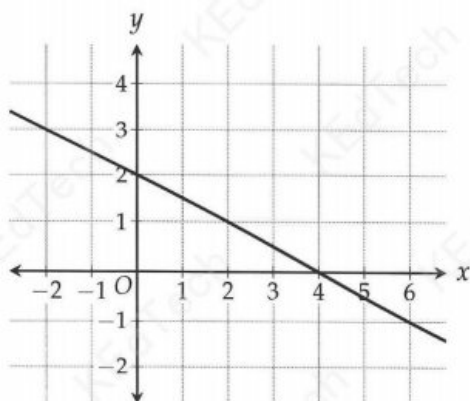


EXERCISE 2: Answers for this exercise start on page 335.

1



The graph of the linear function  $f$  is shown in the  $xy$ -plane. What is the slope of the graph of  $f$ ?

- A)  $-2$
- ☒ B)  $-\frac{1}{2}$
- C)  $\frac{1}{4}$
- D)  $\frac{1}{2}$

2

Line  $j$  is defined by  $4x + 20y = 5$ . Line  $k$  is parallel to line  $j$  in the  $xy$ -plane. What is the slope of line  $k$ ?

- A)  $-5$
- ☒ B)  $-\frac{1}{5}$
- C)  $\frac{1}{5}$
- D)  $5$

3

The linear function  $f$  is defined by  $f(x) = ax + b$ , where  $a$  and  $b$  are constants. If the graph of  $y = f(x)$  in the  $xy$ -plane has a slope of 6 and passes through the point  $(-5, -14)$ , what is the value of  $b$ ?

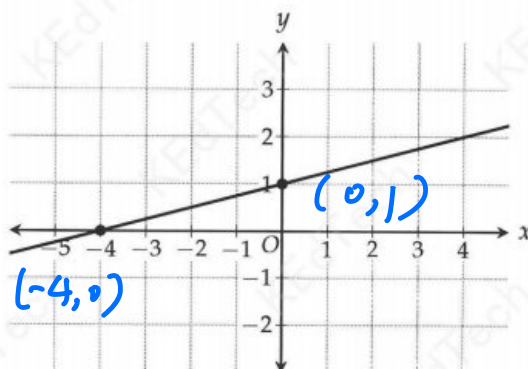
16

4

What is the  $y$ -coordinate of the  $y$ -intercept of the graph of  $7x = 6\left(15 + \frac{9x}{4} - \frac{4y}{7}\right)$  in the  $xy$ -plane?

26.25

5



The graph of the equation  $ax + by = -4$ , where  $a$  and  $b$  are constants, is shown in the  $xy$ -plane. What is the value of  $ab$ ?

-4

$$(-4, 0) \quad -4a = -4$$

$$a = 1$$

$$(0, 1) \quad b \cdot 1 = -4 \quad b = -4$$

$$ab = 1 \cdot (-4) = -4$$

6

A line in the  $xy$ -plane is defined by the equation  $y = ax + b$ , where  $a$  and  $b$  are constants. The line passes through the points  $(0, -79)$  and  $(5, 91)$ . What is the value of  $a + b$ ?

-45

7

In the  $xy$ -plane, the line with equation  $ax - \frac{1}{3}y = 8$ , where  $a$  is a constant, passes through the point  $(2, 6)$ . What is the  $x$ -coordinate of the  $x$ -intercept of the line?

$$2a - \frac{1}{3} \times 6 = 8 \quad 2a - 2 = 8$$

$$2a - 1 = 4 \quad a = 5 \quad (x, 0)$$

$$5x = 8 \quad x = \frac{8}{5}$$

8

| $x$ | $y$        |
|-----|------------|
| -6  | $-114 - p$ |
| -2  | $-57 - p$  |
| 2   | $-p$       |

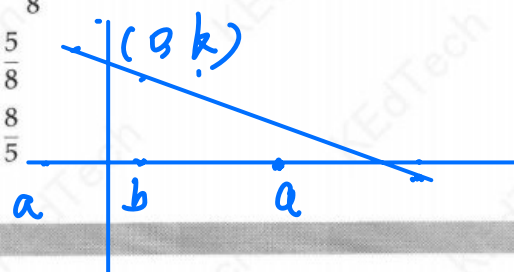
The table shows three values of  $x$  and their corresponding values of  $y$ , where  $p$  is a constant. There is a linear relationship between  $x$  and  $y$ . What is the slope of the line that represents this relationship in the  $xy$ -plane?

- A)  $-\frac{57}{4}$
- ☒ B)  $\frac{57}{4}$
- C)  $\frac{p - 57}{-4}$
- D)  $\frac{2p + 57}{4}$

9

The graph of the equation  $5x - 8y = k$ , where  $k$  is a constant, is a line in the  $xy$ -plane. The line has an  $x$ -intercept at  $(m, 0)$  and a  $y$ -intercept at  $(0, n)$ , where  $m$  and  $n$  are constants. What is the value of  $\frac{m}{n}$ ?

