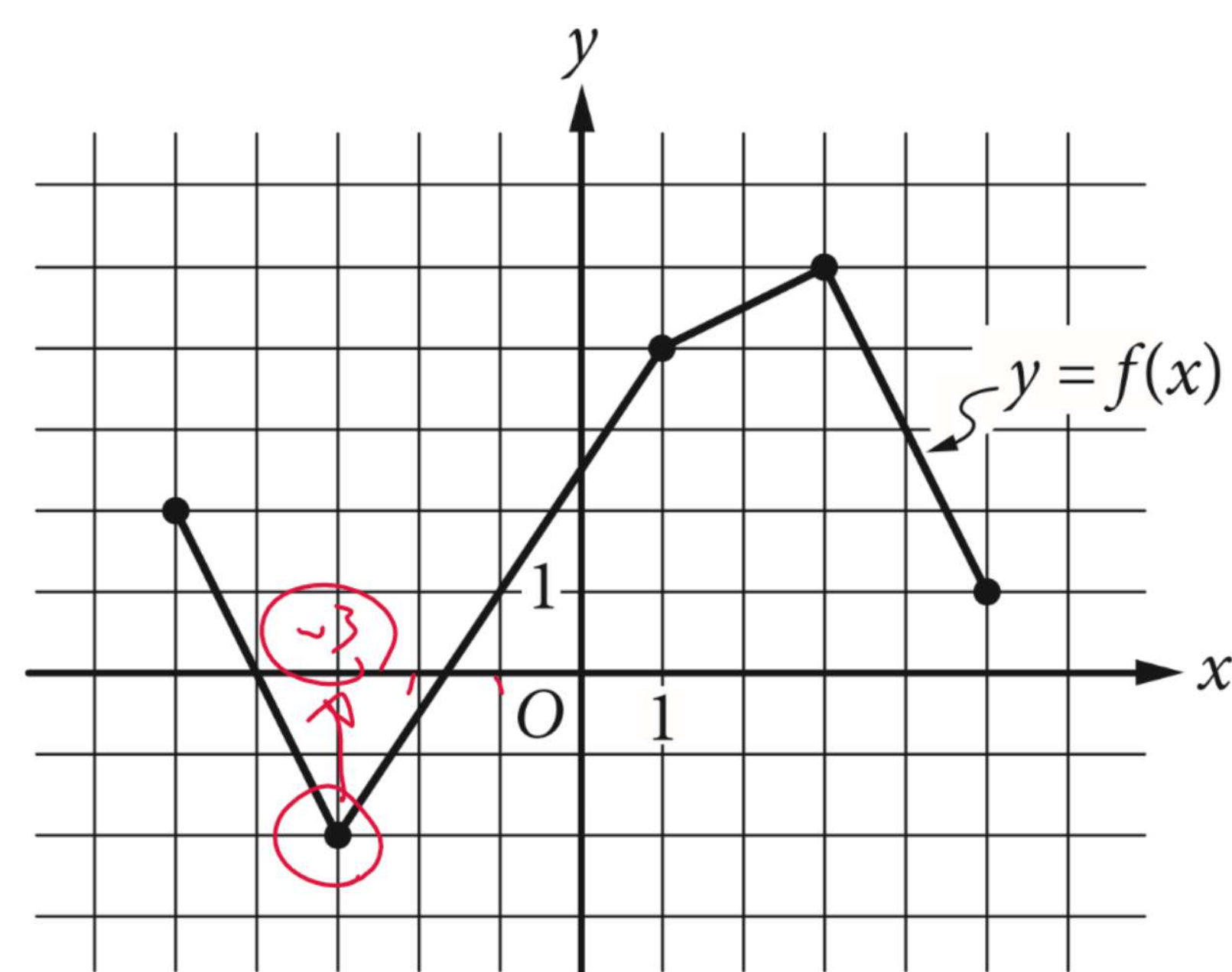
~~A)  $C = 5h$~~

~~B)  $C = \frac{3}{4}h + 5$~~

C)  $C = 3h + 5$

~~D)  $h = 3C$~~

17



The complete graph of the function  $f$  is shown in the  $xy$ -plane above. For what value of  $x$  is the value of  $f(x)$  at its minimum?

A)  $-5$

B)  $-3$

C)  $-2$

D)  $3$





18

$$y < -x + a$$

$$0 < 0 + a$$

$$0 < a$$

$$y > x + b$$

$$0 > 0 + b$$

$$0 > b$$

In the  $xy$ -plane, if  $(0, 0)$  is a solution to the system of inequalities above, which of the following relationships between  $a$  and  $b$  must be true?

