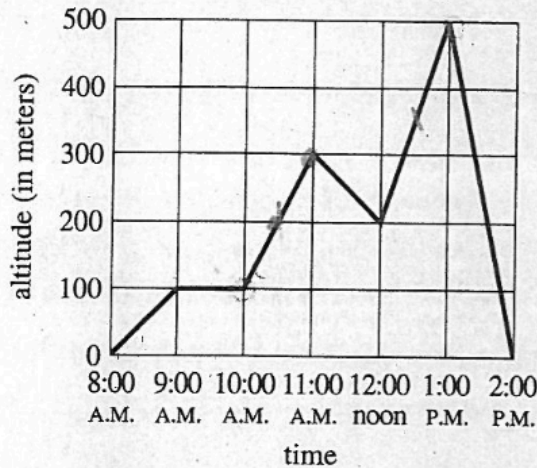


Use the following information to answer questions 46–49.

A balloonist collecting data on pollutants at various levels above the ground takes off at 8:00 A.M. When the balloon is in motion, it moves only straight up or straight down and at a constant speed within each hour-long interval. The balloon is at an altitude that is a multiple of 100 meters at the beginning of each hour. The balloon lands at 2:00 P.M. at the same spot from which it took off. The altitude of the balloon, in meters above the ground, is shown in the figure below.



46. Which of the following is closest to the total distance, in meters, that the balloonist traveled from 10:00 A.M. to 1:00 P.M.?

- H →
- F. 400
  - G. 500
  - H. 600
  - J. 680
  - K. 700

47. What was the total time, in hours and minutes, that the balloon was at least 200 meters above the ground?

- D
- A. 1 hour 30 minutes
  - B. 1 hour 36 minutes
  - C. 3 hours 0 minutes
  - D. 3 hours 6 minutes
  - E. 3 hours 48 minutes

Graphs and real life scenario

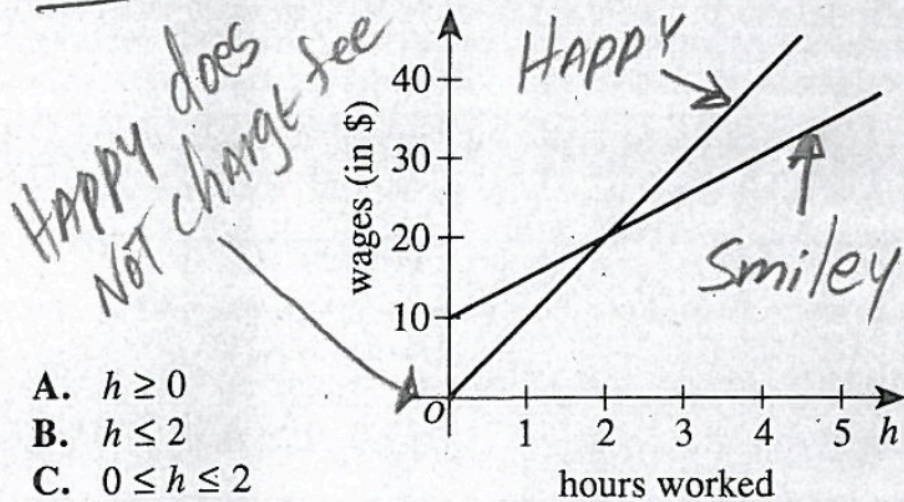
Time Interval	Distance Travel
10am → 11:00	200 ft up
11:00am → 12:00	100 ft down
12:00 → 1:00	300 ft up

TOTAL 600 feet

$$\frac{1}{2} + 1 + 1 + \frac{5}{8} = 3 \text{ hrs } 6 \text{ MIN}$$

Confusing because its tough to determine between 10 and 11 and 1 and 2

27. Smiley the Clown charges \$10 for scheduling a party and \$5 per hour after arriving at the party. Happy the Clown charges \$10 per hour for a party but does not have a charge for scheduling a party. The graph below shows the 2 clowns' wages, with  $h$  as the number of hours worked for a party. For what range of hours worked for a party does Happy the Clown make as much or more than Smiley the Clown?

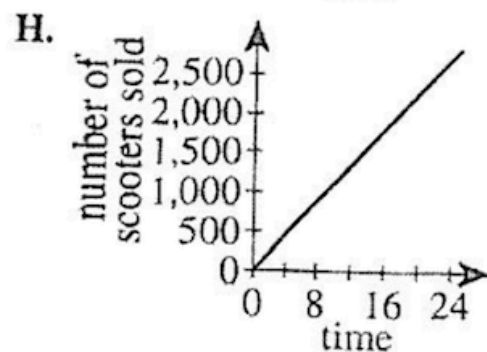
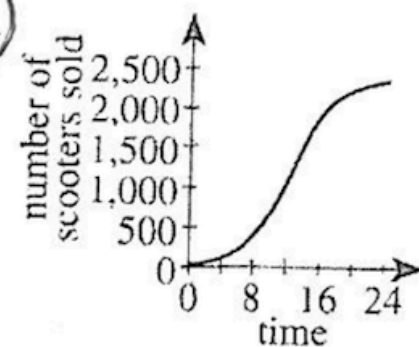
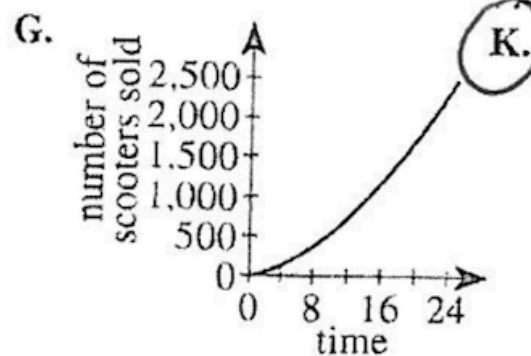
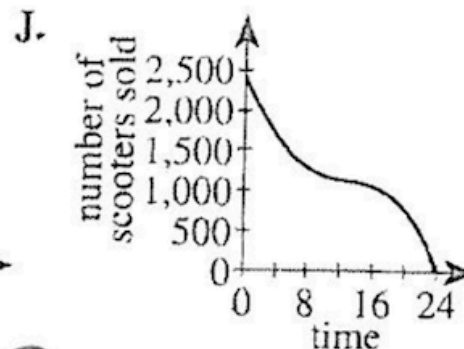
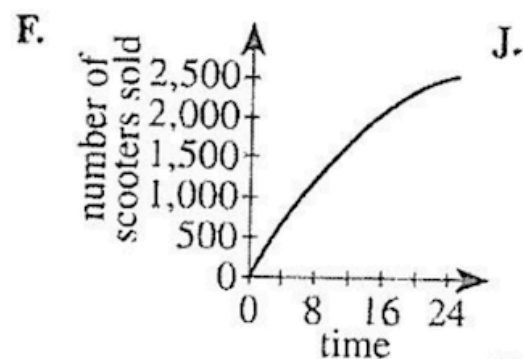


- A.  $h \geq 0$   
 B.  $h \leq 2$   
 C.  $0 \leq h \leq 2$   
 D.  $h \geq 2$   
 E. There is no range for which Happy the Clown will make as much or more than Smiley the Clown.

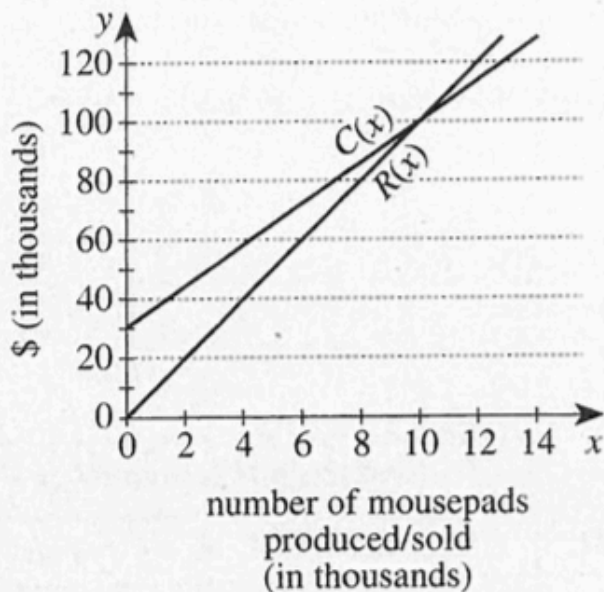
Graph interpretation  
 given some real life  
 scenario

After 2 hours  
 Happy makes MORE

10. For the first several months after the Fiery Red Scooter arrived in toy stores, the rate of sales increased slowly. As this new scooter caught on, however, the rate of sales increased rapidly. After several more months, many people owned a Fiery Red Scooter, and the rate of sales decreased. Which of the following graph could represent the total number of Fiery Red Scooter sold as a function of time, in months, after the scooter arrived in toy stores?

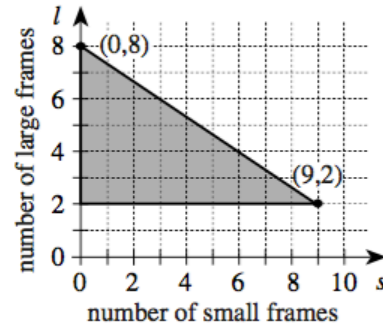


Mousepads Galore is a company that produces computer mousepads. *Cost* is the total money spent to produce and sell the mousepads, and *revenue* is the total income generated by the sale of the mousepads. The graph below depicts projections for the linear cost function,  $C(x)$ , and the linear revenue function,  $R(x)$ .



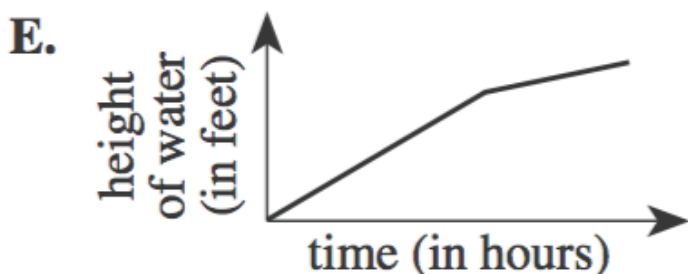
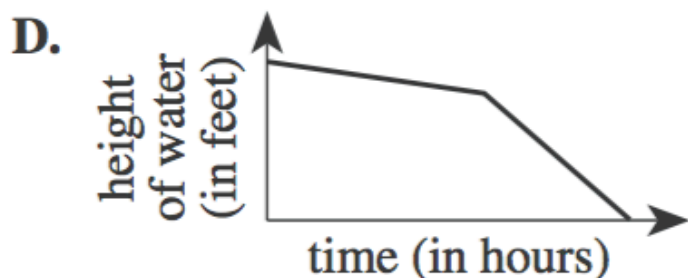
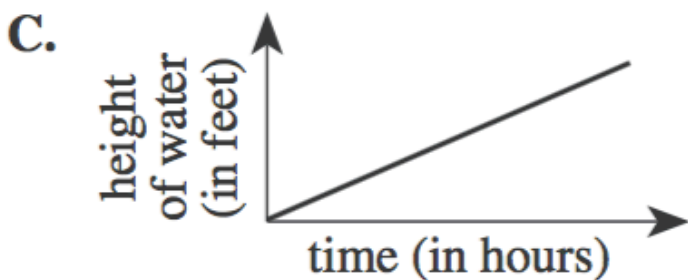
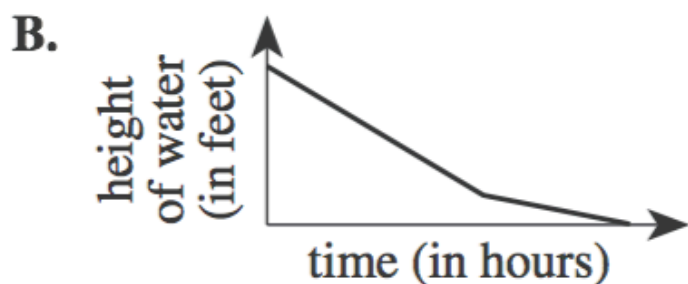
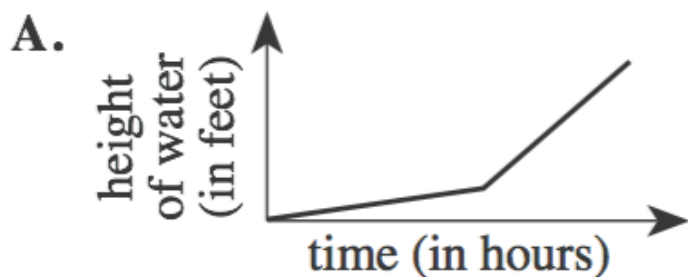
32. During the month of April, Mousepads Galore broke even (did not gain or lose any money) when  $x$  mousepads were produced and sold. How many mousepads did the company produce and sell during the month of April?
- F. 10,000  
 G. 12,000  
 H. 14,000  
 J. 15,000  
 K. 30,000
33. The cost function shown in the graph for Mousepads Galore has 2 components: a fixed cost, plus a constant production cost per mousepad. Which of the following is the fixed cost?
- A. \$ 0  
 B. \$ 1,000  
 C. \$ 10,000  
 D. \$ 30,000  
 E. \$100,000
34. Mousepads Galore sells each mousepad at the same price, which is an integer number of dollars. According to the revenue function, what is the price of each of these mousepads?
- F. \$ 3  
 G. \$ 7  
 H. \$10  
 J. \$12  
 K. Cannot be determined from the given information

Marcia makes and sells handcrafted picture frames in 2 sizes: small and large. It takes her 2 hours to make a small frame and 3 hours to make a large frame. The shaded triangular region shown below is the graph of a system of inequalities representing weekly constraints Marcia has in making the frames. For making and selling  $s$  small frames and  $l$  large frames, Marcia makes a profit of  $30s + 70l$  dollars. Marcia sells all the frames she makes.

