# Module 2
# Linear Functions

## What this module is about

This module is about linear function of the form f(x) = mx + b. As you go over this material, you will develop the skill in determining different aspects of linear function such as slope, trend, intercepts and some points that belong to the graph of the linear function. It is also expected that you will develop the skill in forming linear functions of the form f(x) = mx + b, given certain conditions.


## What you are expected to learn

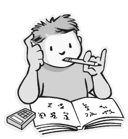
This module is designed for you to:

1. determine the following:

    a. slope
    b. trend (increasing or decreasing)
    c. x- and y-intercepts; and
    d. some points given f(x) = mx + b

2. determine f(x) = mx + b given:

    a. slope and y-intercept
    b. x- and y-intercept
    c. slope and a point;
    d. any two points



## How much do you know

1. What is the slope of the f(x) = 2x – 3?
2. True or false? The trend of a linear function with negative slope is increasing.
3. Solve for the y-intercept of 3x – 2y = 6.
4. Which of the following step will solve for the x-intercept of the linear function y = 4x + 16?

a. Substitute zero to x and solve for y.
b. Substitute zero to y and solve for x.
c. Take the square root of the constant term.
d. Take the negative reciprocal of the coefficient of x.

5. What is the x-intercept of y = 4x + 16?
6. Name three points on the graph of y – 3x + 2 = 0.
7. Determine the linear function with slope 5 and y-intercept -2.
8. The x- and y-intercepts of a linear function are both 3. Find the linear function.
9. The graph of a linear function passes through the point (-4, 0), and its slope is -2. Express the linear function in the form f(x) = mx + b.
10. What linear function has (2, 4) and (-3, 1) as points on its graph?

## *What you will do*

### Lesson 1

### Determining the Slope, Given f(x) = mx + b

In the linear function f(x) = mx + b, m is the slope and b is the y-intercept.

**Examples:**

Determine the slope and the y-intercept of each linear function.

1. f(x) = 3x + 8
   The slope is 3 and the y-intercept is 8.

2. y = 2x – 5
   The slope is 2 and the y-intercept is -5.

3. g(x) = -4x + 7
   The slope is -4 and the y-intercept is 7.

4. $y = \frac{1}{2}x$
   The slope is $\frac{1}{2}$ and the y-intercept is 0.

5. 3x + 2y = 12

   First, transform the equation 3x + 2y = 12 in of form f(x) = mx + b

$$3x + 2y = 12$$

$$2y = -3x + 12 \qquad \text{-3x is added to both sides}$$

$$\frac{2y}{2} = \frac{-3x}{2} + \frac{12}{2} \qquad \text{Divide both sides by the coefficient of y}$$

$$y = -\frac{3}{2}x + 6 \qquad \text{The fractions are simplified.}$$

The slope is $-\frac{3}{2}$ and the y-intercept is 6.

## Try this out

Determine the slope and the y-intercept of each linear function.

Set A
1. f(x) = 4x + 5
2. g(x) = -7x + 1
3. h(x) = 4x
4. F(x) = 3 – 4x
5. 2x + 7y = 14

Set B
1. F(x) = 8x – 9
2. G(x) = -4x – 6
3. H(x) = x
4. 3x + 8y = 24
5. 51x – 17y – 4 = 1

Set C
1. $f(x) = x + \frac{1}{2}$
2. $g(x) = \frac{9}{4}x - \frac{3}{2}$
3. h(x) = -0.3x + 0.1
4. f(x) = -5.2x – 4.4
5. -9x + 8y – 12 = 0

# Lesson 2

## Determining the Trend, Given f(x) = mx + b

The trend of a linear function is said to be increasing if the slope is positive.

The trend of a linear function is said to be decreasing if the slope is negative.

**Examples:**

Determine the trend of each linear function.

1. f(x) = 8x + 3
   The slope is 8; hence, the trend of the function is increasing.

2. y = 5x – 2
   The slope is 5; hence, the trend of the function is increasing.

3. g(x) = -7x + 4
   The slope is -7; hence, the trend of the function is decreasing.
4. $y = \frac{1}{2}x$

The slope is $\frac{1}{2}$; hence, the trend of the function is decreasing.