A)  $a > b$

B)  $b > a$

C)  $|a| > |b|$

D)  $a = -b$

$$a > b$$

19

A food truck sells salads for \$6.50 each and drinks for \$2.00 each. The food truck's revenue from selling a total of 209 salads and drinks in one day was \$836.50. How many salads were sold that day?

A) 77

B) 93

C) 99

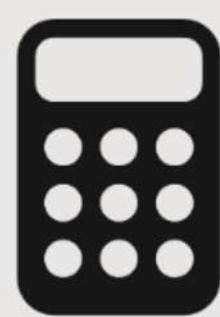
D) 105

$$s + d = 209$$

$$6.50s + 2d = 836.50$$

Mock  
S  
1





20

Alma bought a laptop computer at a store that gave a 20 percent discount off its original price. The total amount she paid to the cashier was  $p$  dollars, including an 8 percent sales tax on the discounted price. Which of the following represents the original price of the computer in terms of  $p$ ?

A)  ~~$0.88p$~~

B)  ~~$\frac{p}{0.88}$~~

C)  $(0.8)(1.08)p$

D)  $\frac{p}{(0.8)(1.08)}$

$$0.80 \times 1.08 \bigcirc = p$$

$$\bigcirc = \frac{p}{0.80 \times 1.08}$$

21

Dreams Recalled during One Week

	None	1 to 4	5 or more	Total
Group X	15	28	57	100
Group Y	21	11	68	<del>100</del>
Total	36	39	125	200

The data in the table above were produced by a sleep researcher studying the number of dreams people recall when asked to record their dreams for one week. Group X consisted of 100 people who observed early bedtimes, and Group Y consisted of 100 people who observed later bedtimes. If a person is chosen at random from those who recalled at least 1 dream, what is the probability that the person belonged to Group Y?

A)  $\frac{68}{100}$

B)  $\frac{79}{100}$

C)  $\frac{79}{164}$

D)  $\frac{164}{200}$

$$\frac{\text{Part}}{\text{Total}} = \frac{11 + 68}{39 + 125} = \frac{79}{164}$$





Questions 22 and 23 refer to the following information.

Annual Budgets for Different Programs in Kansas, 2007 to 2010

Program	Year			
	2007	2008	2009	2010
Agriculture/natural resources	373,904	358,708	485,807	488,106
Education	2,164,607	2,413,984	2,274,514	3,008,036
General government	14,347,325	12,554,845	10,392,107	14,716,155
Highways and transportation	1,468,482	1,665,636	1,539,480	1,773,893
Human resources	4,051,050	4,099,067	4,618,444	5,921,379
Public safety	263,463	398,326	355,935	464,233

The table above lists the annual budget, in thousands of dollars, for each of six different state programs in Kansas from 2007 to 2010.

$$\frac{488106 - 358708}{2}$$

$$65000000$$

$$\frac{4}{6} = \frac{2}{3}$$

$$\frac{4051050}{5921379} = 0.67 \quad 0.68$$

22

Which of the following best approximates the average **rate of change** in the **annual** budget for **agriculture/natural resources** in Kansas from **2008** to **2010**?

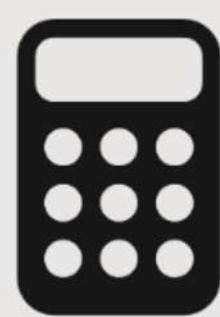
- A) \$50,000,000 per year
- ☒ B) \$65,000,000 per year
- C) \$75,000,000 per year
- D) \$130,000,000 per year

23

Of the following, which program's **ratio** of its **2007** budget to its **2010** budget is closest to the **human resources** program's ratio of its **2007** budget to its **2010** budget?

- A) Agriculture/natural resources
- ☒ B) Education
- C) Highways and transportation
- D) Public safety





24

Which of the following is an equation of a circle in the  $xy$ -plane with center  $(0, 4)$  and a radius with

endpoint  $\left(\frac{4}{3}, 5\right)$ ?

A)  $x^2 + (y - 4)^2 = \frac{25}{9}$

B)  $x^2 + (y + 4)^2 = \frac{25}{9}$

C)  $x^2 + (y - 4)^2 = \frac{5}{3}$

D)  $x^2 + (y + 4)^2 = \frac{3}{5}$

$$\left(\frac{4}{3}\right)^2 + (5-4)^2 = \frac{25}{9}$$

25

$$h = -4.9t^2 + 25t$$

The equation above expresses the approximate height  $h$ , in meters, of a ball  $t$  seconds after it is launched vertically upward from the ground with an initial velocity of 25 meters per second. After approximately how many seconds will the ball hit the ground?