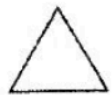
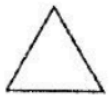
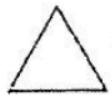
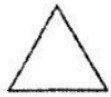
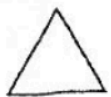


50. The weekly constraint represented by the horizontal line segment containing  $(9,2)$  means that each week Marcia makes a minimum of:
- F. 2 large frames.
  - G. 9 large frames.
  - H. 2 small frames.
  - J. 9 small frames.
  - K. 11 small frames.
51. For every hour that Marcia spends making frames in the second week of December each year, she donates \$3 from that week's profit to a local charity. This year, Marcia made 4 large frames and 2 small frames in that week. Which of the following is closest to the percent of that week's profit Marcia donated to the charity?
- A. 6%
  - B. 12%
  - C. 14%
  - D. 16%
  - E. 19%
52. What is the maximum profit Marcia can earn from the picture frames she makes in 1 week?
- F. \$410
  - G. \$460
  - H. \$540
  - J. \$560
  - K. \$690

31. Two hoses are used to fill the pool. Twice as many gallons of water per minute flow through one of the hoses as through the other. Both hoses had been on for 12 hours and had filled the pool to the 4-foot mark when the hose with the faster flow stopped working. The hose with the slower flow then finished filling the pool to the 5-foot mark. Which of the following graphs shows the relationship between the time spent filling the pool and the height of the water in the pool?



2



Mid-Point  
Formula

2

50. In the standard  $(x,y)$  coordinate plane,  $(12,3)$  is half-way between  $(2a, a + 3)$  and  $(4a, a - 5)$ . What is the value of  $a$ ?

- F. 0
- G. 2
- H. 3
- J. 4
- K. 6

you only have  
to set up ONE  
POINT to find  $a$

or

$$12 = \frac{2a + 4a}{2} \Rightarrow 24 = 6a$$
$$4 = a$$

$$3 = \frac{(a+3) + (a-5)}{2}$$
$$6 = 2a - 2$$
$$a = 2$$

60. In the standard  $(x,y)$  coordinate plane, the graphs of the 3 equations  $x - 1 = 0$ ,  $y + 2 = 0$ , and  $x + y = 4$  form the boundary of a triangle. What is the area of this triangle, expressed in square coordinate units?

- F.  $\frac{1}{2}$
- G.  $\frac{9}{2}$
- H. 8
- J.  $\frac{25}{2}$
- K.  $\frac{49}{2}$

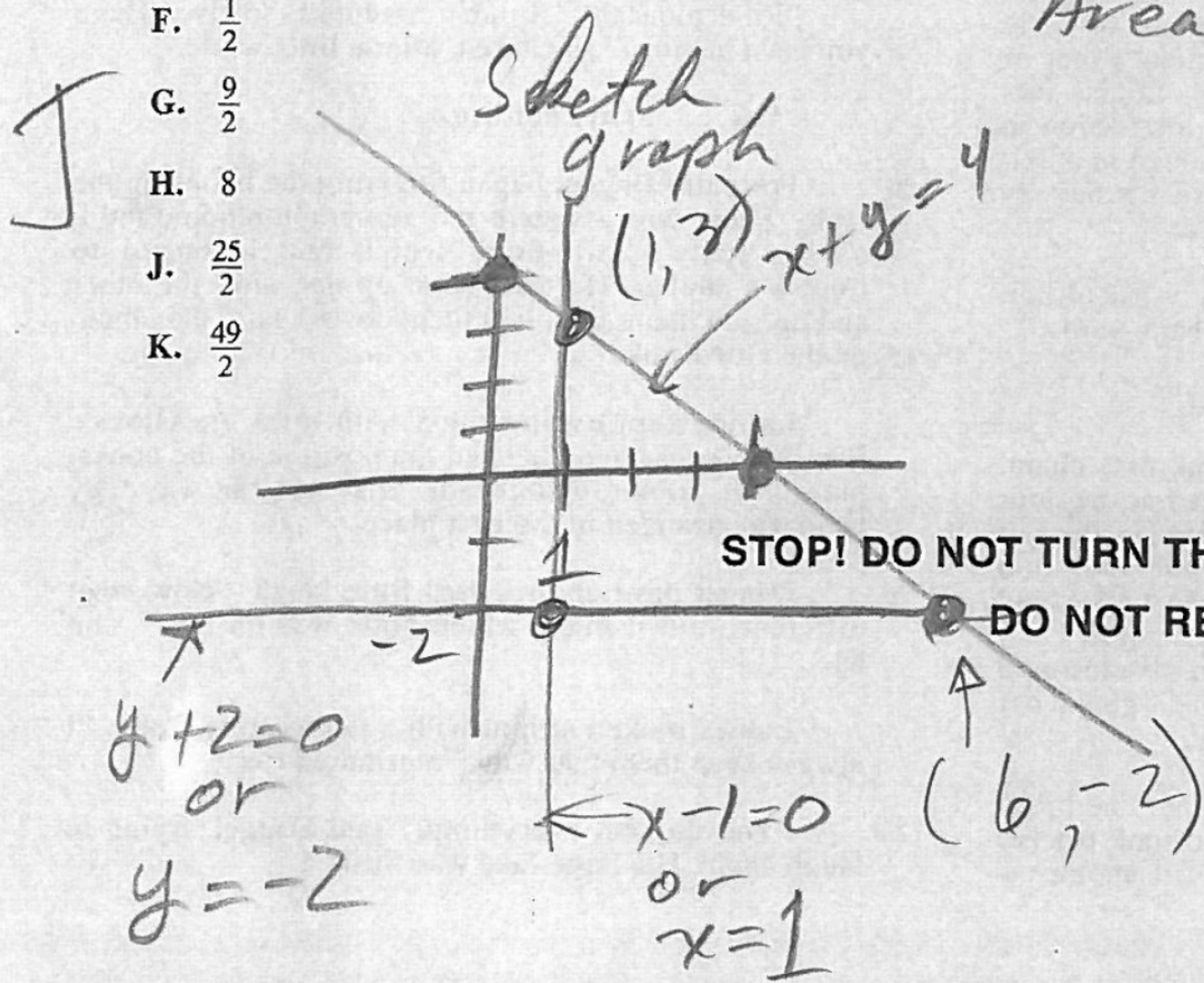
Graphing lines and Area of triangle

$$A = \frac{5 \times 5}{2} = \frac{25}{2}$$

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.



$$\text{base} = 6 - 1 = 5$$

$$\text{Height} = 3 - (-2) = 5$$



**34.** The graph of  $y = -5x^2 + 9$  passes through  $(1, 2a)$  in the standard  $(x, y)$  coordinate plane. What is the value of  $a$  ?

**F.** 2

**G.** 4

**H.** 7

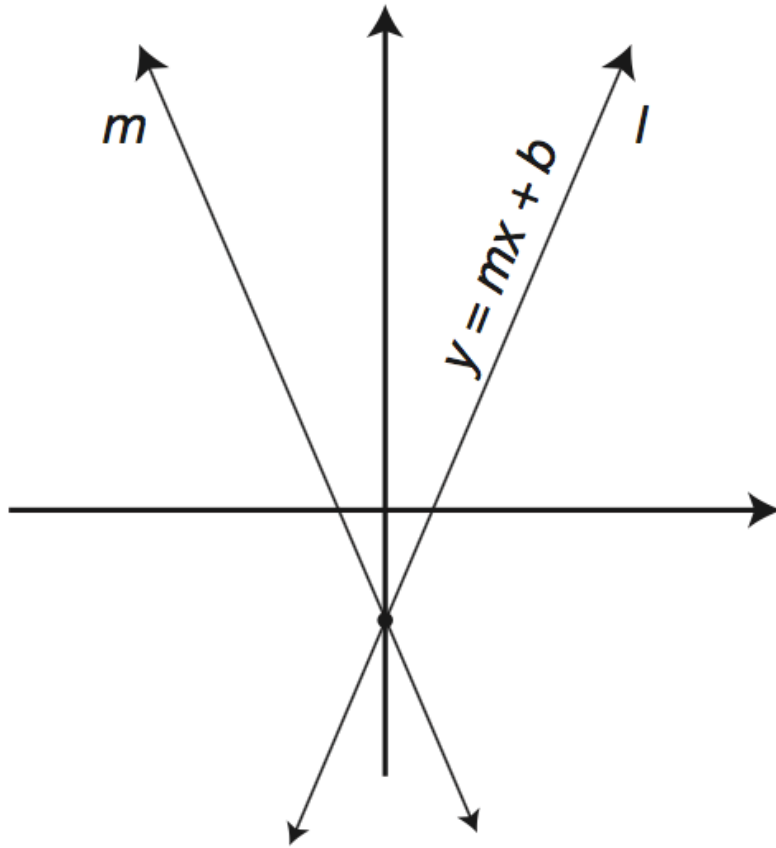
**J.** -1

**K.** -8

**55.** For some real number  $A$ , the graph of the line  $y = (A + 1)x + 8$  in the standard  $(x,y)$  coordinate plane passes through  $(2,6)$ . What is the slope of this line?

- A.**  $-4$
- B.**  $-3$
- C.**  $-1$
- D.**  $3$
- E.**  $7$

**18.** The equation of line  $l$  is  $y = mx + b$ . Which equation is line  $m$ ?



f.  $y = -mx$

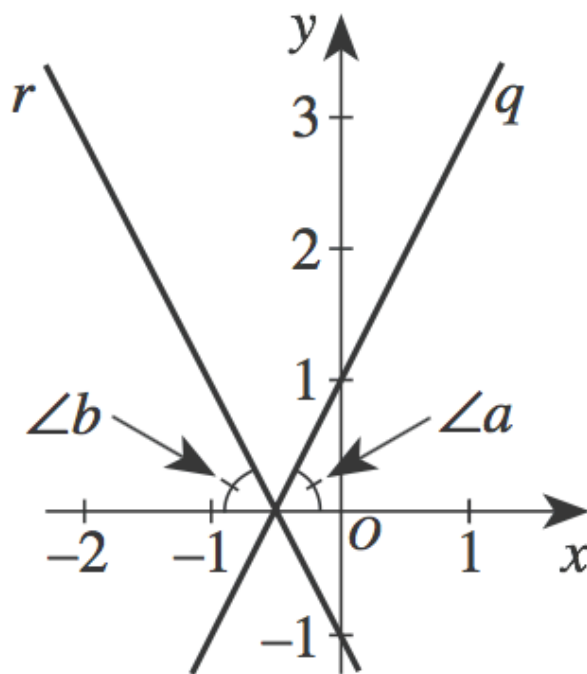
g.  $y = -x + b$

h.  $y = 2mx + b$

i.  $y = \frac{1}{2}mx - b$

j.  $y = -mx + b$

52. In the figure below, line  $q$  in the standard  $(x,y)$  coordinate plane has equation  $-2x + y = 1$  and intersects line  $r$ , which is distinct from line  $q$ , at a point on the  $x$ -axis. The angles,  $\angle a$  and  $\angle b$ , formed by these lines and the  $x$ -axis are congruent. What is the slope of line  $r$ ?



F.  $-2$

G.  $-\frac{1}{2}$

H.  $\frac{1}{2}$

J.  $2$

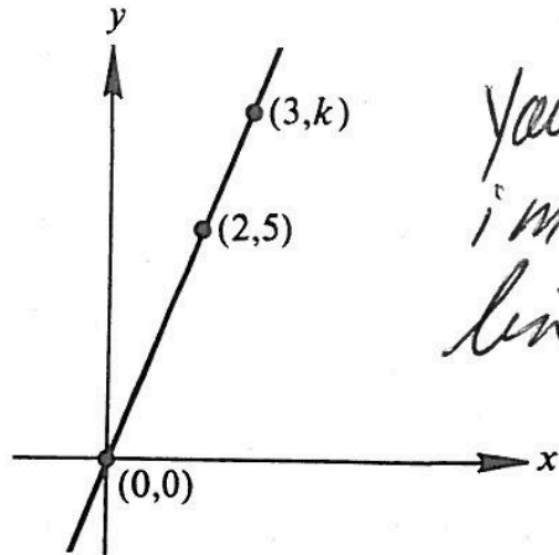
K. Cannot be determined from the given information

31. What are the  $(x,y)$  coordinates of the unique point on the graph of  $x + 4y = 18$  such that the  $y$ -coordinate of that point is twice the  $x$ -coordinate?