5. 4x + 3y = 12

   First, transform the equation 4x + 3y = 12 in of form f(x) = mx + b.

| | |
|---|---|
| 4x + 3y = 12 | |
| 3y = -4x + 12 | -4x is added to both sides |
| $\frac{3y}{3} = \frac{-4x}{3} + \frac{12}{3}$ | Divide both sides by the coefficient of y |
| $y = -\frac{4}{3}x + 4$ | The fractions are simplified |

The slope is $-\frac{4}{3}$, hence, the trend of the function is decreasing.

## Try this out

Determine the trend of each linear function.

Set A
1. f(x) = 5x + 4
2. g(x) = -x + 7
3. h(x) = -4x – 5
4. F(x) = 4 – 3x
5. -5x + 3y + 15 = 0

Set B
1. F(x) = 9x – 8
2. G(x) = -5x + 1

3. H(x) = -5 – x
4. 8x + 3y = 24
5. 17x – 51y – 4 = -1

Set C
1. h(x) = -0.1x + 0.3
2. 5x – 6 = y
3. 3x + y = 11
4. -8x + 12y – 9 = 0
5. 25x – 15y – 3 = 2

## Lesson 3

## Determining the X-and Y-intercepts, Given f(x) = mx + b

To determine the y-intercept of a linear function, substitute x = 0 and solve for the value of y. This value is the y-intercept.

To determine the x-intercept of a linear function, substitute y = 0 and solve for the value of y. This value is the x-intercept.

**Examples:**

Determine the x- and the y-intercepts of each linear function.

1. f(x) = 3x + 8

Let y = f(x) = 3x + 8.

0 = 3x + 8 — 0 is substituted to y

-8 = 3x — -8 is added to both sides

3x = -8 — Apply symmetric property of equality

$x = -\frac{8}{3}$ — Both sides are divided by 3

The x-intercept is $-\frac{8}{3}$ .

y = 3(0) + 8 — 0 is substituted to x

y = 8 — The numerical expression is simplified

The y-intercept is 8.

2. 3x + 2y = 12

3x + 2(0) = 12 — 0 is substituted to y

3x = 12

$\frac{3x}{3} = \frac{12}{3}$ — Divide both sides by the coefficient of x

x = 4

The x-intercept is 4.

$3(0) + 2y = 12$ — 0 is substituted to x

$2y = 12$

$\frac{2y}{2} = \frac{12}{2}$ — Divide both sides by the coefficient of y

$y = 6$

The y-intercept is 6.

## Try this out

Determine the x- and the y-intercepts of each linear function.

Set A
1. f(x) = 8x + 16
2. g(x) = 4x – 2
3. y = 3 – 4x
4. 2x – 5 = y
5. -7x + 7y = 14

Set B
1. F(x) = -14x + 7
2. 2y = -4x – 6
3. 4x + 6 = 2y
4. 16x – 12 = 4y
5. -12x + 22y – 14 = 0

Set C
1. 6x – 30 = 18y
2. -32x + 8y – 12 = 0
3. 28x – 12y – 3 = 1
4. G(x) = -0.3x + 0.1
5. y = -5.2x – 4.4

# Lesson 4

## Determining Some Points of a Given Linear Function

To determine a point on the graph of a given linear function y = f(x):

A. Get any element from the domain of the linear function. Recall that the domain of any linear function is the set of real numbers. This element is the abscissa of the point.
B. Substitute this abscissa to x in the linear function.

C. Solve for the corresponding value of y. This value is the ordinate of the point.
D. Repeat steps A to C using other element from the domain of the linear function to determine other points on the graph of the linear function.

**Examples:**

Determine three points on the graph of each linear function.

1. $y = x + 4$

| | |
|---|---|
| If $x = 0$, then | Step A |
| $y = 0 + 4$ | Step B |
| $y = 4$ | Step C |

The point (0, 4) is on the graph of $y = x + 4$.

If $x = 2$, then
$y = 2 + 4$
$y = 6$

The point (2, 6) is also on the graph of $y = x + 4$.

If $x = -5$, then
$y = -5 + 4$
$y = -1$

The point (-5, -1) is also on the graph of $y = x + 4$.

