Graph the linear equation in a coordinate plane.

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

3. $y = -1$ 4. $y = -2x - 4$

5. $y = \frac{2}{3}x + 2$ 6. $x = -2$

Warm Up

discuss $y = mx + b$

· What are the parts
· how would we graph

· Students work in pairs
  to complete then
  discuss as a class.

Determine whether the table represents a *linear* or *nonlinear* function. Explain.

1.

x	2	3	4	5
y	4	9	14	19

2.

x	6	8	10	12
y	-1 0	-4	-2	2

3.

x	-3	-1	1	3
y	0	2	2	0

Cumulative Warm Up

· Have students graph
to determine if the
table is linear.

Essential Question

Given the graph of a linear function, how can you write an equation of the line?

· find y-Intercept
· begin on y-access
and count slope

$y = mx + b$

Essential Question

What you will learn:

· write equations in
  slope-intercept form

· Use linear equations
  to solve real-life
  problems.

Exploration 1

Work with a partner.
- Find the slope and y-intercept of each line.
- Write an equation of each line in slope-intercept form.
- Use a graphing calculator to verify your equation.

a.) $b = -1$ $m = 2$ $y = 2x - 1$

b.) $b = 2$ $m = -1$ $y = -x + 2$

c.) $b = 1$ $m = -2/3$ $y = -2/3x + 1$

d.) $b = -2$ $m = 1/2$ $y = 1/2x - 2$

Exploration 2

Work with a partner. The graph shows the cost of a smartphone plan.

a. What is the y-intercept of the line? Interpret the y-intercept in the context of the problem.

b. Approximate the slope of the line. Interpret the slope in the context of the problem.

c. Write an equation that represents the cost as a function of data usage.

$(0,20) (500,38)$

$$\frac{38-20}{500-0} = \frac{18}{500}$$

a.) 20; the base cost of the plan is $20/month

b.) can calculate. approx $0.03/$0.04 — depends on rounding. each megabyte costs about $0.03 - 0.04

c.) $y = 0.04x + 20$

Example 1

Write an equation of each line with the given slope and y-intercept.

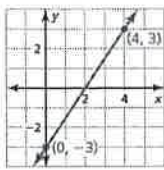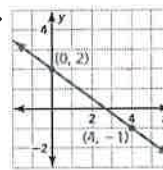a. slope = -3; y-intercept = $\frac{1}{2}$

b. slope = 0; y-intercept = -2

$y = mx + b$ Slope y-Intercept

a) = $y = -3x + 1/2$

b.) = $y = -2$

Write an equation of each line in slope-intercept form.

a.

(4, 3)
(0, −3)

b.

(0, 2)
(4, −1)

$b = -3$

$m = \dfrac{k}{4} = \dfrac{3}{2}$

$m = -\dfrac{3}{4}$

$b = 2$

Example 2

a.) $y = \dfrac{3}{2}x - 3$

b.) $y = -\dfrac{3}{4}x + 2$

· How can we check to see that the equation is correct?

Write an equation of each line that passes through the given points.

a. $(-3, 5), (0, -1)$
$x_1 \ y_1 \ x_2 \ y_2$

b. $(0, -5), (8, -5)$
$x_1 \ y_1 \ x_2 \ y_2$

$m = \dfrac{-1-5}{0-(-3)}$

$m = \dfrac{-6}{3}$

$m = -2$

$y = -2x - 1$

$m = \dfrac{-5-(-5)}{8-0}$

$m = \dfrac{-5+5}{8}$

$m = \dfrac{0}{8} = 0$

$y = -5$

Example 3

$m = \dfrac{rise}{run} = \dfrac{y}{x} = \dfrac{y_2 - y_1}{x_2 - x_1}$

* watch substitution

* label points so you substitute correctly.

Write a linear function f with the values $f(0) = 10$ and $f(6) = 34$.

$f(0) = 10$
$(0, 10)$
$x_1 \quad y_1$

$f(6) = 34$
$(6, 34)$
$x_2 \quad y_2$

$m = \dfrac{34-10}{6-0} = \dfrac{24}{6} = 4$

$y = mx + b$
$y = 4x + 10 \quad f(x) = 4x + 10$

Example 4

$f(x) = y$

· the value of x is in parenthesis
· $f(x) = y$

· Remember y-intercept is when $x = 0$

Write an equation of the line with the given slope and y-intercept.

1. slope = 7; y-intercept = 2

$$y = 7x + 2$$

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

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

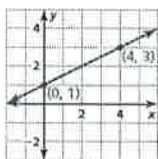Monitoring Progress 1-2

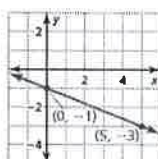$$y = m_1 x + b$$
↑   ↑
Slope   y-Intercept

* Student practice

Write an equation of the line in slope-intercept form.

3.

4.

$$y = \frac{1}{2}x + 1 \qquad y = -\frac{2}{5}x - 1$$

Monitoring Progress 3-4

· Student practice

5. Write an equation of the line that passes through (0, −2) and (4, 10).

$$m = \frac{10 - (-2)}{4 - 0} = \frac{12}{4} = 3 \qquad y = 3x - 2$$

6. Write a linear function g with the values g(0) = 9 and g(8) = 7.

$$(0, 9) \quad (8, 7)$$

$$m = \frac{7 - 9}{8 - 0} = \frac{-2}{8} = -\frac{1}{4}$$

$$y = -\frac{1}{4}x + 9$$
$$g(x) = -\frac{1}{4}x + 9$$

Monitoring Progress 5-6

* Student practice

Excluding hydropower, U.S. power plants used renewable energy sources to generate 105 million megawatt hours of electricity in 2007. By 2012, the amount of electricity generated had increased to 219 million megawatt hours. Write a linear model that represents the number of megawatt hours generated by non-hydropower renewable energy sources as a function of the number of years since 2007. Use the model to predict the number of megawatt hours that will be generated in 2017.

$$(0, 105) \quad (5, 219)$$
$$x_1 \quad y_1 \quad\quad x_2 \quad y_2$$

$$m = \frac{219 - 105}{5 - 0} = \frac{114}{5} = 22.8$$

Example 5

linear model : a linear function that models a real-life situation.

$$y = 22.8x + 105$$
$$y = 22.8(10) + 105$$
$$y = 333$$

renewable energy sources will generate 333 mil mega watt hours in 2017.

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7. The corresponding data for electricity generated by hydropower are 248 million megawatt hours in 2007 and 277 million megawatt hours in 2012. Write a linear model that represents the number of megawatt hours generated by hydropower as a function of the number of years since 2007.

$$(7, 248) \quad (12, 277)$$
$$x_1 \quad y_1 \quad\quad x_2 \quad y_2$$

$$\frac{277 - 248}{12 - 7} = \frac{29}{5} = 5.8$$

Monitoring Progress 7

* Student practice

$$y = 5.8x + 248$$

Writing Prompt: For a line that has been graphed in a coordinate plane, you can write the equation by …

Closure

exit ticket

explain!