- A.  $(1,2)$
- B.  $(2,4)$
- C.  $(3,6)$
- D.  $(4,8)$
- E.  $(9,18)$

35. In the  $(x,y)$  coordinate plane below, a straight line passes through the 3 indicated points. What is the value of  $k$ ?

DO YOUR FIGURING HERE.



5  
You can look at points and tell immediately that the slope of line is  $\frac{5}{2}$ . Because  $\frac{5-0}{2-0} = \frac{5}{2}$   
Set up equation  $\frac{5}{2} = \frac{k-5}{3-2} = k-5$

These two are wrong because line has positive slope

$$\frac{5}{2} = k - 5$$
$$5 + \frac{5}{2} = k = \frac{15}{2}$$

A.  $-\frac{15}{2}$

B.  $-\frac{6}{5}$

C.  $\frac{6}{5}$

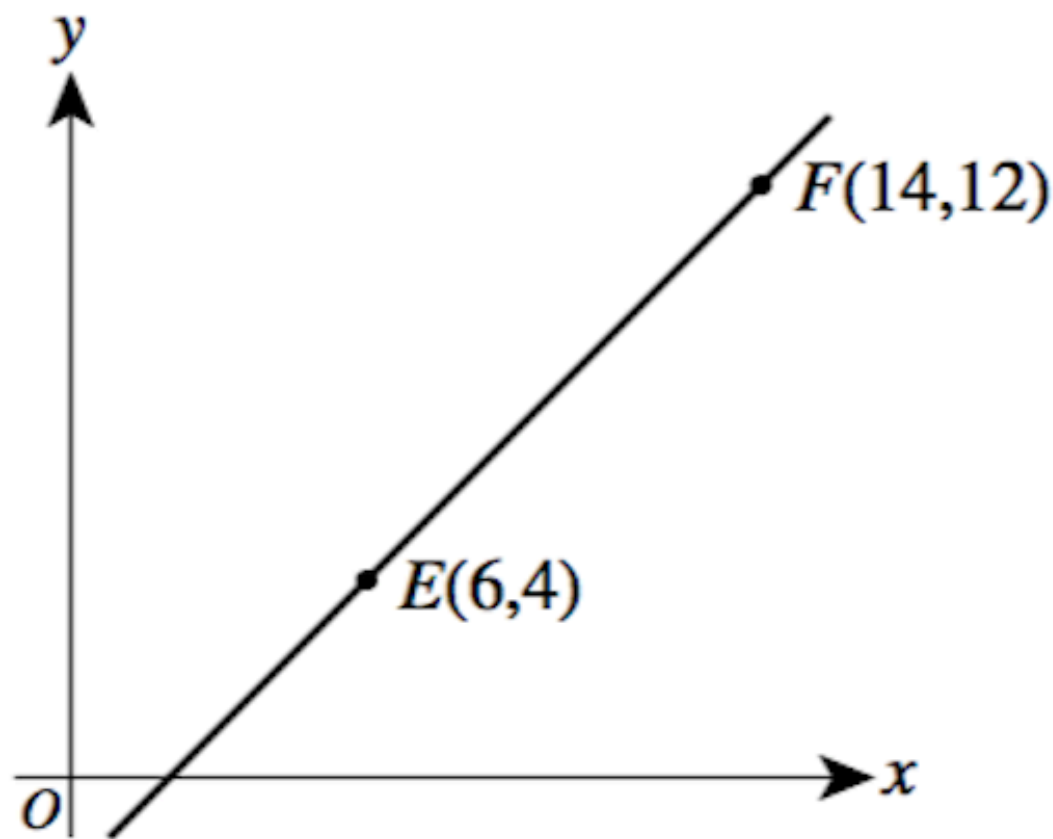
D. 6

E.  $\frac{15}{2}$

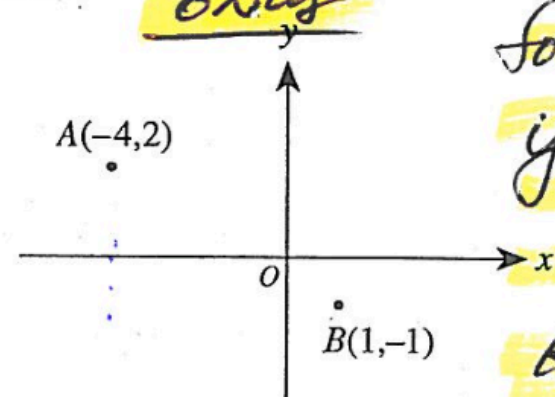


44. The points  $E(6,4)$  and  $F(14,12)$  lie in the standard  $(x,y)$  coordinate plane shown below. Point  $D$  lies on  $\overline{EF}$  between  $E$  and  $F$  such that the length of  $\overline{EF}$  is 4 times the length of  $\overline{DE}$ . What are the coordinates of  $D$ ?

- F. ( 7, 5)
- G. ( 8, 6)
- H. ( 8, 8)
- J. (10, 8)
- K. (12,10)



19. In the standard  $(x,y)$  coordinate plane shown below, what is the distance in the  $x$  direction, in units, from point A to point B?



- A
- A. 5
  - B. 4
  - C. 3
  - D. -3
  - E. -5

This is Not a distance formula question. Make sure you work on the question asked and not what you assume.  $(-4 - 1) = -5$  or <sup>5</sup> units



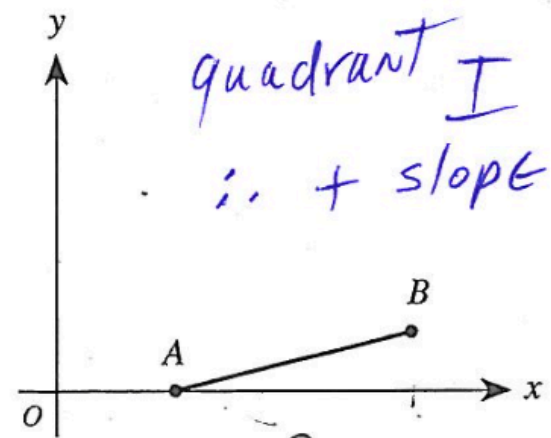
17. The scales on both axes of the standard  $(x,y)$  coordinate plane below are the same. Of the following, which is the best estimate for the slope of  $\overline{AB}$ ?

Big  $\Delta$  in  $y$   
Small  $\Delta$  in  $x$

- A. 4
- B.  $\frac{3}{4}$
- C.  $\frac{1}{4}$
- D.  $-\frac{1}{4}$
- E. -4

→

ACT-57B  
Can't be

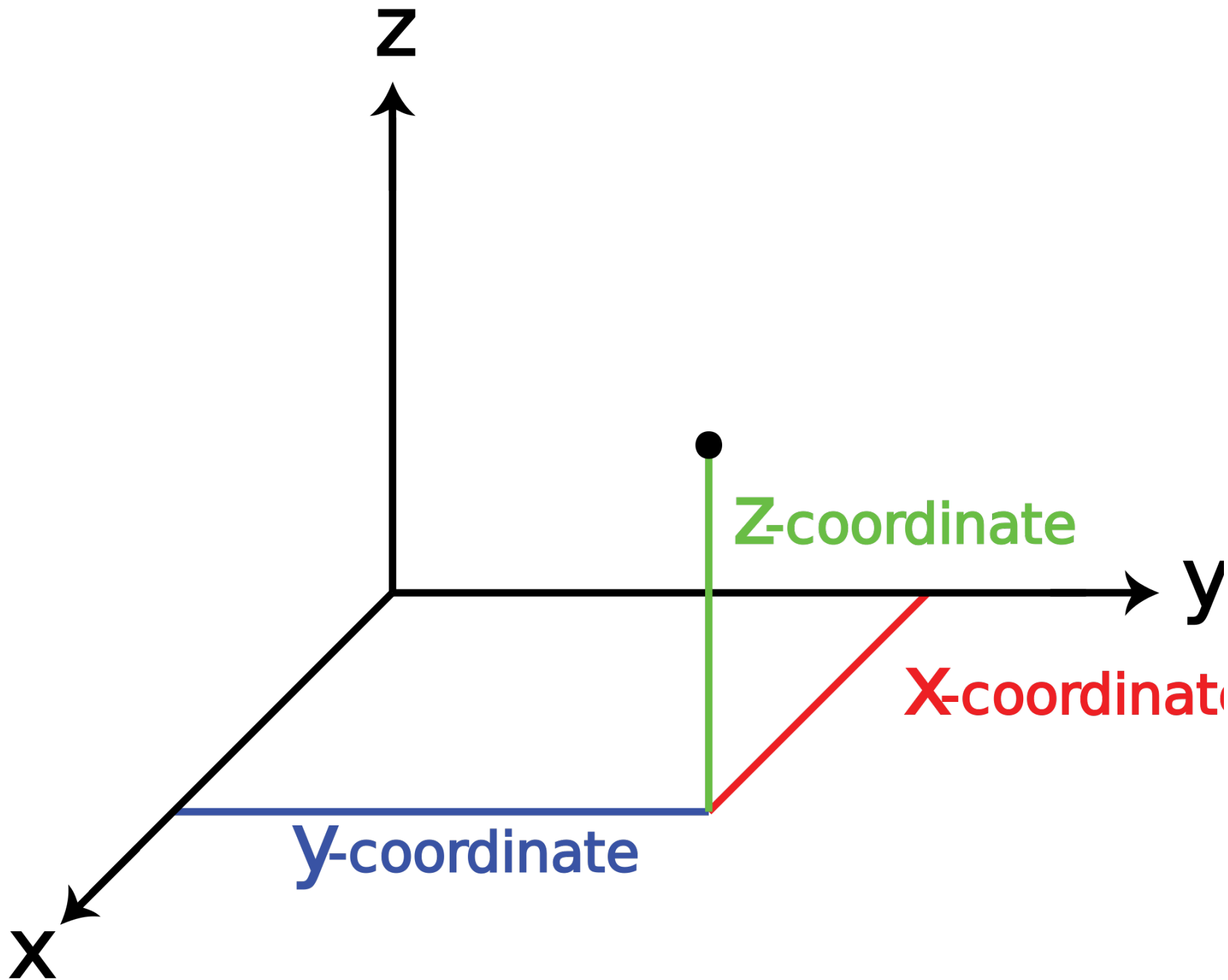


Slope and coordinate graphing system

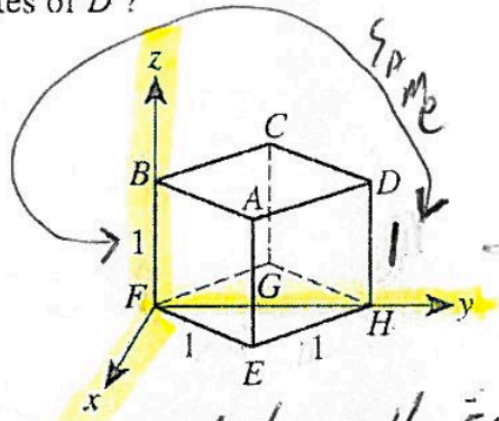
$$\text{Slope} = \frac{\Delta y}{\Delta x} \frac{\text{change of } y}{\text{change of } x}$$

Going from A to B, there's much more change in  $x$  than in  $y$

GO ON TO THE NEXT PAGE.



52. As shown in the  $(x,y,z)$  coordinate space below, the cube with vertices  $A$  through  $H$  has edges that are 1 coordinate unit long. The coordinates of  $F$  are  $(0,0,0)$ , and  $H$  is on the positive  $y$ -axis. What are the coordinates of  $D$ ?