2. $3x – 4y = 36$

| | |
|---|---|
| If $x = 0$, then | Step A |
| $3(0) – 4y = 36$ | Step B |
| $0 – 4y = 36$ | Step C |
| $-4y = 36$ | |
| $\frac{-4y}{-4} = \frac{36}{-4}$ | |
| $y = -9$ | |

The point (0, -9) is on the graph of $3x – 4y = 36$.

If $x = 2$, then
$3(2) – 4y = 36$
$6 – 4y = 36$
$-4y = 30$

$$\frac{-4y}{-4} = \frac{30}{-4}$$

$$y = -\frac{15}{2}$$

The point $\left(2, -\frac{15}{2}\right)$ is also on the graph of 3x – 4y = 36.

If x = -4, then

3(4) – 4y = 36

12 – 4y = 36

-4y = 24

$$\frac{-4y}{-4} = \frac{24}{-4}$$

y = -6

The point (-4, -6) is also on the graph of 3x – 4y = 36.

## Try this out

Determine three points on the graph of each linear function.

Set A

1. f(x) = x + 6
2. g(x) = -2x + 7
3. h(x) = 2x
4. y = 4 – 3x
5. -2x + y = 4

Set B

1. g(x) = 5x – 4
2. 2y = -2x – 6
3. 4x + 6 = 2y
4. -12x + 22y – 14 = 0
5. 14x – 21y – 4 = 3

Set C

1. y = -7x
2. $y = 2 - \frac{x}{4}$
3. 28x – 12y – 3 = 1
4. $f(x) = \frac{9}{4}x - \frac{3}{2}$
5. h(x) = -0.3x + 0.1

## Lesson 5

## Determining f(x) = mx + b, Given the Slope and Y-intercept

To determine f(x) = mx + b, given the slope and y-intercept of the linear function, substitute the given slope to m and the given y-intercept to b.

**Examples:**

Determine f(x) = mx + b, given the slope and y-intercept of the linear function.

1. slope = 2, y-intercept 3

Since the slope is 3, m = 2 and the y-intercept is 3, b = 3. Hence,

f(x) = mx + b
f(x) = 2x + 3

2. slope = -3, y-intercept 1

Since the slope is -3, m = -3 and the y-intercept is 1, b = 1. Hence,

f(x) = mx + b
f(x) = -3x + 1

3. slope = 1, y-intercept $-\frac{3}{2}$

Since the slope is 1, m = 1 and the y-intercept is $-\frac{3}{2}$, b = $-\frac{3}{2}$. Hence,

f(x) = mx + b

$$f(x) = (1)x + \left(-\frac{3}{2}\right)$$

$$f(x) = x - \frac{3}{2}$$

4. slope = $\frac{4}{3}$, y-intercept 0

Since the slope is $\frac{4}{3}$, m = $\frac{4}{3}$ and the y-intercept is 0, b = 0. Hence,

f(x) = mx + b

$$f(x) = \frac{4}{3}x + 0$$

$$f(x) = \frac{4}{3}x$$

Try this out

Determine f(x) = mx + b, given the slope and y-intercept of the linear function.

Set A
1. slope 3, y-intercept 2
2. slope -2, y-intercept 4
3. slope 5, y-intercept -7
4. slope -8, y-intercept -1
5. slope 6, y-intercept 0

Set B
1. slope 1, y-intercept -1
2. slope -9, y-intercept 0
3. slope $\frac{4}{3}$, y-intercept -2
4. slope $-\frac{1}{3}$, y-intercept $-\frac{1}{3}$
5. slope 7, y-intercept $-\frac{4}{3}$

Set C
1. slope $\frac{2}{3}$, y-intercept $-\frac{1}{4}$
2. slope $-\frac{2}{5}$, y-intercept $-\frac{1}{3}$
3. slope 0.2, y-intercept 1
4. slope 1, y-intercept -0.1
5. slope 2, y-intercept $\sqrt{2}$

## Lesson 6

## Determining f(x) = mx + b, Given the X - and Y- intercepts

Let y = f(x). To determine f(x) = mx + b, given the x- and y-intercept of the linear function, substitute the given x-intercept to a and the given y-intercept to b in the form of the equation

$$\frac{x}{a} + \frac{y}{b} = 1$$

and then, solve for y in terms of x.

**Examples:**

Determine f(x) = mx + b, given the x- and y-intercept of the linear function.