- ☒ A)  $-\frac{8}{5}$
- B)  $-\frac{5}{8}$
- C)  $\frac{5}{8}$
- D)  $\frac{8}{5}$



10

In the  $xy$ -plane, the graph of the linear function  $f$  has a negative slope and a  $y$ -intercept at  $(0, k)$ , where  $k$  is a positive constant. Which of the following must be true?

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

- ☒ A) I and II only
- B) I and III only
- C) II and III only
- D) I, II, and III

11

In the  $xy$ -plane, the points  $(-3, 5)$  and  $(6, 8)$  lie on line  $l$ . Which of the following points also lies on line  $l$ ?

- ☒ A)  $(27, 15)$
- B)  $(33, 19)$
- C)  $(42, 23)$
- D)  $(54, 27)$

$$24 = 2m + b + 6 \quad (1)$$

$$12 = 6m + b + 6 \quad (2)$$

THE COLLEGE PANDA

$$(1) - (2) \quad 12 = -4m \quad m = -3$$

$$12 = 6(-3) + b + 6$$

$$6 = -18 + b$$

$$b = 24$$

6. LINES & LINEAR RELATIONSHIPS

12

$$y = \frac{a}{b}x + c$$

$$y = \frac{d}{e}x + c$$

In the given pair of equations,  $a, b, c, d$ , and  $e$  are constants. The pair of equations represent two perpendicular lines in the  $xy$ -plane. If

$0 < \frac{a}{b} < 1$ , which of the following must be true?

A)  $\frac{d}{e} < -1$

B)  $-1 < \frac{d}{e} < 0$

C)  $0 < \frac{d}{e} < 1$

D)  $\frac{d}{e} > 1$

$$\frac{a}{b} \cdot \frac{d}{e} = -1$$

$$0 < \frac{a}{b} < 1 \quad \frac{d}{e} < 0$$

$$0 < -\frac{1}{\frac{a}{b}} < 1 \quad \frac{d}{e} < -1$$

13

In the  $xy$ -plane, line  $p$  passes through the point  $(1, n)$ , where  $n$  is a constant. Line  $q$  intersects line  $p$  at the point  $(0, 0)$  and is perpendicular to line  $p$ . Which of the following points must lie on line  $q$ ?

A)  $(-n, -1)$

B)  $(n, -1)$

C)  $(n, 1)$

D)  $(1, -n)$

$$\text{Line } p: (1, n) \quad (0, 0)$$

$$\frac{n-0}{1-0} = \frac{1}{1} = n$$

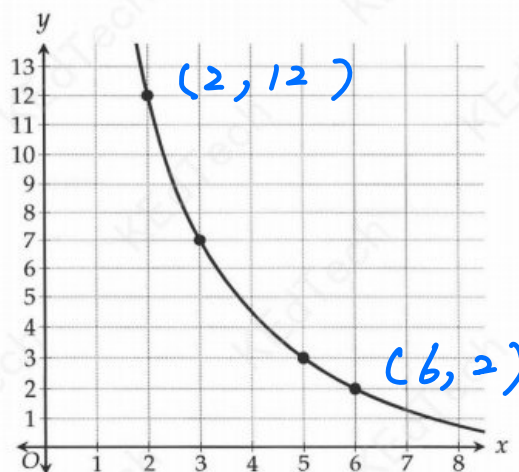
Slope Line  $q: -\frac{1}{n} \quad y = -\frac{1}{n}x$

14

In the  $xy$ -plane, line  $m$  has an  $x$ -intercept at  $(a, b + 4)$ , where  $a$  and  $b$  are constants. If line  $m$  passes through the points  $(b, -11)$  and  $(b + 6, 7)$ , what is the value of  $a$ ?

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

15



The function  $g$  is defined by  $g(x) = \frac{f(x) + 6}{x}$ , where  $f$  is a linear function. The partial graph of  $y = g(x)$  is shown. What is the  $y$ -intercept of the graph of  $y = f(x)$  in the  $xy$ -plane?

A)  $(0, 8)$

B)  $(0, 24)$

C)  $(0, 30)$

D)  $(0, 48)$

$$12 = \frac{2m + b + 6}{2}$$

$$2 = \frac{6m + b + 6}{6}$$

$$24 = 2m + b + 6 \quad (1) \quad 12 = 6m + b + 6 \quad (2)$$

16

In the  $xy$ -plane, the line with equation  $ax - by = 5$ , where  $a$  and  $b$  are constants, is perpendicular to the line with equation  $11x - 4y = 5$ . Which of the following equations represents a line that is perpendicular to the line with equation  $11x + 12y = 5$ ?

A)  $ax - 3by = 5$

B)  $ax + 3by = 5$

C)  $3ax - by = 5$

D)  $3ax + by = 5$

$$11x - 4y = 5$$

$$-4y = -11x + 5$$

$$y = \frac{11}{4}x - \frac{5}{4}$$

$$-\frac{4}{11}$$

$$ax - by = 5 \quad -by = -ax + 5$$

$$y = \frac{a}{b}x - \frac{5}{b}$$

$$-\frac{4}{11} = \frac{a}{b}$$

$$\frac{12}{11} \cdot k = -1 \quad k = -\frac{11}{12}$$