$(x, y, z)$  coordinate  
Planes

To get your bearings, refer back to the  $(x, y)$  coordinate plane. Point  $D$  would move up from  $(x, y)$

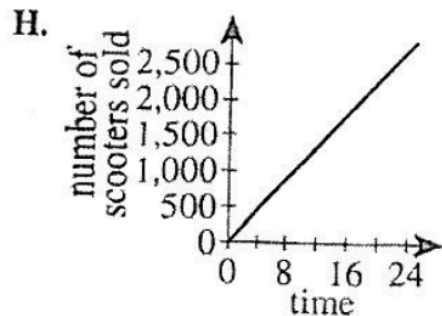
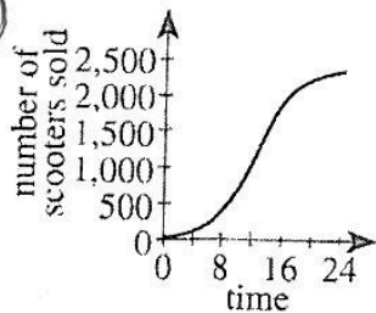
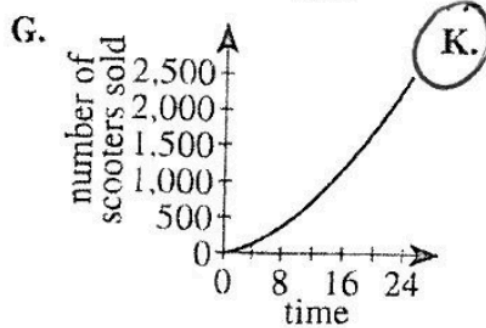
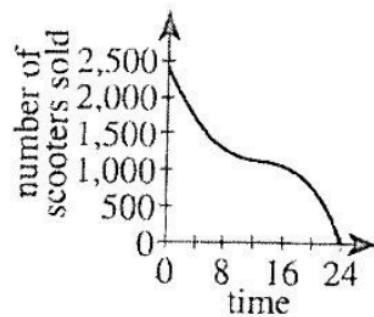
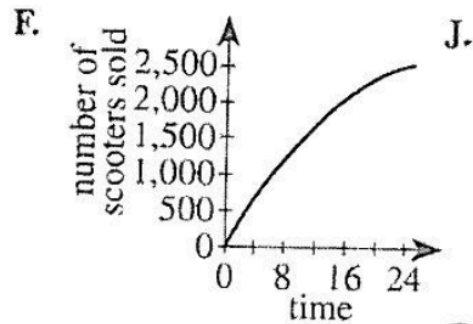
and have the same  $z$  value as point  $B$

$$1^2 + 1^2 = (\text{Point \#})^2 \rightarrow \text{Point D has same } y\text{-value as point H}$$

$$2^2 = (\text{Point \#})^2 = \sqrt{2} = \text{Point \#}$$

- F.  $(0,1,1)$   
 G.  $(0,\sqrt{2},0)$   
 → H.  $(0,\sqrt{2},1)$   
 J.  $(0,\sqrt{2},\sqrt{3})$   
 K.  $(1,1,1)$

10. For the first several months after the Fiery Red Scooter arrived in toy stores, the rate of sales increased slowly. As this new scooter caught on, however, the rate of sales increased rapidly. After several more months, many people owned a Fiery Red Scooter, and the rate of sales decreased. Which of the following graphs could represent the total number of Fiery Red Scooters sold as a function of time, in months, after the scooter arrived in toy stores?



Translating  
real life events  
into graphical  
form

← slow, rapid increase,  
decrease in rate of  
increase.

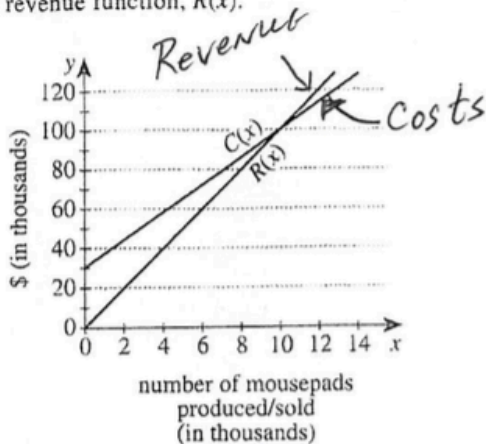


Use the following information to answer questions 32–34.

DO YOUR FIGURING HERE.

Linear Means STRAIGHT LINE

Mousepads Galore is a company that produces computer mousepads. *Cost* is the total money spent to produce and sell the mousepads, and *revenue* is the total income generated by the sale of the mousepads. The graph below depicts projections for the linear cost function,  $C(x)$ , and the linear revenue function,  $R(x)$ .



32. During the month of April, Mousepads Galore broke even (did not gain or lose any money) when  $x$  mousepads were produced and sold. How many mousepads did the company produce and sell during the month of April?

→ F. 10,000  
G. 12,000  
H. 14,000  
J. 15,000  
K. 30,000

where the two lines intersect is where the company starts to recoup their expenses.

33. The cost function shown in the graph for Mousepads Galore has 2 components: a fixed cost, plus a constant production cost per mousepad. Which of the following is the fixed cost?

→ A. \$ 0  
B. \$ 1,000  
C. \$ 10,000  
D. \$ 30,000  
E. \$ 100,000

Before the company sold or produce ONE unit, it had \$30,000 in START up cost. Look at point (0, 30)

34. Mousepads Galore sells each mousepad at the same price, which is an integer number of dollars. According to the revenue function, what is the price of each of these mousepads?

→ F. \$ 3  
G. \$ 7  
H. \$ 10  
J. \$ 12  
K. Cannot be determined from the given information

\$10.00 is your best choice  
This question is a little misleading because this point where  $C(x)$  crosses  $R(x)$  isn't exactly  $\frac{\$100,000}{10,000}$

The Slope of the  $R(x)$  unit is the cost per unit.

44. The points  $E(6,4)$  and  $F(14,12)$  lie in the standard  $(x,y)$  coordinate plane shown below. Point  $D$  lies on  $\overline{EF}$  between  $E$  and  $F$  such that the length of  $\overline{EF}$  is 4 times the length of  $\overline{DE}$ . What are the coordinates of  $D$ ?

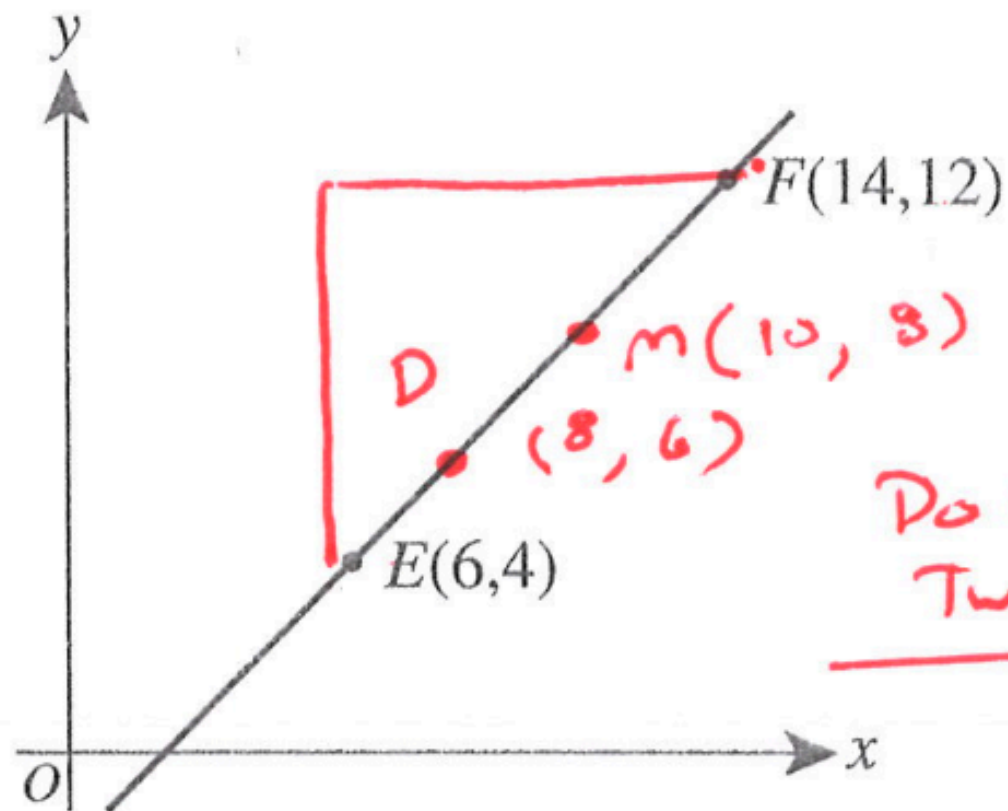
F. ( 7, 5)

G. ( 8, 6)

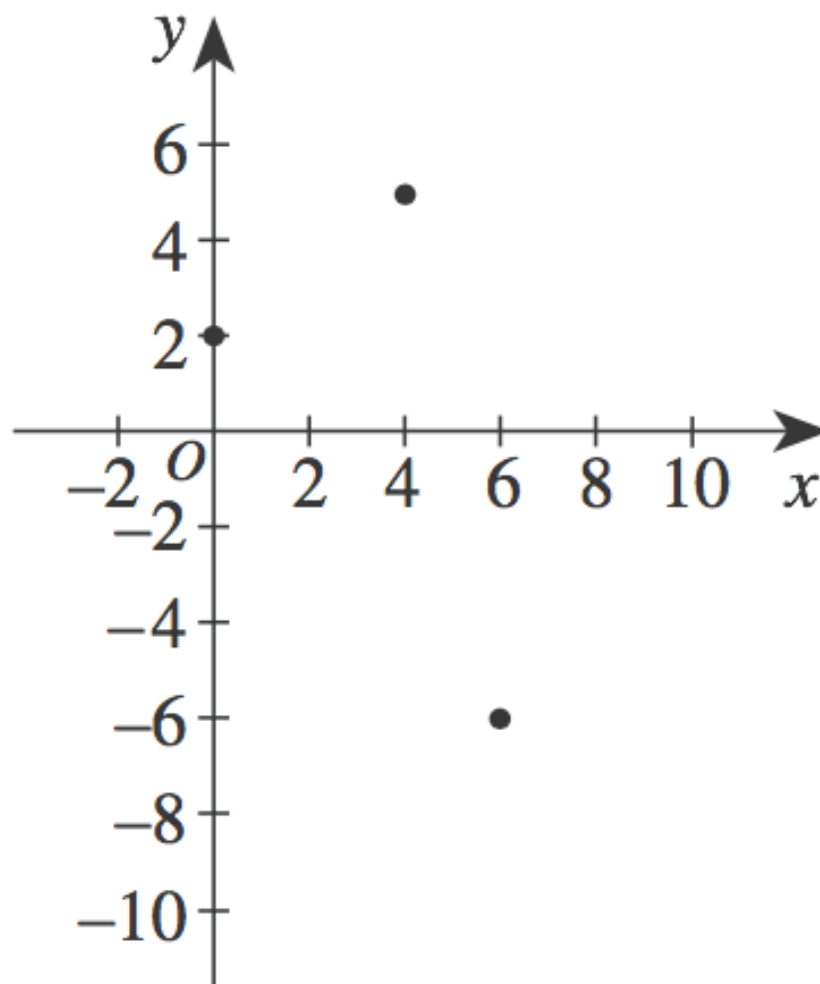
H. ( 8, 8)

J. (10, 8)

K. (12,10)



10. Rectangle  $ABCD$  has vertices  $A(4,5)$ ,  $B(0,2)$ , and  $C(6,-6)$ . These vertices are graphed below in the standard  $(x,y)$  coordinate plane. What are the coordinates of vertex  $D$ ?



- F.  $(10, -3)$
- G.  $(9, -2)$
- H.  $(8, 2)$
- J.  $(7, 1)$
- K.  $(2, -9)$

---

**25.** The sides of a square are 3 cm long. One vertex of the square is at  $(3,0)$  on a square coordinate grid marked in centimeter units. Which of the following points could also be a vertex of the square?

**A.**  $(6, 0)$

**B.**  $\left(4\frac{1}{2}, 1\frac{1}{2}\right)$

**C.**  $(1, 2)$

**D.**  $(0, -2)$

**E.**  $(-3, 0)$



**30.** The sides of a square are 3 cm long. One vertex of the square is at  $(2,0)$  on a square coordinate grid marked in centimeter units. Which of the following points could also be a vertex of the square?