A) 3.5

B) 4.0

C) 4.5

D) 5.0

Circle

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

Center  $(h, k)$   
radius  $= \sqrt{r^2}$

$$x^2 + ax + y^2 + by = c$$

Center  $\left(-\frac{a}{2}, -\frac{b}{2}\right)$   
 $r = \sqrt{\left(\frac{a}{2}\right)^2 + \left(\frac{b}{2}\right)^2 + c}$

26

Katarina is a botanist studying the production of pears by two types of pear trees. She noticed that Type A trees produced 20 percent more pears than Type B trees did. Based on Katarina's observation, if the Type A trees produced 144 pears, how many pears did the Type B trees produce?

A) 115

B) 120

C) 124

D) 173

$$A = 1.20 B$$

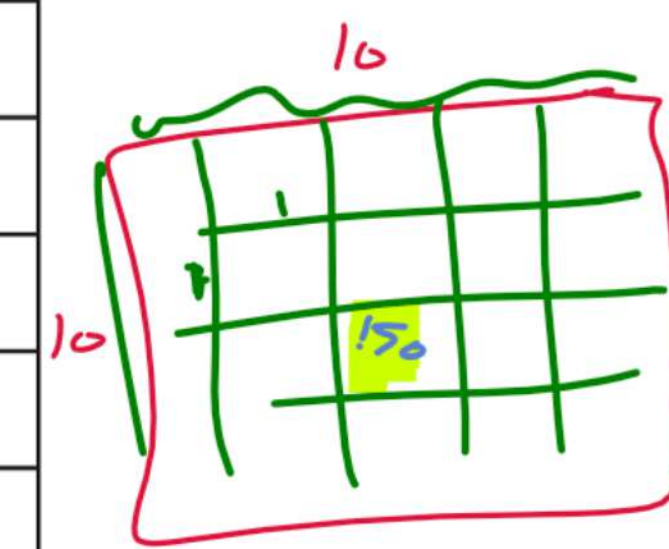
$$144 = 1.20 B$$

$$120 = B$$

27

A square field measures 10 meters by 10 meters. Ten students each mark off a randomly selected region of the field; each region is square and has side lengths of 1 meter, and no two regions overlap. The students count the earthworms contained in the soil to a depth of 5 centimeters beneath the ground's surface in each region. The results are shown in the table below.

Region	Number of earthworms	Region	Number of earthworms
A	107	F	141
B	147	G	150
C	146	H	154
D	135	I	176
E	149	J	166



$$10 \times 10 = 100 \text{ squares}$$

Which of the following is a reasonable approximation of the number of earthworms to a depth of 5 centimeters beneath the ground's surface in the entire field?

