## Discuss the Ideas

1. When a real-world situation can be modelled by a linear function, what do the slope and vertical intercept usually represent?
2. When you are given the graph of a linear function, how can you determine an equation that represents that function?
3. When you are given an equation of a linear function in slope-intercept form, how can you quickly sketch the graph?

# Exercises

## A

**4.** For each equation, identify the slope and $y$-intercept of its graph.

**a)** $y = 4x - 7$ **b)** $y = x + 12$

**c)** $y = -\frac{4}{9}x + 7$ **d)** $y = 11x - \frac{3}{8}$

**e)** $y = \frac{1}{5}x$ **f)** $y = 3$

**5.** Write an equation for the graph of a linear function that:

**a)** has slope 7 and $y$-intercept 16

**b)** has slope $-\frac{3}{8}$ and $y$-intercept 5

**c)** passes through H(0, $-3$) and has slope $\frac{7}{16}$

**d)** has $y$-intercept $-8$ and slope $-\frac{6}{5}$

**e)** passes through the origin and has slope $-\frac{5}{12}$

**6.** Graph the line with each $y$-intercept and slope.

**a)** $y$-intercept is 1, slope is $\frac{1}{2}$

**b)** $y$-intercept is $-5$, slope is 2

**c)** $y$-intercept is 4, slope is $-\frac{2}{3}$

**d)** $y$-intercept is 0, slope is $\frac{4}{3}$

## B

**7.** Graph each equation on grid paper. Explain the strategy you used.

**a)** $y = 2x - 7$ **b)** $y = -x + 3$

**c)** $y = -\frac{1}{4}x + 5$ **d)** $y = \frac{5}{2}x - 4$

**e)** $V = -100t + 6000$ **f)** $C = 10n + 95$

**8.** For a service call, an electrician charges an \$80 initial fee, plus \$50 for each hour she works.

**a)** Write an equation to represent the total cost, C dollars, for $t$ hours of work.

**b)** How would the equation change if the electrician charges \$100 initial fee plus \$40 for each hour she works?

**9.** The total fee for withdrawing money at an ATM in a foreign country is a \$3.50 foreign cash withdrawal fee, plus a 2% currency conversion fee. Write an equation to represent the total fee, $F$ dollars, for withdrawing $d$ dollars.

**10.** Use a graphing calculator or a computer with graphing software. Graph each equation. Explain the strategy you used. Sketch or print the graph.

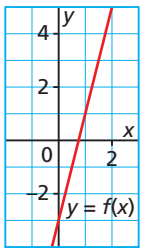
**a)** $f(x) = -\frac{3}{13}x + \frac{4}{11}$ **b)** $g(x) = 3.75x - 2.95$

**c)** $C(n) = 0.45n + 25.50$ **d)** $F(c) = \frac{9}{5}c + 32$

**11.** A student said that the equation of this graph is $y = -3x + 4$.

**a)** What mistakes did the student make?

**b)** What is the equation of the graph?



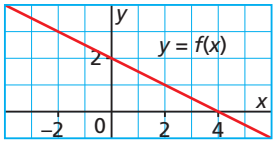

**12.** For each graph that follows:

**i)** Determine its slope and $y$-intercept.

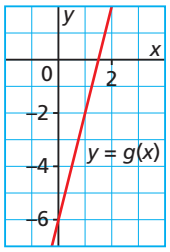
**ii)** Write an equation to describe the graph, then verify the equation.

**iii)** Use the equation to calculate the value of $y$ when $x = 10$.

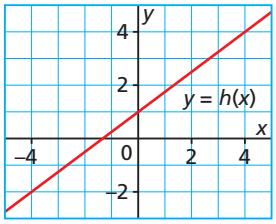
**a)**



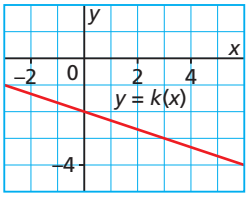

**b)**



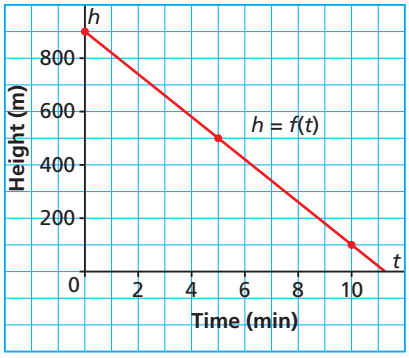

**c)**




**d)**




**13.** This graph represents the height of a float plane above a lake as the plane descends to land.




**a)** Determine the slope and the $h$-intercept. What do they represent?

**b)** Write an equation to describe the graph, then verify the equation.

**c)** Use the equation to calculate the value of $h$ when $t = 5.5$ min.

**d)** Suppose the plane began its descent at 700 m and it landed after 8 min.

**i)** How would the graph change?

**ii)** How would the equation change?

**14.** An online music site charges a one-time membership fee of \$20, plus \$0.80 for every song that is downloaded.

**a)** Write an equation for the total cost, $C$ dollars, for downloading $n$ songs.

**b)** Jacques downloaded 109 songs. What was the total cost?

**c)** Michelle paid a total cost of \$120. How many songs did she download?

**15. a)** How can you use the slope-intercept form of an equation, $y = mx + b$, to graph the horizontal line $y = 2$?

**b)** How can you graph the vertical line $x = 2$? Explain your answers.

**16.** Alun has a part-time job working as a bus boy at a local restaurant. He earns \$34 a night plus 5% of the tips.

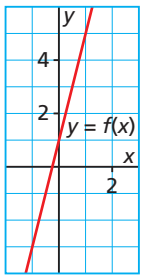
**a)** Write an equation for Alun's total earnings, $E$ dollars, when the tips are $t$ dollars.