**F.**  $(-4, 0)$

**G.**  $(0, 1)$

**H.**  $(1, -1)$

**J.**  $(4, 1)$

**K.**  $(5, 0)$

**16.** What is the slope of any line parallel to the line  $8x + 9y = 3$  in the standard  $(x,y)$  coordinate plane?

**F.**  $-8$

**G.**  $-\frac{8}{9}$

**H.**  $\frac{8}{3}$

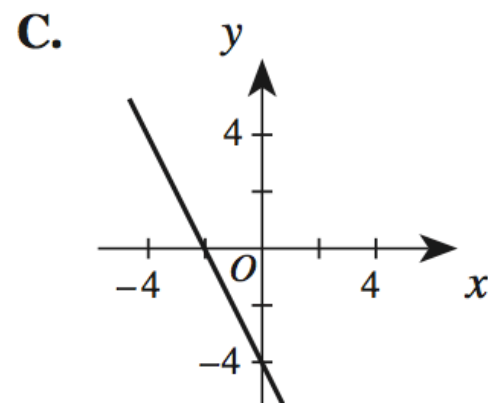
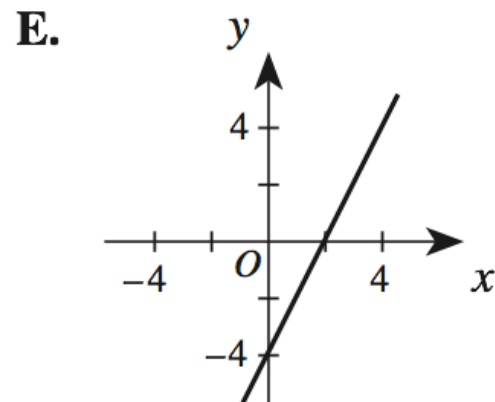
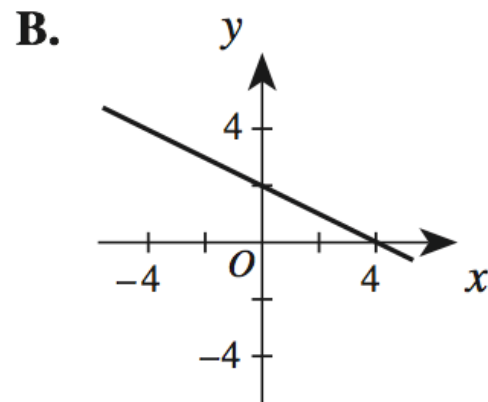
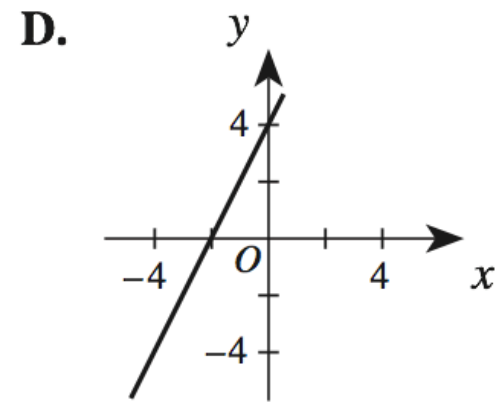
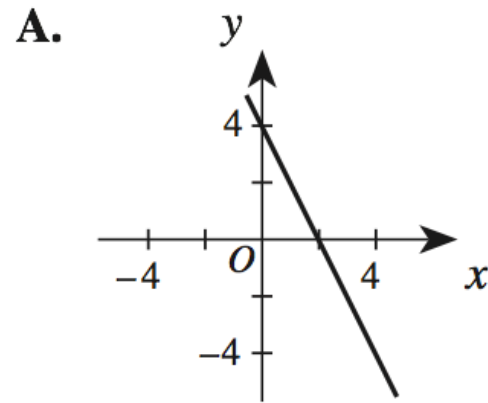
**J.**  $3$

**K.**  $8$

**17.** In the standard  $(x,y)$  coordinate plane, a line segment has its endpoints at  $(3,6)$  and  $(9,4)$ . What are the coordinates of the midpoint of the line segment?

- A.**  $(3,-1)$
- B.**  $(3, 1)$
- C.**  $(6, 2)$
- D.**  $(6, 5)$
- E.**  $(12,10)$

35. Which of the following is the graph of the equation  $2x + y = 4$  in the standard  $(x,y)$  coordinate plane?



**57.** When graphed in the standard  $(x,y)$  coordinate plane, the lines  $x = -3$  and  $y = x - 3$  intersect at what point?

**A.**  $(0, 0)$

**B.**  $(0, -3)$

**C.**  $(-3, 0)$

**D.**  $(-3, -3)$

**E.**  $(-3, -6)$

**12.** What is the slope of the line through  $(-5,2)$  and  $(6,7)$  in the standard  $(x,y)$  coordinate plane?

**F.** 9

**G.** 5

**H.**  $-5$

**J.**  $\frac{5}{11}$

**K.**  $-\frac{5}{11}$

**37.** In the standard  $(x,y)$  coordinate plane, the midpoint of  $\overline{AB}$  is  $(4,-3)$  and  $A$  is located at  $(1,-5)$ . If  $(x,y)$  are the coordinates of  $B$ , what is the value of  $x + y$  ?

- A.** 19
- B.** 8
- C.** 6
- D.**  $-1.5$
- E.**  $-3$

9. In the standard  $(x,y)$  coordinate plane, point  $M$  with coordinates  $(5,4)$  is the midpoint of  $\overline{AB}$ , and  $B$  has coordinates  $(7,3)$ . What are the coordinates of  $A$  ?

A.  $(17,11)$

B.  $(9, 2)$

C.  $(6, 3.5)$

D.  $(3, 5)$

E.  $(-3,-5)$



**17.** Which of the following is the slope of a line parallel to the line  $y = \frac{2}{3}x - 4$  in the standard  $(x,y)$  coordinate plane?

**A.**  $-4$

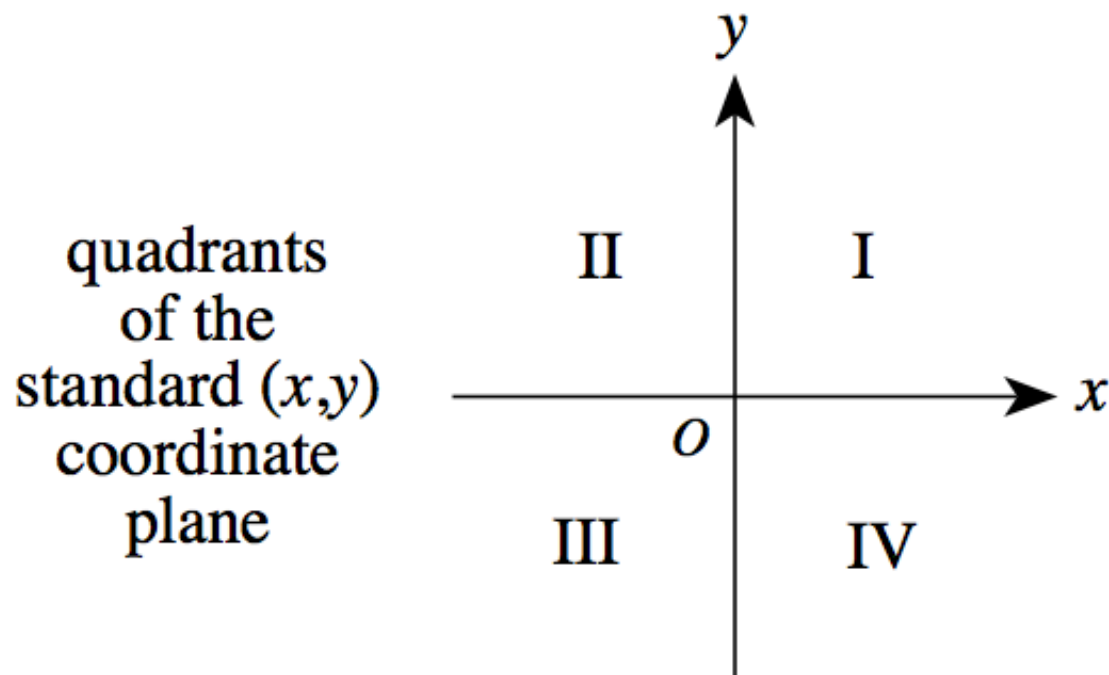
**B.**  $-\frac{3}{2}$

**C.**  $2$

**D.**  $\frac{3}{2}$

**E.**  $\frac{2}{3}$

33. What are the quadrants of the standard  $(x,y)$  coordinate plane below that contain points on the graph of the equation  $4x - 2y = 8$  ?



- A. I and III only
- B. I, II, and III only
- C. I, II, and IV only
- D. I, III, and IV only
- E. II, III, and IV only

- 39.** The coordinates of the endpoints of  $\overline{CD}$ , in the standard  $(x,y)$  coordinate plane, are  $(-4,-2)$  and  $(14,2)$ . What is the  $x$ -coordinate of the midpoint of  $\overline{CD}$  ?
- A.** 0
  - B.** 2
  - C.** 5
  - D.** 9
  - E.** 10

**4.** What is the  $y$ -intercept of the line  $4y + 2x = 12$ ?

**f.** 12

**g.** -2

**h.** 6

**i.** -6

**j.** 3

---

**13.** Which point lies on the same line as  $(2, -3)$  and  $(6, 1)$ ?

a.  $(5, -6)$

b.  $(2, 3)$

c.  $(-1, 8)$

d.  $(7, 2)$

e.  $(4, 0)$

**11.** Find the slope of the line  $7x = 3y - 9$ .

a. 3

b. -9

c.  $\frac{7}{3}$

d. -3

e.  $\frac{3}{7}$

**29.** The vertices of a triangle are  $A(-1, 3)$ ,  $B(3, 0)$ , and  $C(-2, -1)$ . Find the length of side  $\overline{AC}$ .

a.  $\sqrt{15}$

b.  $\sqrt{17}$

c. 19

d. 17

e.  $3\sqrt{6}$

**30.** Which of the following equations has a graph that has a  $y$ -intercept of 4 and is parallel to  $3y - 9x = 24$ ?

f.  $-12x + 4y = 16$

g.  $9x - 3y = -15$

h.  $2y = 4x + 8$

i.  $7y = 14x + 7$

j.  $3x - 9y = 14$



**56.** Three of the vertices of a square are  $(-2, 3)$ ,  $(5, 3)$ , and  $(-2, -4)$ . What is the length of a side of the square?

**f.** 5

**g.** 4

**h.** 3

**i.** 7

**j.** 8

**57.** Which of the following lines is perpendicular to  $y = 3x + 1$ ?

a.  $6x + 5 = 2y$

b.  $4 + y = 3x$

c.  $-9y = -3 + 2x$

d.  $2x + y = 4$

e.  $3y + x = 5$

**59.** What is the midpoint of  $\overline{XY}$  if  $X(-4, -2)$  and  $Y(3, 8)$ ?

- a.  $(-7, 6)$
- b.  $(-0.5, 3)$
- c.  $(-1, 6)$
- d.  $(-7, -10)$
- e.  $(2, -1.5)$

- 74.** Triangle  $XYZ$  is an equilateral triangle.  $\overline{YW}$  is an altitude of the triangle. If  $\overline{YX}$  is 14 inches, what is the length of the altitude?
- f.  $7\sqrt{3}$  inches
  - g. 7 inches
  - h.  $7\sqrt{2}$  inches
  - i.  $6\sqrt{3}$  inches
  - j. 12 inches

17. The scales on both axes of the standard  $(x, y)$  coordinate plan below are the same. Of the following, which is the best estimate for the slope of  $\overline{AB}$ ?

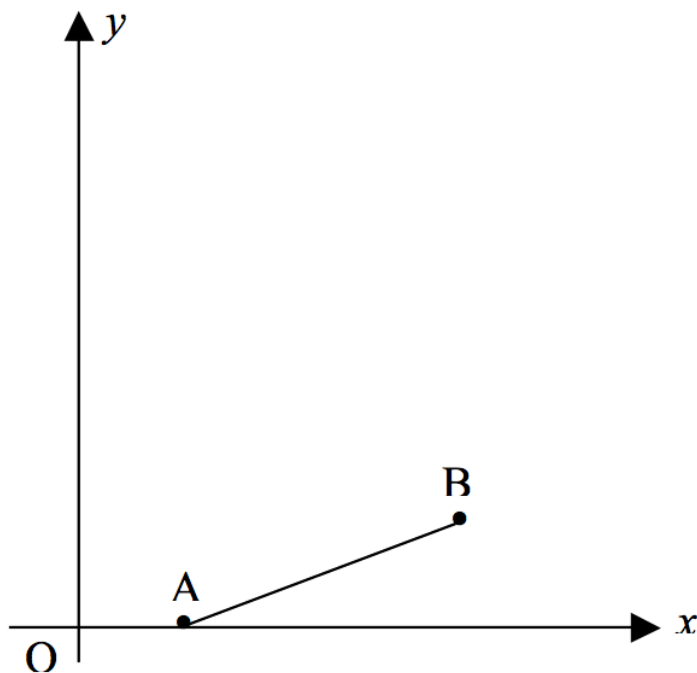
A. 4

B.  $\frac{3}{4}$

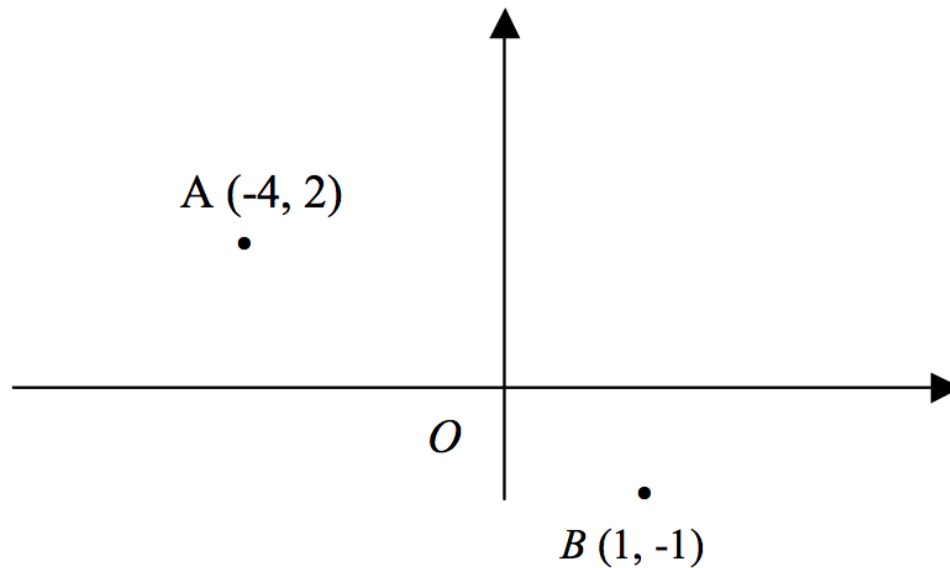
C.  $\frac{1}{4}$

D.  $-\frac{1}{4}$

E. -4



19. In the standard  $(x, y)$  coordinate plane shown below, what is the distance in the  $x$  direction, in units, from point  $A$  to point  $B$ ?