A) 150

B) 1,500

C) 15,000

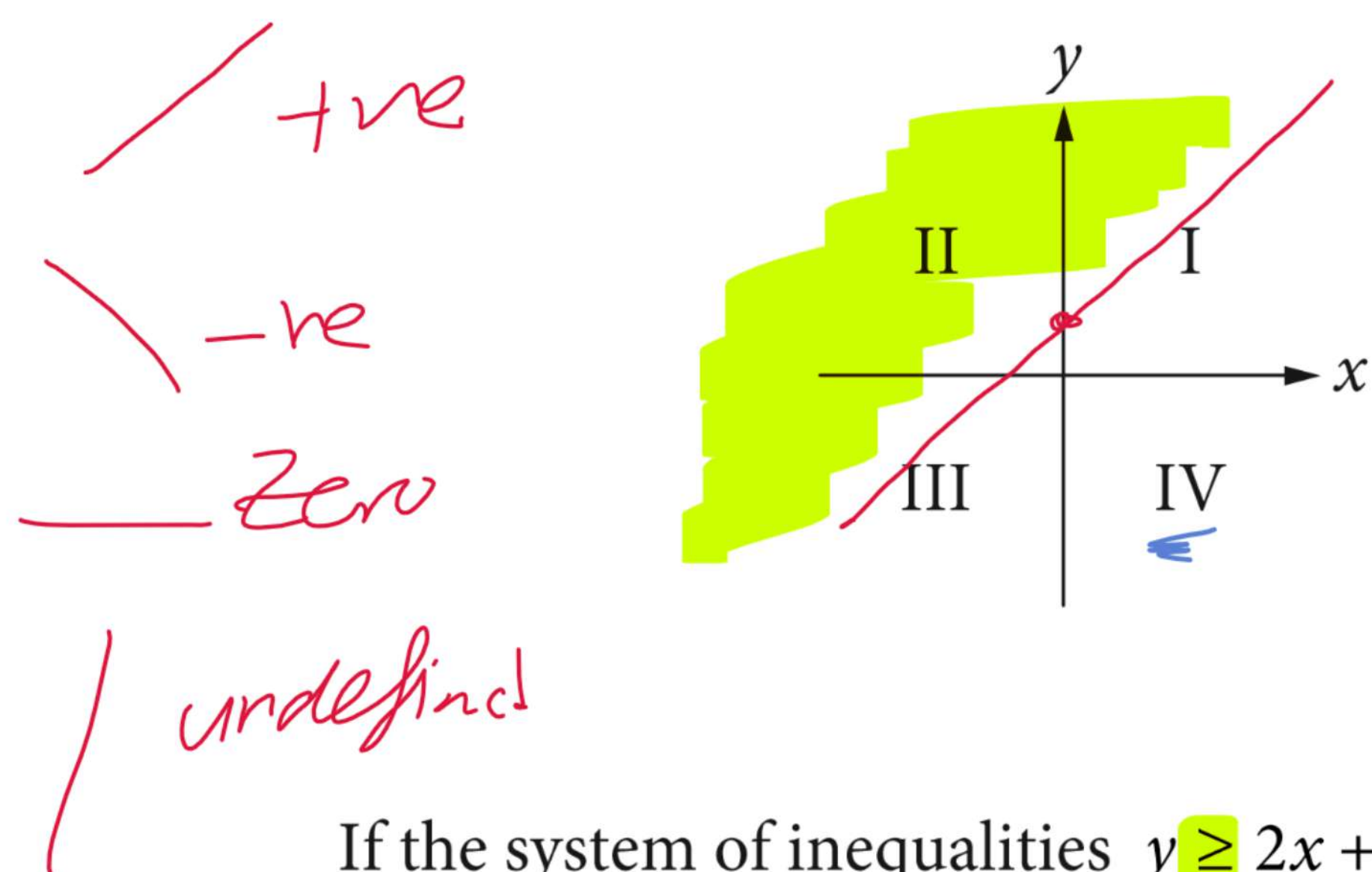
D) 150,000

$$150 \times 100 = 15000$$





28



If the system of inequalities  $y \geq 2x + 1$  and

$y > \frac{1}{2}x - 1$  is graphed in the  $xy$ -plane above, which

quadrant contains no solutions to the system?

- A) Quadrant II
- B) Quadrant III
- ☒ C) Quadrant IV
- D) There are solutions in all four quadrants.