1. x-intercept 2, y-intercept 3

Since the x-intercept is 2, a = 2 and the y-intercept is 3, b = 3. Hence,

$$\frac{x}{a}+\frac{y}{b}=1$$

$$\frac{x}{2}+\frac{y}{3}=1$$

$$6\left(\frac{x}{2}+\frac{y}{3}\right)=6(1)$$ Multiply both sides by the LCD, 6

3x + 2y = 6

2y = -3x + 6 -3x is added to both sides

$$\frac{2y}{2}=\frac{-3x}{2}+\frac{6}{2}$$ Both sides are divided by 2

$$y=-\frac{3}{2}+3$$

$$f(x)=-\frac{3}{2}+3$$

2. x-intercept = -3, y-intercept = 1, hence,

$$\frac{x}{a}+\frac{y}{b}=1$$

$$\frac{x}{-3}+\frac{y}{1}=1$$

$$-3\left(\frac{x}{-3}+\frac{y}{1}\right)=-3(1)$$ Multiply both sides by the LCD, –3

x – 3y = -3

-3y = -x – 3 x is subtracted from both sides

$$y=\frac{-x}{-3}-\frac{3}{-3}$$ Both sides are divided by –3

$$y=\frac{1}{3}x+1$$

$$f(x)=\frac{1}{3}x+1$$

3. x-intercept 1, y-intercept $-\frac{3}{2}$

Since the x-intercept is 1, a = 1 and the y-intercept is $-\frac{3}{2}$, b = $-\frac{3}{2}$. Hence,

$$\frac{x}{a}+\frac{y}{b}=1$$

$$\frac{x}{1}+\frac{y}{-\frac{3}{2}}=1$$

$$-\frac{3}{2}\left(\frac{x}{1}+\frac{y}{-\frac{3}{2}}\right)=-\frac{3}{2}(1)$$ Multiply both sides by the LCD, $-\frac{3}{2}$

$$-\frac{3}{2}x+y=-\frac{3}{2}$$

$$y=\frac{3}{2}x-\frac{3}{2}$$ $\frac{3}{2}x$ is added to both sides

$$f(x)=\frac{3}{2}x-\frac{3}{2}$$

4. x-intercept $\frac{4}{3}$, y-intercept $-\frac{6}{5}$

Since the x-intercept is $\frac{4}{3}$, a = $\frac{4}{3}$ and the y-intercept is $-\frac{6}{5}$, b = $-\frac{6}{5}$.

Hence,

$$\frac{x}{a}+\frac{y}{b}=1$$

$$\frac{x}{\frac{4}{3}}+\frac{y}{-\frac{6}{5}}=1$$

$$\frac{3x}{4}-\frac{5y}{6}=1$$

$$12\left(\frac{3x}{4}-\frac{5y}{6}\right)=12(1)$$ Multiply both sides by the LCD 12.

9x – 10y = 12

-10y = -9x + 12 9x is subtracted from both sides

$$y=\frac{-9x}{-10}+\frac{12}{-10}$$ Both sides are divided by –10

$$y=\frac{9}{10}x-\frac{6}{5}$$

$$f(x)=\frac{9}{10}x-\frac{6}{5}$$

## Try this out

Determine f(x) = mx + b, given the slope and y-intercept of the linear function.

Set A
1. x-intercept 3, y-intercept 2
2. x-intercept -2, y-intercept 4
3. x-intercept -1, y-intercept -3
4. x-intercept -8, y-intercept -1
5. x-intercept -4, y-intercept -8

Set B
1. x-intercept 5, y-intercept 6
2. x-intercept -4, y-intercept 12
3. x-intercept -12, y-intercept -16
4. x-intercept -15, y-intercept -18
5. x-intercept $-\frac{1}{3}$, y-intercept $\frac{1}{7}$

Set C
1. x-intercept 13, y-intercept $\frac{1}{5}$
2. x-intercept $-\frac{1}{9}$, y-intercept 3
3. x-intercept $-\frac{8}{3}$, y-intercept -3
4. x-intercept $-\frac{4}{7}$, y-intercept $\frac{1}{2}$
5. x-intercept $\frac{2}{9}$, y-intercept $\frac{13}{12}$

## Lesson 7

## Determining f(x) = mx + b, Given the Slope and One Point

Let y = f(x). To determine f(x) = mx + b, given the slope and one point of the linear function, substitute the given slope to m and the coordinates of the given point to $x_1$ and $y_1$ in the form of the equation $y - y_1 = m(x - x_1)$ and then, solve for y in terms of x.