- A. 5
- B. 4
- C. 3
- D. -3
- E. -5

**25.** To check the slope of a ramp, a building inspector places an overlay of the standard  $(x,y)$  coordinate plane on the construction blueprint so that the  $x$ -axis aligns with the horizontal on the blueprint. The line segment representing the side view of the ramp goes through the points  $(1,-3)$  and  $(14,2)$ . What is the slope of the planned ramp?

**A.**  $-\frac{1}{15}$

**B.**  $-\frac{1}{13}$

**C.**  $-\frac{1}{6}$

**D.**  $\frac{5}{13}$

**E.**  $\frac{13}{5}$

- 56.** Lines  $p$  and  $q$  intersect at point  $(1,3)$  in the standard  $(x, y)$  coordinate plane. Lines  $p$  and  $r$  intersect at  $(2,5)$ . Which of the following is an equation for line  $p$ ?
- F.**  $y = 2x + 1$
- G.**  $y = 2x + 2$
- H.**  $y = 2x + 3$
- I.**  $y = 2x + 5$
- J.** Cannot be determined from the given information



**36.** Which of the following is an equation of the line that passes through the points  $(1,3)$  and  $(-3,-13)$  in the standard  $(x,y)$  coordinate plane?

**F.**  $x + y = 4$

**G.**  $4x - y = 1$

**H.**  $5x - y = 2$

**J.**  $6x - 2y = 8$

**K.**  $7x - 2y = 5$

K.  $1 < a$

45. What is the distance, in coordinate units, between the points  $P(-2,-1)$  and  $Q(1,3)$  in the standard  $(x,y)$  coordinate plane?

A.  $\sqrt{5}$

B.  $\sqrt{7}$

C. 3

D. 5

E. 7

47. Which of the following defines the solution set for the system of inequalities below?

$$\begin{aligned}x &\leq 6 \\4 + 2x &\geq 0\end{aligned}$$

- A.  $x \geq -2$
- B.  $x \leq 6$
- C.  $-8 \leq x \leq 6$
- D.  $-2 \leq x \leq 6$
- E.  $2 \leq x \leq 6$

49. If two lines in the standard  $(x,y)$  coordinate plane are perpendicular and the slope of one of the lines is 3, what is the slope of the other line?

A.  $-3$

B.  $-1$

C.  $-\frac{1}{3}$

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

E.  $3$

**50.** In the standard  $(x,y)$  coordinate plane,  $(12,3)$  is half-way between  $(2a, a + 3)$  and  $(4a, a - 5)$ . What is the value of  $a$ ?

- F.** 0
- G.** 2
- H.** 3
- J.** 4
- K.** 6

24. In the  $(x,y)$  coordinate plane, what is the slope of the line  $y = x - 5$  ?

F.  $-5$

G.  $-1$

H.  $\frac{1}{5}$

J.  $1$

K.  $5$

31. What are the  $(x,y)$  coordinates of the unique point on the graph of  $x + 4y = 18$  such that the  $y$ -coordinate of that point is twice the  $x$ -coordinate?
- A.  $(1,2)$
  - B.  $(2,4)$
  - C.  $(3,6)$
  - D.  $(4,8)$
  - E.  $(9,18)$

21. What is the slope of the line given by the equation  
 $3x + 5y = -15$  ?

A.  $-3$

B.  $-\frac{5}{3}$

C.  $-\frac{3}{5}$

D.  $3$

E.  $5$



49. In the standard  $(x,y)$  coordinate plane, what is the distance between the points  $(3,-4)$  and  $(-5,2)$  ?

- A. 4
- B. 6
- C. 8
- D. 10
- E. 14

**26.** The slope of the line with equation  $y = ax + b$  is greater than the slope of the line with equation  $y = cx + b$ . Which of the following statements *must* be true about the relationship between  $a$  and  $c$  ?

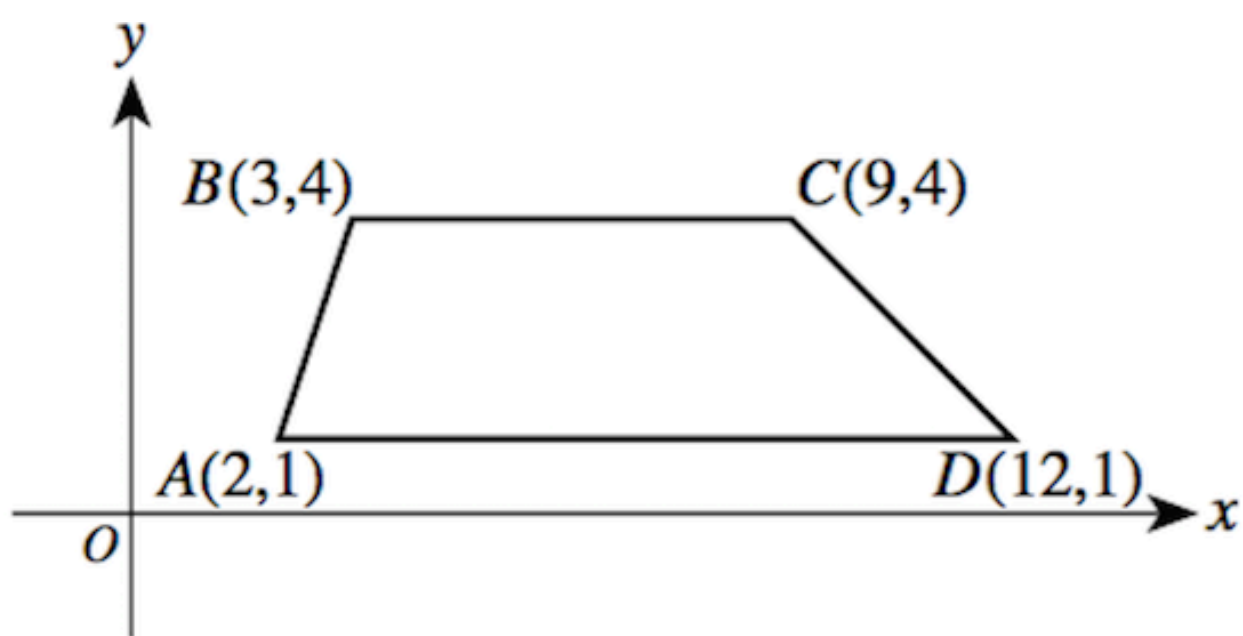
**F.**  $a \leq c$

**G.**  $a < c$

**H.**  $a = c$

**J.**  $a > c$

**K.**  $a \geq c + 1$



39. What is the slope of  $\overline{CD}$  ?

A.  $-3$

B.  $-1$

C.  $1$

D.  $\frac{5}{21}$

E.  $\frac{3}{2}$

**4.** What is the  $y$ -intercept of the line  $4y + 2x = 12$ ?

**f.** 12

**g.** -2

**h.** 6

**i.** -6

**j.** 3

**11.** Find the slope of the line  $7x = 3y - 9$ .

**a.** 3

**b.** -9

**c.**  $\frac{7}{3}$

**d.** -3

**e.**  $\frac{3}{7}$

---

**26.** The slope of the line with equation  $y = ax + b$  is greater than the slope of the line with equation  $y = cx + b$ . Which of the following statements *must* be true about the relationship between  $a$  and  $c$  ?

**F.**  $a \leq c$

**G.**  $a < c$

**H.**  $a = c$

**J.**  $a > c$

**K.**  $a \geq c + 1$

24. Lines  $p$  and  $n$  lie in the standard  $(x,y)$  coordinate plane. An equation for line  $p$  is  $y = 0.12x + 3,000$ . The slope of line  $n$  is 0.1 greater than the slope of line  $p$ . What is the slope of line  $n$  ?

F. 0.012

G. 0.02

H. 0.22

J. 1.2

K. 300

25. To check the slope of a ramp, a building inspector places an overlay of the standard  $(x,y)$  coordinate plane on the construction blueprint so that the  $x$ -axis aligns with the horizontal on the blueprint. The line segment representing the side view of the ramp goes through the points  $(1,-3)$  and  $(14,2)$ . What is the slope of the planned ramp?

D A.  $-\frac{1}{15}$

B.  $-\frac{1}{13}$

C.  $-\frac{1}{6}$

D.  $\frac{5}{13}$

E.  $\frac{13}{5}$

Figuring Slope given  
Two points

$$\text{Slope} = \frac{\Delta y}{\Delta x} = \frac{2 - (-3)}{14 - 1} = \frac{5}{13}$$

You don't even need to find  $\Delta x$ .  
the only answer with 5 in the  
numerator is D



36. Which of the following is an equation of the line that passes through the points (1,3) and (-3,-13) in the standard (x,y) coordinate plane?

- F.  $x + y = 4$
- G.  $4x - y = 1$
- H.  $5x - y = 2$
- J.  $6x - 2y = 8$
- K.  $7x - 2y = 5$

Slope of line given

Two points

$$\text{Slope} = \frac{\Delta Y}{\Delta X} = \frac{(-13 - 3)}{(-3 - 1)} = \frac{-16}{-4} = 4$$

Look at your choices and see which one would have slope 4 in  $y = mx + b$  form

31. What are the  $(x,y)$  coordinates of the unique point on the graph of  $x + 4y = 18$  such that the  $y$ -coordinate of that point is twice the  $x$ -coordinate?

- A. (1,2)
- B. (2,4)
- C. (3,6)
- D. (4,8)
- E. (9,18)

*You can quickly try each one and see what works. Start with the small ones first (B) works*

**GO ON TO THE NEXT PAGE.**

12

$$m = 6$$

or

$$n = 36$$

55. What is the length, in coordinate units, of the diameter of a circle whose endpoints have coordinates (12,3) and (6,-5) in the standard (x,y) coordinate plane?

DISTANCE FORMULA

A.  $\sqrt{28}$

B.  $\sqrt{80}$

C.  $\sqrt{82}$

D.  $\sqrt{100}$

E.  $\sqrt{202}$

$$\begin{aligned} \sqrt{(12-6)^2 + (3-(-5))^2} &= \sqrt{36 + 64} \\ &= \sqrt{100} \end{aligned}$$

28. Which of the following is an equation of the line that passes through the points (1,-2) and (4,7) in the standard (x,y) coordinate plane?

F.  $y = x - 2$

G.  $y = 3x - 5$

H.  $y = 4x + 7$

J.  $y = \frac{5}{3}x + \frac{1}{3}$

K.  $y = \frac{1}{3}x + \frac{17}{3}$

DO YOUR FIGURING HERE.

Point Slope

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - (-2)}{4 - 1}$$

$$= \frac{9}{3} = 3$$

All answers

in slope/intercept

form. All slopes

are different so

if you find slope, you have answer

G has 3

33. What is the distance, in coordinate units, between (6,4) and (8,10) in the standard (x,y) coordinate plane?

- A.  $\sqrt{8}$   
 B.  $\sqrt{32}$   
 C.  $\sqrt{40}$   
 D. 4  
 E. 8

DO YOUR FIGURING HERE.

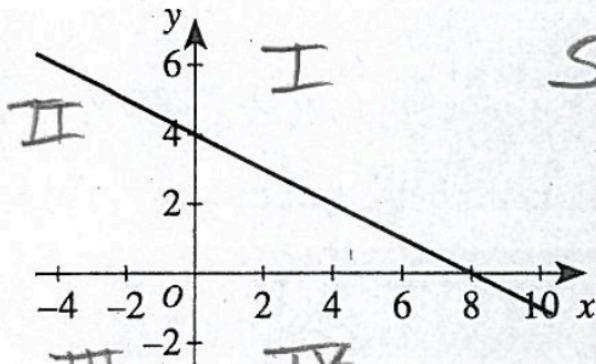
Distance Formula

$$D = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

$$\sqrt{(10 - 4)^2 + (8 - 6)^2} = \sqrt{36 + 4} = \sqrt{40}$$

34. One of the following is the slope of the line graphed in the standard (x,y) coordinate plane below. Which one is it?

- F. -8  
 G.  $-\frac{1}{2}$   
 H.  $\frac{1}{2}$   
 J. 2  
 K. 4



SLOPE OF LINES in COORDINATE PLANE

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{4 - 0}{0 - 8} = \frac{4}{-8} = -\frac{1}{2}$$

Between choices F and G, G is better because slope -8 is very STEEP

Because line goes thru II and IV, slope is (-)

43. The point  $(3, -4)$  is the midpoint of the line segment in the standard  $(x, y)$  coordinate plane joining the point  $(8, -11)$  and the point  $(a, b)$ . Which of the following is  $(a, b)$ ?