**b)** What will Alun earn when the tips are \$400? Explain your strategy.

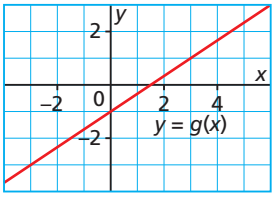
**c)** What were the nightly tips when Alun earned \$64? Explain your strategy.

**17.** Which equation matches each given graph? Justify your choice.

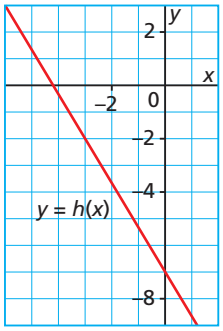
**a)** $y = x + 4$
$y = 4x + 1$
$y = x - 4$
$y = -4x + 1$




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




**c)** $y = \frac{5}{3}x + 7$
$y = -\frac{3}{5}x - 7$
$y = -7x - \frac{5}{3}$
$y = -\frac{5}{3}x - 7$

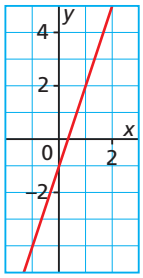


**18.** Match each equation with its graph. How did you decide on the equation for each graph?

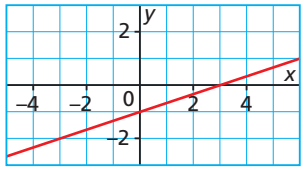
**a)** $y = 2x - 1$ **b)** $y = 3x - 1$

**c)** $y = -x - 1$ **d)** $y = \frac{1}{3}x - 1$

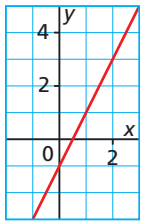
Graph A



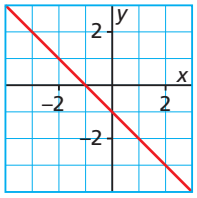

Graph B




Graph C




Graph D

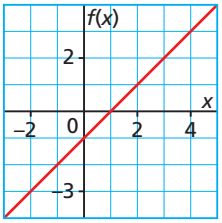



**19.** Match each equation with its graph. Compare the graphs. What do you notice?

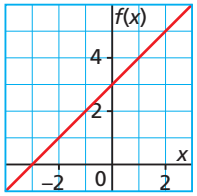
**a)** $f(x) = -x - 4$ **b)** $f(x) = -x + 1$

**c)** $f(x) = x + 3$ **d)** $f(x) = x - 1$

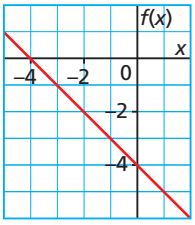
Graph A



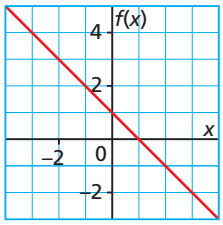

Graph B




Graph C




Graph D




**20.** Identify the graph below that corresponds to each given slope and $y$-intercept.

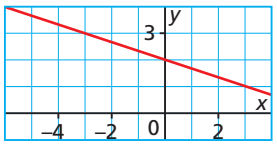
**a)** slope 3; $y$-intercept 2

**b)** slope $\frac{1}{3}$; $y$-intercept $-2$

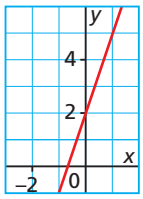
**c)** slope $-3$; $y$-intercept $-2$

**d)** slope $-\frac{1}{3}$, $y$-intercept 2

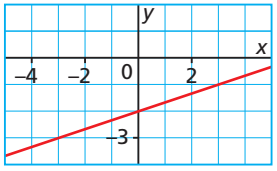
Graph A



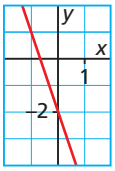

Graph B




Graph C




Graph D




**21.** Consider these equations:

$y = -5x - 7$, $y = 5x + 15$,

$y = \frac{1}{5}x + 9$, $y = -\frac{1}{5}x + 15$,

$y = \frac{1}{5}x + 21$, $y = -5x + 13$,

$y = 5x + 24$, $y = -\frac{1}{5}x$

Which equations represent parallel lines? Perpendicular lines? How do you know?

## C

**22.** Write an equation of a linear function that has $y$-intercept 4 and $x$-intercept 3. Describe the steps you used to determine the equation.

**23.** An equation of a line is $y = \frac{5}{3}x + c$. Determine the value of $c$ when the line passes through the point F(4, −6). Describe your strategy.

**24.** An equation of a line is $y = mx - \frac{7}{8}$. Determine the value of $m$ when the line passes through the point E(−3, 5).

## Reflect

How do the values of $m$ and $b$ in the linear equation $y = mx + b$ relate to the graph of the corresponding linear function? Include an example.