**Examples:**

Determine f(x) = mx + b, given the slope and one point of the linear function.

1. slope = 2, (1, 3)

Since the slope is 2, m = 2 and the given point is (1, 3), $x_1 = 1$ and $y_1 = 3$.

Hence,

$y - y_1 = m(x - x_1)$
$y - 3 = 2(x - 1)$
$y - 3 = 2x - 2$ Distributive property is applied
$y = 2x - 2 + 3$ 3 is added to both sides
$y = 2x + 1$

2. slope = -3, (2, -1)

Since the slope is -3, m = -3 and the given point is (2, -1), $x_1 = 2$ and $y_1 = -1$. Hence,

$y - y_1 = m(x - x_1)$
$y - (-1) = -3(x - 2)$
$y + 1 = -3x + 6$ Distributive property is applied
$y = -3x + 6 - 1$ 1 is subtracted from both sides
$y = -3x + 5$

3. slope $\frac{1}{2}$, (-1, -4)

Since the slope is $\frac{1}{2}$, m = $\frac{1}{2}$ and the given point is (-1, -4), $x_1 = -1$ and $y_1 = -4$. Hence,

$y - y_1 = m(x - x_1)$

$y - (-4) = \frac{1}{2}[x - (-1)]$

$y + 4 = \frac{1}{2}(x + 1)$

$2(y + 4) = 2\left[\frac{1}{2}(x + 1)\right]$ Both sides are multiplied by 2

$2y + 8 = x + 1$ Distributive property is applied
$2y = x + 1 - 8$ 8 is subtracted from both sides
$2y = x - 7$

$\frac{2y}{2} = \frac{x - 7}{2}$ Both sides are divided by 2

$y = \frac{1}{2}x - \frac{7}{2}$

4. slope $-\frac{4}{3}$, $(-2, 3)$

Since the slope is $-\frac{4}{3}$, m = $-\frac{4}{3}$ and the given point is (-2, 3), $x_1$ = -2 and $y_1$ = 3. Hence,

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -\frac{4}{3}[x - (-2)]$$

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

$$y - 3 = -\frac{4}{3}x - \frac{8}{3}$$ (Distributive property is applied)

$$y = -\frac{4}{3}x - \frac{8}{3} + 3$$ (3 is added to both sides)

$$y = -\frac{4}{3}x - \frac{8}{3} + \frac{9}{3}$$ (Renaming 3)

$$y = -\frac{4}{3}x + \frac{1}{3}$$

## Try this out

Determine f(x) = mx + b, given the slope and a point of the linear function.

Set A
1. slope 3, (2, 5)
2. slope 4, (3, -4)
3. slope 2, (-5, 1)
4. slope -2, (-4, -2)
5. slope 5, (-7, 0)

Set B
1. slope 5, (-2, 2)
2. slope -3, (3, 1)
3. slope 1, (6, -1)
4. slope -9, (-5, 0)
5. slope $\frac{1}{3}$, $(2, -3)$

Set C
1. slope $\frac{2}{3}$, $(4, -1)$
2. slope $-\frac{1}{2}$, $\left(4, \frac{1}{2}\right)$

3. slope $-\frac{2}{3}$, $\left(\frac{2}{3}, \frac{1}{2}\right)$
4. slope $0.2$, $(1, 0.3)$
5. slope $-0.3$, $(0.1, 0.2)$

## Lesson 8

## Determining f(x) = mx + b, Given Any Two Points

Let y = f(x). To determine f(x) = mx + b, given any two points of the linear function, substitute the coordinates of the first point to $x_1$ and $y_1$, and the coordinates of the second point to $x_2$ and $y_2$ in the form of the equation

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

and then, solve for y in terms of x.

**Examples:**

Determine f(x) = mx + b, given two points of the linear function.