- A.  $(-2, 3)$   
B.  $(-2, -19)$   
C.  $(2, -3)$   
D.  $(2.5, -3.5)$   
E.  $(5.5, -7.5)$

$$3 = \frac{8 + x}{2}$$

$$-2 = x$$

and

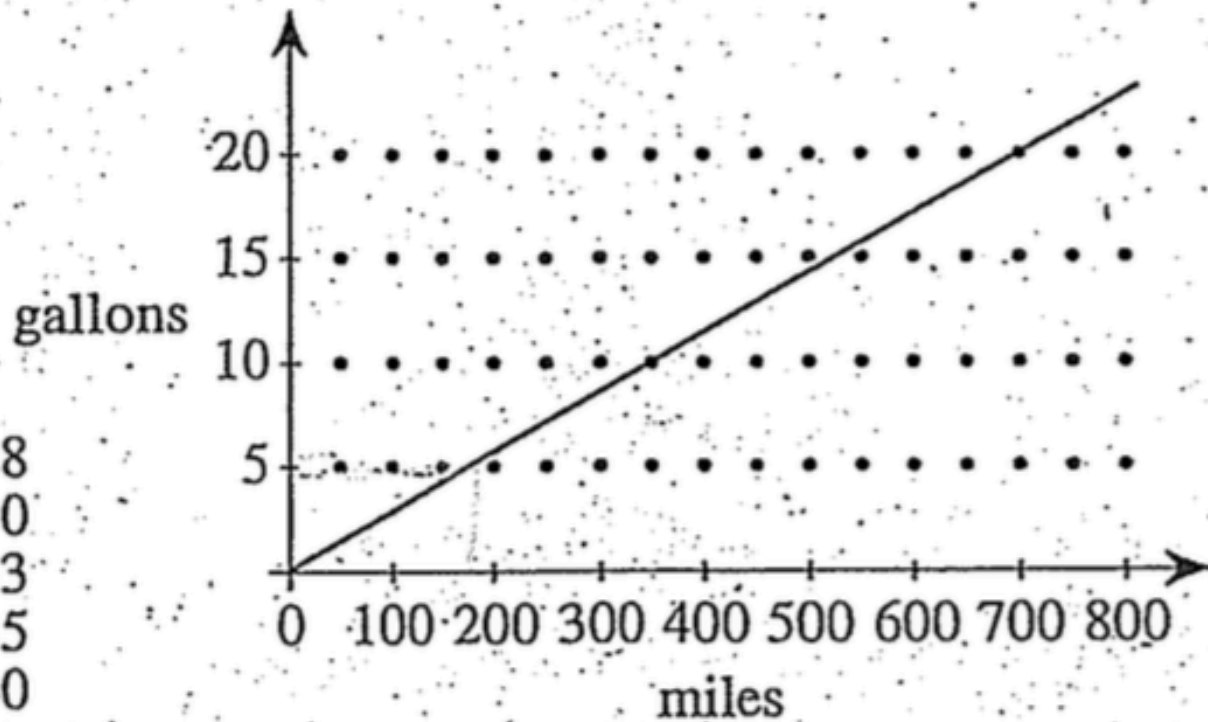
$$-4 = \frac{-11 + y}{2}$$

$$y = 3$$

Mid Point Formula  
 $\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

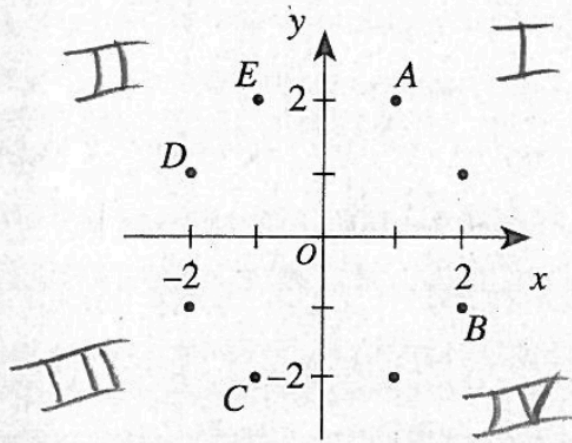
43. The line graphed below shows the predicted gasoline use for a certain car. Which of the following is the closest estimate of this car's predicted *rate* of gasoline use, in miles per gallon?

DO YOU



- A. 28
- B. 30
- C. 33
- D. 35
- E. 40

13. Eight points with integer coordinates are plotted in the standard  $(x,y)$  coordinate plane below. Which of the plotted points has an  $x$ -coordinate less than 1 and a  $y$ -coordinate of at least 2?



- A. A
- B. B
- C. C
- D. D
- E. E

## Coordinate Geometry

quadrant I  $\rightarrow (+, +)$

II  $\rightarrow (-, +)$

III  $\rightarrow (-, -)$

IV  $\rightarrow (+, -)$

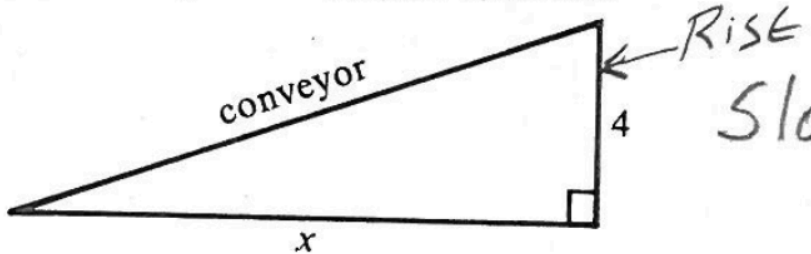
If  $y \geq 2$ , then it can only be A or E. Since  $x < 1$ , then E

E



THIS IS THE ONLY ANSWER THAT WILL ALWAYS PRODUCE

20. The manufacturer of an airport baggage conveyor recommends a slope of no more than 0.25. If the baggage conveyor in the figure below rises 4 feet, what is the minimum acceptable value for  $x$ , in feet?



$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

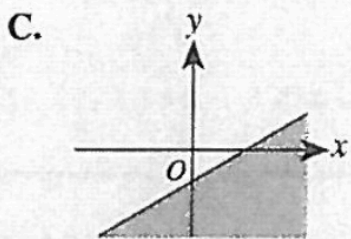
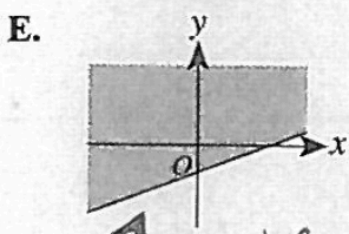
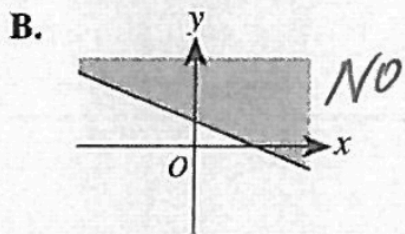
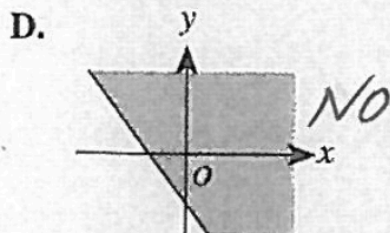
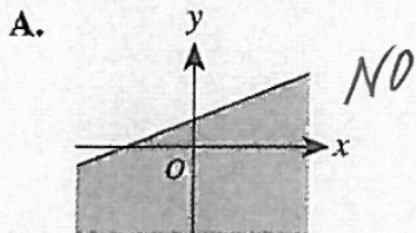
$$\text{Slope of } 0.25 \text{ is } \frac{25}{100} \text{ or } \frac{1}{4}$$

$$\frac{\text{Rise}}{\text{RUN}} = \frac{1}{4} = \frac{4}{x}$$

$$x = 16$$

- H F.  $4\frac{1}{4}$
- G. 5
- H. 16
- J. 25
- K. 29

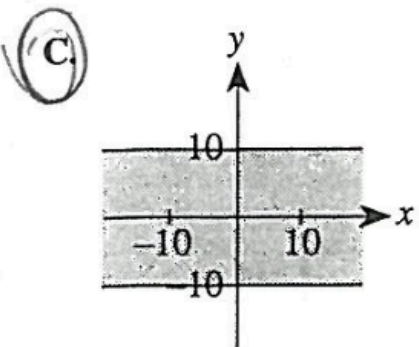
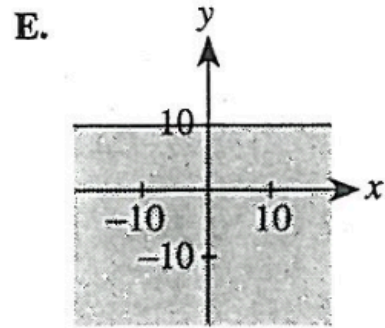
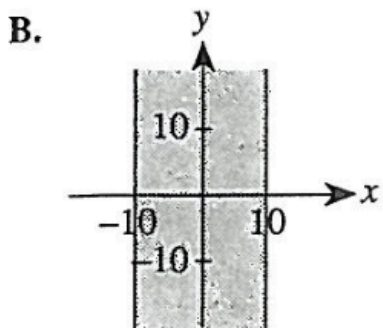
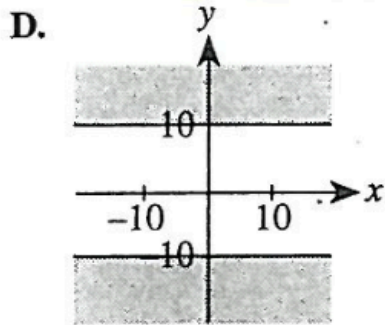
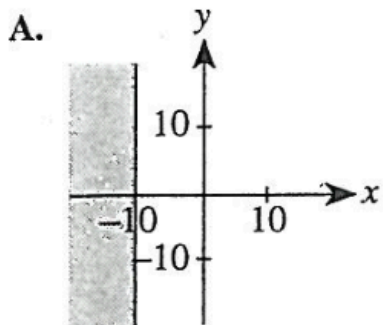
53. Which of the following best represents the graph of  $y \leq ax + b$  for some positive  $a$  and negative  $b$ ?



Y values are greater than line

perpendicular to radius  
 Inequalities and slope intercept form  
 $a = \text{slope}$   $b = \text{y-intercept}$   
 Since slope is positive, eliminate B and D.  
 Since  $b$  is negative eliminate choice A. Choose C because all the y values are less than the line  $y \leq ax + b$

53. Which of the following shaded regions is the graph in the standard  $(x,y)$  coordinate plane of the points that satisfy the inequality  $|y| \leq 10$ ?