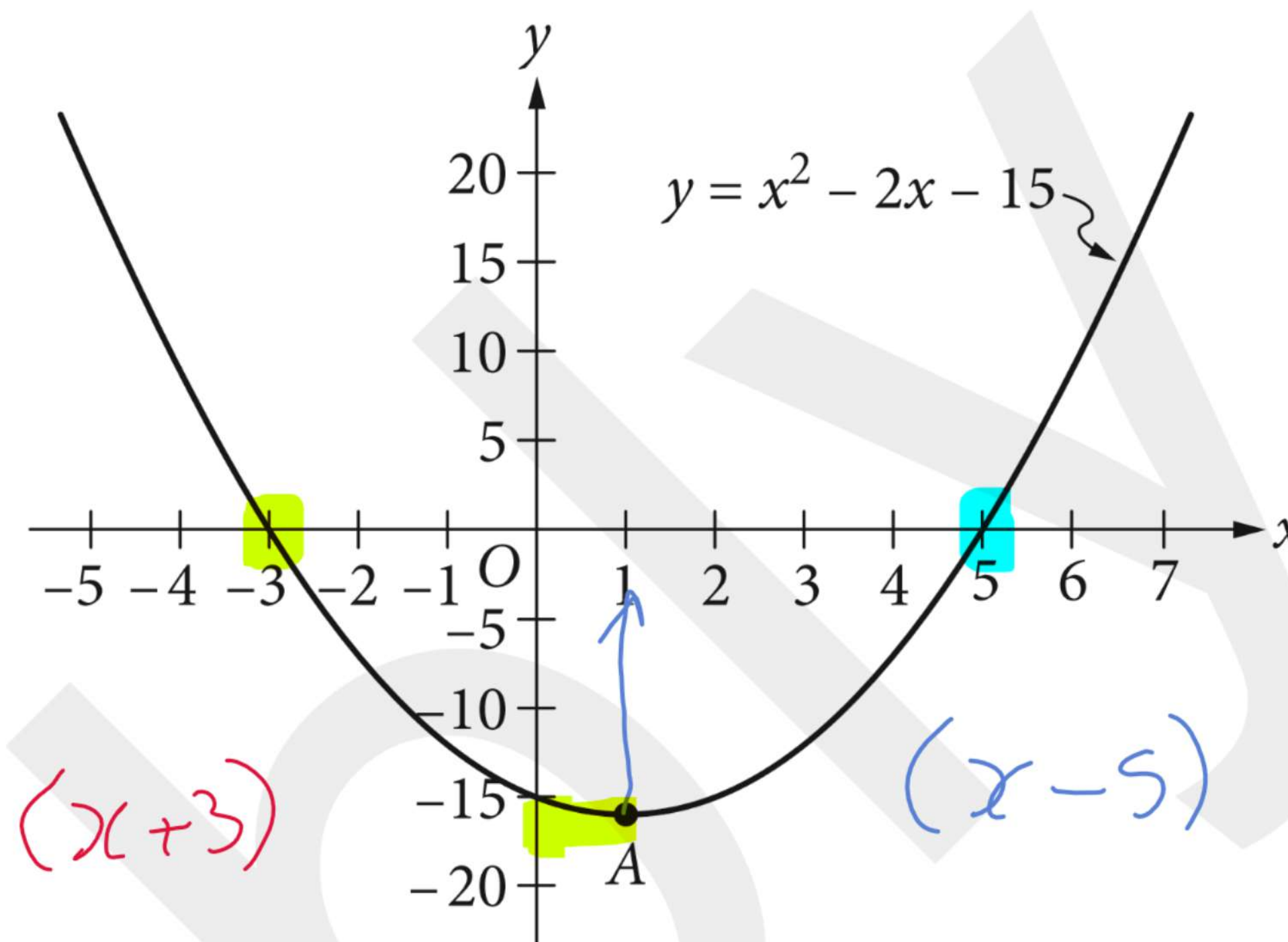
29

For a polynomial  $p(x)$ , the value of  $p(3)$  is  $-2$ . Which of the following must be true about  $p(x)$ ?

- A)  $x - 5$  is a factor of  $p(x)$ .
- B)  $x - 2$  is a factor of  $p(x)$ .
- C)  $x + 2$  is a factor of  $p(x)$ .
- ☒ D) The remainder when  $p(x)$  is divided by  $x - 3$  is  $-2$ .

$f(5) = 0 \Rightarrow (x-5)$  factor  
 $f(5) = 2 \Rightarrow \frac{f(x)}{(x-5)}$  remainder = 2

30



Which of the following is an equivalent form of the equation of the graph shown in the  $xy$ -plane above, from which the coordinates of vertex A can be identified as constants in the equation?

- A)  $y = (x + 3)(x - 5)$
- B)  $y = (x - 3)(x + 5)$
- C)  $y = x(x - 2) - 15$
- ☒ D)  $y = (x - 1)^2 - 16$

vertex, Max, Min





31

Wyatt can husk at least 12 dozen ears of corn per hour and at most 18 dozen ears of corn per hour. Based on this information, what is a possible amount of time, in hours, that it could take Wyatt to husk 72 dozen ears of corn?

A) 2

B) 3

C) 5

D) 7

$$\frac{72}{12} = 6$$

$$\frac{72}{18} = 4$$

32

The posted weight limit for a covered wooden bridge in Pennsylvania is 6000 pounds. A delivery truck that is carrying  $x$  identical boxes each weighing 14 pounds will pass over the bridge. If the combined weight of the empty delivery truck and its driver is 4500 pounds, what is the maximum possible value for  $x$  that will keep the combined weight of the truck, driver, and boxes below the bridge's posted weight limit?