1. (2, 1), (3, 4)

Since the first point is (2, 1), $x_1 = 2$ and $y_1 = 1$ and the second point is (3, 4), $x_2 = 3$ and $y_2 = 4$. Hence,

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

$$y - 1 = \frac{4 - 1}{3 - 2}(x - 2)$$

$$y - 1 = \frac{3}{1}(x - 2)$$

y – 1 = 3(x – 2)
y – 1 = 3x – 6
y = 3x – 6 + 1
y = 2x – 5

2. (-2, 5), (0, -3)

Since the first point is (-2, 5), $x_1 = -2$ and $y_1 = 5$ and the second point is (0, -3), $x_2 = 0$ and $y_2 = -3$. Hence,

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

$$y - 5 = \frac{-3-5}{0-(-2)}[x - (-2)]$$

$$y - 5 = \frac{-8}{2}(x + 2)$$

y – 5 = -4(x + 2)
y – 5 = -4x – 8
y = -4x – 8 + 5
y = -4x – 3

3. (-2, -7), (-3, -1)

Since the first point is (-2, -7), $x_1$ = -2 and $y_1$ = -7 and the second point is (-3, -1), $x_2$ = -3 and $y_2$ = -1. Hence,

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

$$y - (-7) = \frac{-1-(-7)}{-3-(-2)}[x - (-2)]$$

$$y - 7 = \frac{6}{-1}(x + 2)$$

y – 7 = -6(x + 2)
y – 7 = -6x – 12
y = -6x – 12 + 7
y = -6x – 5

## Try this out

Determine f(x) = mx + b, given two points of the linear function.

Set A
1. (1, 3), (-2, 6)
2. (3, 0), (0, -2)
3. (-5, 0), (-4, 7)
4. (0, 4), (4, 0)
5. (0, 1), (1, -2)

Set B
1. (1, 4), (5, 6)
2. (8, -2), (6, -4)
3. (9, 0), (5, -2)
4. (5, -6), (6, -5)
5. (9, 3), (5, -6)

Set C
1. (-3, -2), (2, 1)
2. (-1, 3), (1, 0)
3. (-2, -3), (3, -1)
4. (-1, 3), (3, -3)
5. (-1, -1), (-3, -3)

## Let's summarize

1. In the linear function f(x) = mx + b, m is the slope and b is the y-intercept.

2. The trend of a linear function is said to be increasing if the slope is positive. The trend of a linear function is said to be decreasing if the slope is negative.

3. To determine the y-intercept of a linear function f(x) = y, substitute x = 0 and solve for the value of y. This value is the y-intercept. To determine the x-intercept of the linear function, substitute y = 0 and solve for the value of y. This value is the x-intercept.

4. To determine a point on the graph of a given linear function y = f(x):

   a. Get any element from the domain of the linear function. Recall that the domain of any linear function is the set of real numbers. This element is the abscissa of the point.
   b. Substitute this abscissa to x in the linear function.
   c. Solve for the corresponding value of y. This value is the ordinate of the point.
   d. Repeat steps a to c using other element from the domain of the linear function to determine other points on the graph of the linear function.

5. To determine f(x) = mx + b, given the slope and y-intercept of the linear function, substitute the given slope to m and the given y-intercept to b.

6. To determine f(x) = y = mx + b, given the x- and y-intercept of the linear function, substitute the given x-intercept to a and the given y-intercept to b in the form of the equation

$$\frac{x}{a} + \frac{y}{b} = 1$$

   and then, solve for y in terms of x.

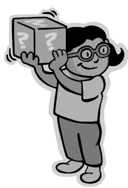
7. To determine f(x) = y = mx + b, given the slope and one point of the linear function, substitute the given slope to m and the coordinates of the given

point to $x_1$ and $y_1$ in the form of the equation $y - y_1 = m(x - x_1)$and then, solve for y in terms of x.

8. To determine f(x) = y = mx + b, given any two points of the linear function, substitute the coordinates of the first point to $x_1$ and $y_1$, and the coordinates of the second point to $x_2$ and $y_2$ in the form of the equation

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

and then, solve for y in terms of x.

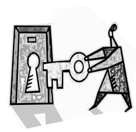


## *What have you learned*

1. What is the slope of the f(x) = -5x + 4?
2. True or false? The trend of a linear function with positive slope is increasing.
3. Solve for the y-intercept of 6x – 3y = 4.
4. Which of the following step will solve for the y-intercept of the linear function y = 3x + 9?

    a. Substitute zero to x and solve for y.
    b. Substitute zero to y and solve for x.
    c. Take the square root of the constant term.
    d. Take the negative reciprocal of the coefficient of x.