Absolute Value and graphing inequalities

$$|y| \leq 10$$

split

$$-y \leq 10$$

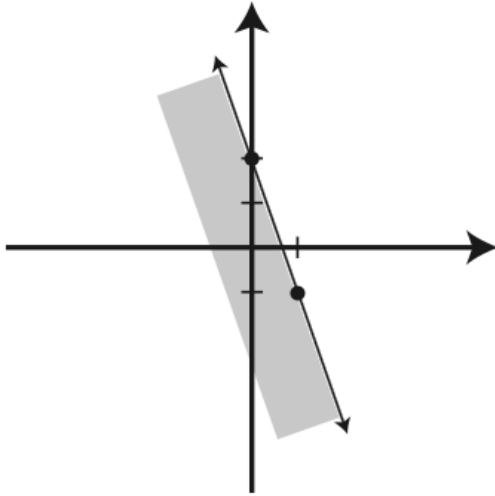
$$y \geq -10$$

$$y \leq 10$$

y values are less than 10

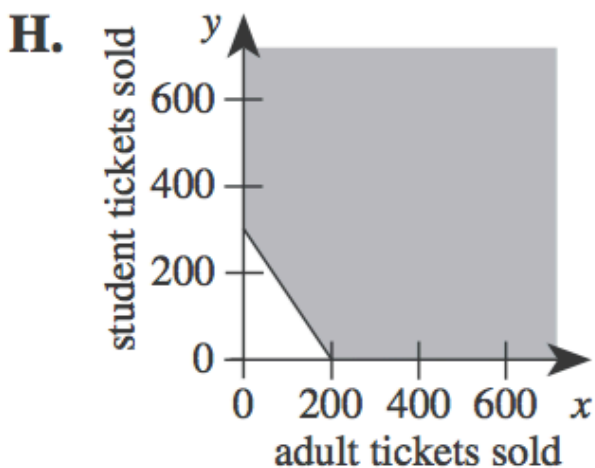
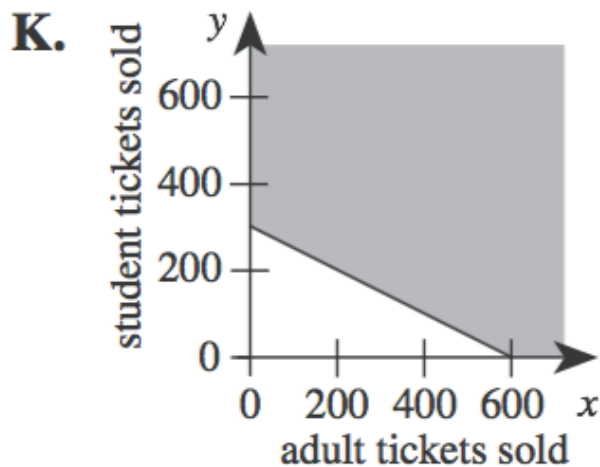
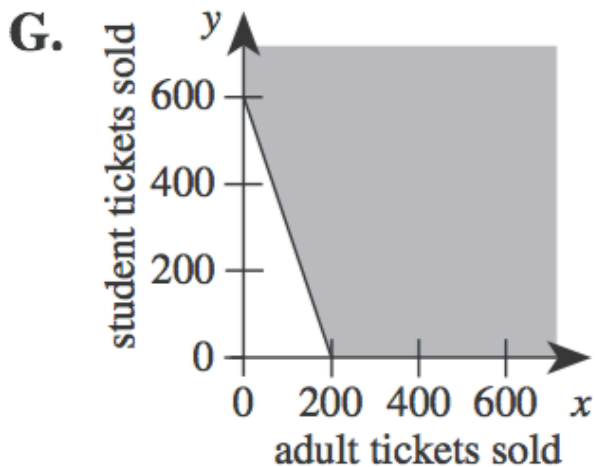
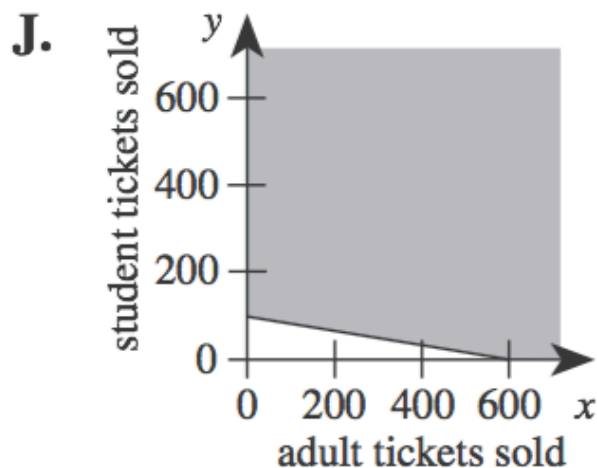
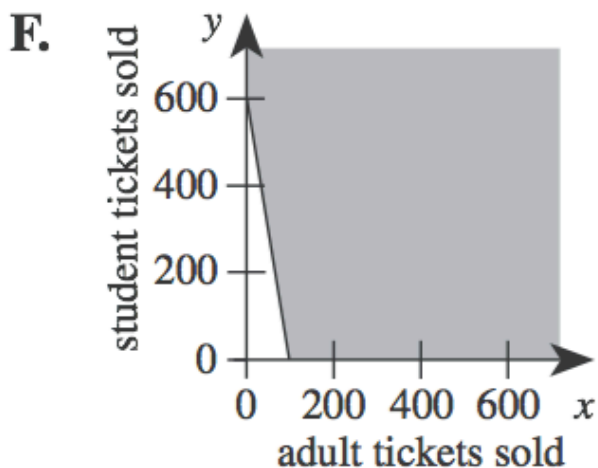
y values are greater than negative ten

**79.** What is the inequality that corresponds to the graph below?



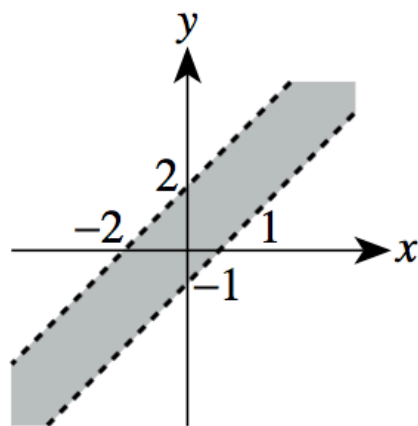
- a.  $y > 3x + 2$
- b.  $y \leq -3x + 2$
- c.  $y \geq -3x + 2$
- d.  $y < 3x + 2$
- e.  $y < -3x + 2$

40. Tickets for the Senior Talent Show at George Washington Carver High School are \$3 for adults and \$2 for students. To cover expenses, a total of \$600 must be collected from ticket sales for the show. One of the following graphs in the standard  $(x,y)$  coordinate plane, where  $x$  is the number of adult tickets sold and  $y$  is the number of student tickets sold, represents all the possible combinations of ticket sales that cover at least \$600 in expenses. Which graph is it?

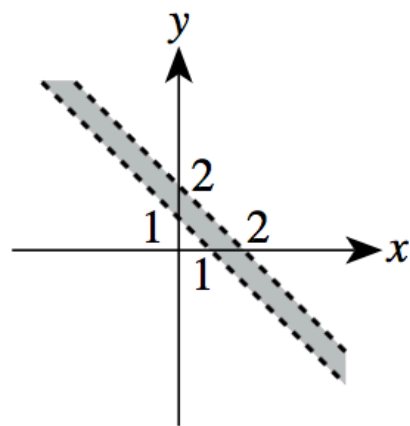


36. Which of the following is the graph of the region  $1 < x + y < 2$  in the standard  $(x,y)$  coordinate plane?

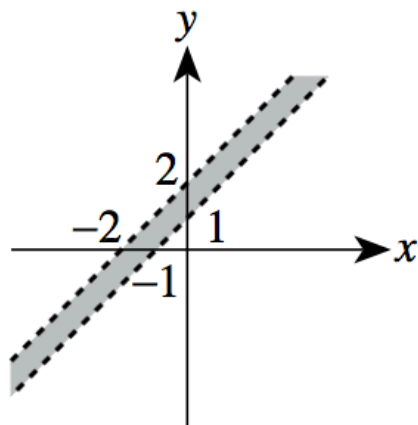
F.



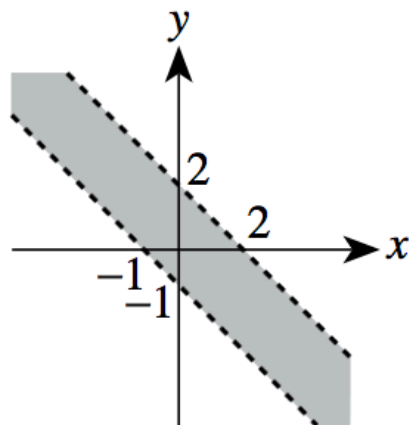
J.



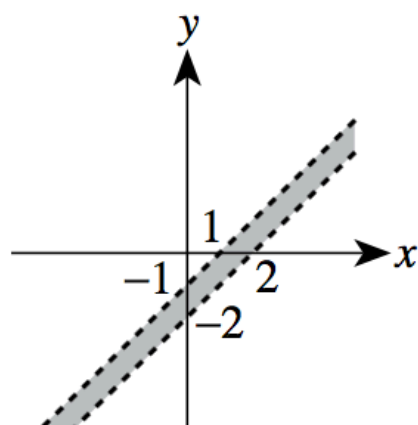
G.



K.



H.



- 29.** As a class experiment, a cart was rolled at a constant rate along a straight line. Shawn recorded in the chart below the cart's distance ( $x$ ), in feet, from a reference point at the start of the experiment and for each of 5 times ( $t$ ), in seconds.

$t$	0	1	2	3	4	5
$x$	10	14	18	22	26	30

Which of the following equations represents this data?

- A.**  $x = t + 10$
- B.**  $x = 4t + 6$
- C.**  $x = 4t + 10$
- D.**  $x = 10t + 4$
- E.**  $x = 14t$

- 28.** As part of a lesson on motion, students observed a cart rolling at a constant rate along a straight line. As shown in the chart below, they recorded the distance,  $y$  feet, of the cart from a reference point at 1-second intervals from  $t = 0$  seconds to  $t = 5$  seconds.

$t$	0	1	2	3	4	5
$y$	14	19	24	29	34	39

Which of the following equations represents this data?

- F.**  $y = t + 14$
- G.**  $y = 5t + 9$
- H.**  $y = 5t + 14$
- J.**  $y = 14t + 5$
- K.**  $y = 19t$



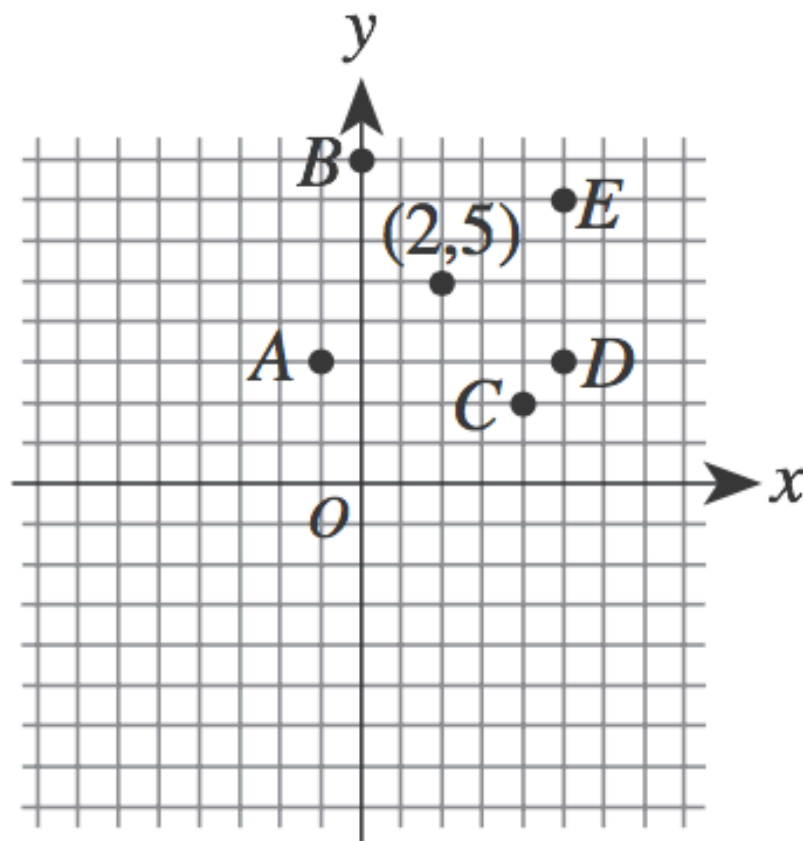
11. Students studying motion observed a cart rolling at a constant rate along a straight line. The table below gives the distance,  $d$  feet, the cart was from a reference point at 1-second intervals from  $t = 0$  seconds to  $t = 5$  seconds.

$t$	0	1	2	3	4	5
$d$	14	20	26	32	38	44

Which of the following equations represents this relationship between  $d$  and  $t$ ?

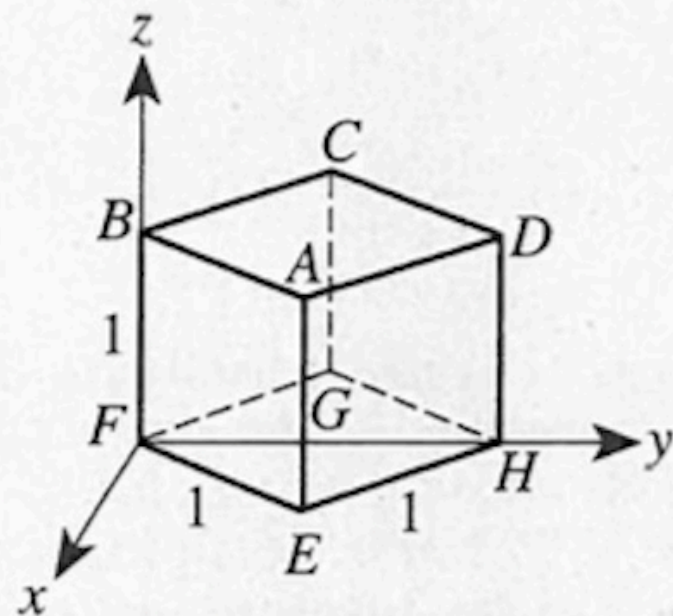
- A.  $d = t + 14$
- B.  $d = 6t + 8$
- C.  $d = 6t + 14$
- D.  $d = 14t + 6$
- E.  $d = 34t$

43. The point  $(2,5)$  is shown in the standard  $(x,y)$  coordinate plane below. Which of the following is another point on the line through the point  $(2,5)$  with a slope of  $-\frac{2}{3}$  ?



- A.  $A(-1,3)$
- B.  $B(0,8)$
- C.  $C(4,2)$
- D.  $D(5,3)$
- E.  $E(5,7)$

52. As shown in the  $(x,y,z)$  coordinate space below, the cube with vertices  $A$  through  $H$  has edges that are 1 coordinate unit long. The coordinates of  $F$  are  $(0,0,0)$ , and  $H$  is on the positive  $y$ -axis. What are the coordinates of  $D$ ?



- F.  $(0,1,1)$
- G.  $(0,\sqrt{2},0)$
- H.  $(0,\sqrt{2},1)$
- J.  $(0,\sqrt{2},\sqrt{3})$
- K.  $(1,1,1)$