A) 100

B) 107

C) 246

D) 321

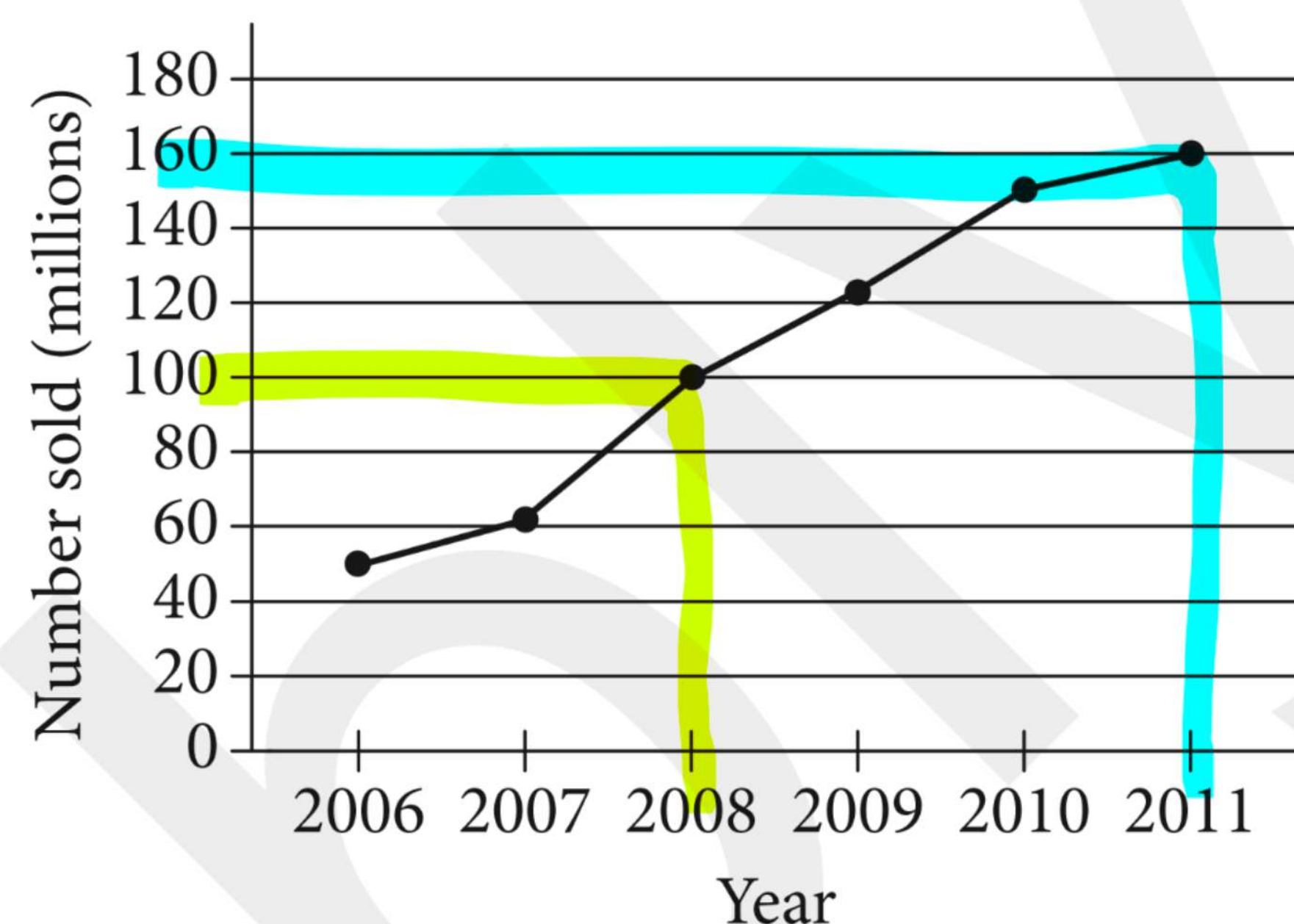
$$4500 + 14x \leq 6000$$

$$14x \leq \frac{1500}{14}$$

$$x \leq 107.1$$

33

Number of Portable Media Players Sold Worldwide Each Year from 2006 to 2011



According to the line graph above, the number of portable media players sold in 2008 is what fraction of the number sold in 2011?

A) 9/16

B) 5/8

C) 3/4

D) 8/5

$$\frac{100}{160} = \frac{5}{8}$$

34

A local television station sells time slots for programs in 30-minute intervals. If the station operates 24 hours per day, every day of the week, what is the total number of 30-minute time slots the station can sell for Tuesday and Wednesday?

A) 1.8

B) 30

C) 48

D) 96

$$24 \times 2 \times 2$$

int.  
1min  
30

x

$$2 \times 24 \times 60$$

$$\frac{1 \times 2 \times 24 \times 60}{30} = 96$$