5. What is the x-intercept of 12 = 9y + 18x?
6. Name three points on the graph of y – 2x + 4 = 0.
7. Determine the linear function with slope -3 and y-intercept -4.
8. The x- and y-intercepts of a linear function are both -2. Find the linear function.
9. The graph of a linear function passes through the point (-3, 7), and its slope is -4. Express the linear function in the form f(x) = mx + b.
10. What linear function has (-2, -5) and (-3, 1) as points on its graph?



## Answer Key

How much do you know

1. 2
2. False
3. -3
4. b
5. -4
6. (-1, -5), (0, -2), (1, 1)
7. y = 5x – 2
8. y = -x + 3
9. y = -2x – 8
10. $y = \frac{3}{5}x + \frac{14}{5}$

Try this out

Lesson 1

Set A

1. The slope is 4 and the y-intercept is 5.
2. The slope is -7 and the y-intercept is 1.
3. The slope is 4 and the y-intercept is 0.
4. The slope is -4 and the y-intercept is 3.
5. The slope is $-\frac{2}{7}$ and the y-intercept is 2.

Set B

1. The slope is 8 and the y-intercept is -9.
2. The slope is -4 and the y-intercept is -6.
3. The slope is 1 and the y-intercept is 0.
4. The slope is $-\frac{3}{8}$ and the y-intercept is 3.
5. The slope is 3 and the y-intercept is $-\frac{5}{17}$.

Set C

1. The slope is 1 and the y-intercept is $\frac{1}{2}$.
2. The slope is $\frac{9}{4}$ and the y-intercept is $-\frac{3}{2}$.
3. The slope is -0.3 and the y-intercept is 0.1.
4. The slope is -5.2 and the y-intercept is -4.4.
5. The slope is $\frac{9}{8}$ and the y-intercept is $\frac{3}{2}$.

Lesson 2

Set A

1. increasing
2. decreasing
3. decreasing
4. decreasing
5. increasing

Set B

1. increasing
2. decreasing
3. decreasing
4. decreasing
5. increasing

Set C

1. decreasing
2. increasing
3. decreasing
4. increasing
5. increasing

Lesson 3

Set A

1. The x-intercept is -2 and the y-intercept is 16.
2. The x-intercept is $\frac{1}{2}$ and the y-intercept is -2.
3. The x-intercept is $\frac{3}{4}$ and the y-intercept is 3.
4. The x-intercept is $\frac{5}{2}$ and the y-intercept is -5.
5. The x-intercept is -2 and the y-intercept is 2.

Set B

1. The x-intercept is $\frac{1}{2}$ and the y-intercept is 7.
2. The x-intercept is $-\frac{3}{2}$ and the y-intercept is -3.
3. The x-intercept is $-\frac{3}{2}$ and the y-intercept is 3.
4. The x-intercept is $\frac{3}{4}$ and the y-intercept is -3.

5. The x-intercept is 7/6 and the y-intercept is $-\frac{7}{11}$.

Set C

1. The x-intercept is 5 and the y-intercept is $-\frac{5}{3}$.
2. The x-intercept is $-\frac{3}{8}$ and the y-intercept is $\frac{3}{2}$.
3. The x-intercept is $\frac{1}{7}$ and the y-intercept is $-\frac{1}{3}$.
4. The x-intercept is $\frac{1}{3}$ and the y-intercept is 0.1.
5. The x-intercept is $-\frac{11}{13}$ and the y-intercept is -4.4.

Lesson 4

Set A (Answers may vary)

1. (-1, 5), (0, 6), (1, 7)
2. (-1, 9), (0, 7), (1, 5)
3. (-1, -2), (0, 0), (1, 2)
4. (-1, 7), (0, 4), (1, 1)
5. (-1, 2), (0, 4), (1, 6)

Set B (Answers may vary)

1. (-1, -9), (0, -4), (1, 2)
2. (-1, -2), (0, -6), (1, -8)
3. (-1, 1), (0, 3), (1, 1)
4. $\left(-1,\frac{1}{11}\right)$, $\left(0,\frac{7}{11}\right)$, $\left(1,-\frac{13}{11}\right)$
5. $(-1,-1)$, $\left(0,-\frac{1}{3}\right)$, $\left(1,\frac{1}{3}\right)$

Set C (Answers may vary)

1. (-1, 7), (0, 0), (1, -7)
2. (-4, 3), (0, 2), (4, 1)
3. $(-1,-3)$, $\left(0,-\frac{2}{3}\right)$, $\left(1,\frac{5}{3}\right)$
4. $\left(-1,-\frac{15}{4}\right)$, $\left(0,-\frac{3}{2}\right)$, $\left(1,\frac{3}{4}\right)$
5. (-1, 0.4), (0, 0.1), (1, -0.2)

Lesson 5

Set A

1. f(x) = 3x + 2

2. $f(x) = -2x + 4$
3. $f(x) = 5x - 7$
4. $f(x) = -8x - 1$
5. $f(x) = 6x$

Set B
1. $f(x) = x - 1$
2. $f(x) = -9x$
3. $f(x) = \frac{4}{3}x - 2$
4. $f(x) = -\frac{1}{3}x - \frac{1}{3}$
5. $f(x) = 7x - \frac{4}{3}$

Set C
1. $f(x) = \frac{2}{3}x - \frac{1}{4}$
2. $f(x) = -\frac{2}{5}x - \frac{1}{3}$
3. $f(x) = 0.2x + 1$
4. $f(x) = x - 0.1$
5. $f(x) = 2x + \sqrt{2}$

Lesson 6

Set A
1. $f(x) = -\frac{2}{3}x + 2$
2. $f(x) = 2x + 4$
3. $f(x) = 3x - 3$
4. $f(x) = -\frac{1}{8}x - 1$
5. $f(x) = -2x - 8$

Set B
1. $f(x) = -\frac{6}{5}x + 6$
2. $f(x) = 3x + 12$
3. $f(x) = -\frac{4}{3}x - 16$
4. $f(x) = -\frac{6}{5}x - 18$
5. $f(x) = \frac{3}{7}x + \frac{1}{7}$

Set C

1. $f(x) = -\frac{1}{65}x + \frac{1}{5}$
2. $f(x) = 27x + 3$
3. $f(x) = -\frac{9}{8}x + 3$
4. $f(x) = \frac{7}{8}x + \frac{1}{2}$
5. $f(x) = \frac{39}{8}x + \frac{13}{12}$

Lesson 7

Set A

1. $f(x) = 3x - 1$
2. $f(x) = 4x - 16$
3. $f(x) = 2x + 11$
4. $f(x) = -2x - 10$
5. $f(x) = 5x + 35$

Set B

1. $f(x) = 5x + 12$
2. $f(x) = -3x + 10$
3. $f(x) = x - 7$
4. $f(x) = -9x - 45$
5. $f(x) = \frac{1}{3}x - \frac{11}{3}$

Set C

1. $f(x) = \frac{2}{3}x - \frac{11}{3}$
2. $f(x) = -\frac{1}{2}x + \frac{5}{2}$
3. $f(x) = -\frac{2}{3}x + \frac{17}{18}$
4. $f(x) = 0.2x + 0.1$
5. $f(x) = -0.3x + 0.23$

Lesson 8

1. y = -x + 4
2. y = $\frac{2}{3}$x - 2

3. $y = 7x + 35$
4. $y = -x + 4$
5. $y = -3x + 1$

Set B
1. $y = \frac{x}{2} + \frac{7}{2}$
2. $y = x - 10$
3. $y = \frac{x}{2} – \frac{9}{2}$
4. $y = x - 11$
5. $y = \frac{9x}{4} - \frac{69}{4}$

Set C
1. $y = \frac{3x}{5} – \frac{1}{5}$
2. $y = -\frac{3}{2}x + \frac{3}{2}$
3. $y = \frac{2x}{5} – \frac{11}{5}$
4. $y = -\frac{3}{2}x + \frac{3}{2}$
5. $y = x$

What have you learned
1. -5
2. true
3. $-\frac{4}{3}$
4. a
5. $\frac{2}{3}$
6. (0, -4), (1, -2), (2, 0)
7. $y = -3x - 4$
8. $y = -x - 2$
9. $y = -4x - 5$
10. $y = -6x - 17$