Problems with the homework?   nil reported

formulas for slope

$$m = \frac{rise}{run} \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \frac{\Delta y}{\Delta x} \qquad m = \frac{change\ in\ y}{change\ in\ x}$$

Another name for slope $= rate\ of\ change\ (ROC)$

Parallel Lines $-$ same slope

Perpendicular lines - negative reciprocals

Example: 5 and $-\frac{1}{5}$

The slope of $\perp$ lines multiply to give what answer?

$$\frac{5}{1}\left(\frac{-1}{5}\right) = \frac{-5}{5}$$
$$= -1$$

6.4   Slope-Intercept Form of the Equation for a Linear Function

LESSON FOCUS   Relate the graph of a linear function to its equation in slope-intercept form.

Make Connections

This graph shows a cyclist's journey where the distance is measured from her home.
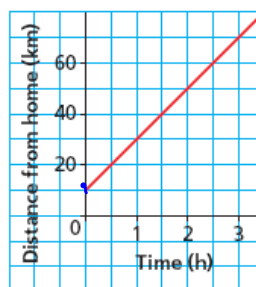
What does the vertical intercept represent?
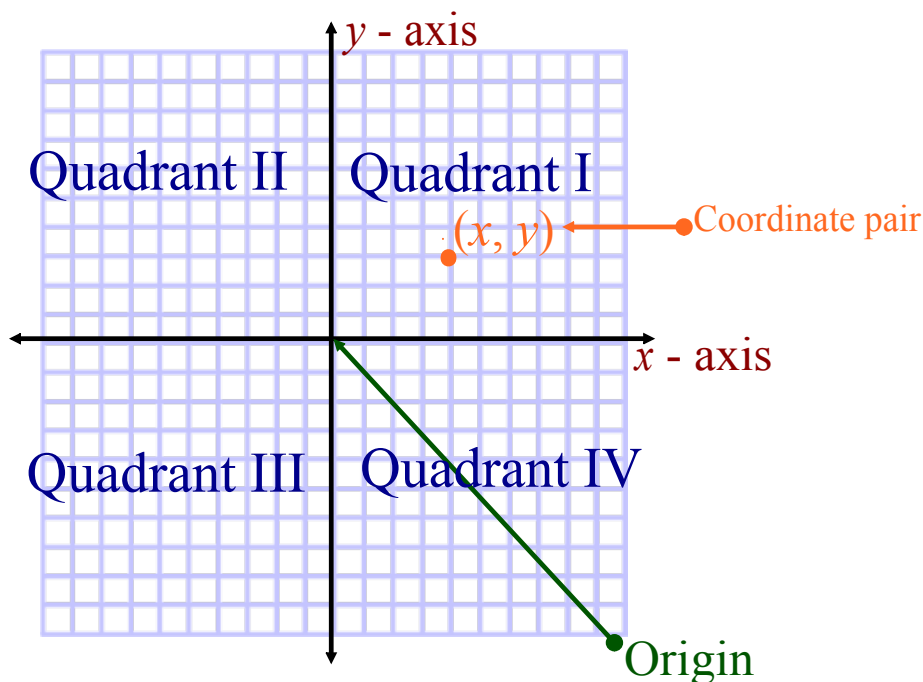What does the slope of the line represent?

Graph of a Bicycle Journey

1. She started 10Km from home

2. $m = \frac{rise}{run}$ Speed

$= \frac{km}{h}$

Cartesian Plane

y - axis

Quadrant II   Quadrant I

(x, y) ← ● Coordinate pair

x - axis

Quadrant III   Quadrant IV

● Origin

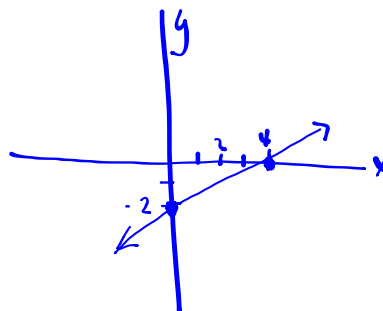# Finding Intercepts

- _x - intercept:_ - a point where the graph crosses the x-axis.

  - to find the x-intercept $\Rightarrow$ let $y = 0$ & solve for x.

- _y - intercept_: - a point where the graph crosses the y-axis.

  - to find the y-intercept $\Rightarrow$ let $x = 0$ & solve for y.

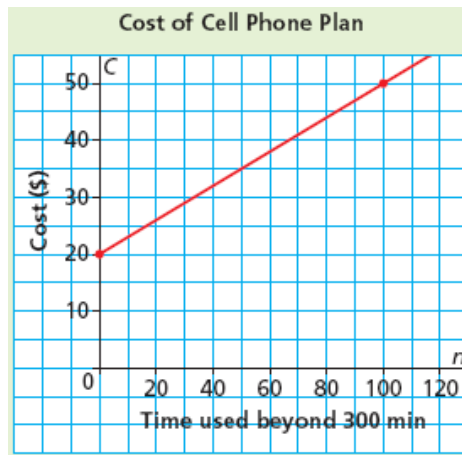**Example:** Find both intercepts given the line...

$$3x - 6y = 12$$

X-int let y=0
$$3x - 6(0) = 12$$
$$3x = 12$$
$$x = 4$$
$$(4, 0)$$

y-int let x=0
$$3(0) - 6y = 12$$
$$-6y = 12$$
$$\frac{-6y}{-6} = \frac{12}{-6}$$
$$y = -2$$
$$(0, -2)$$

How do you know this is the graph of a linear function? What does the slope of the graph represent?

1. Slope-the same

2. $m = \dfrac{rise}{run}$

$\quad = \$/min$

Write an equation to describe this function. Verify that your equation is correct.

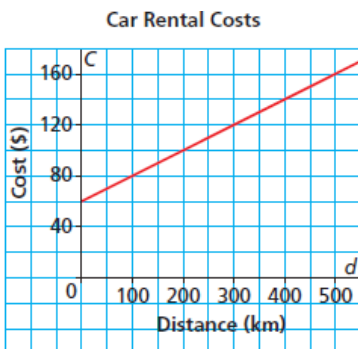$m = \dfrac{rise}{run}$

$\quad = \dfrac{30}{100}$

$\quad = \dfrac{3}{10}$

$\quad = 0.3$

$C = .3n + 20$

Cost of Cell Phone Plan

slope

In Chapter 5, Lesson 5.6, we described a linear function in different ways. The linear function below represents the cost of a car rental.

Car Rental Costs

An equation of the function is:

$C = 0.20d + 60$

The number 0.20 is the rate of change, or the slope of the graph. This is the cost in dollars for each additional 1 km driven.

The number 60 is ?

An equation of the function is:

$C = 0.20d + 60$

ROC (m)   y-int

6.4 Slope-Intercept Form of the Equation for a Linear Function

In general, any linear function can be described in **slope-intercept form.**

Slope-Intercept Form of the Equation of a Linear Function

The equation of a linear function can be written in the form $y = mx + b$, where m is the slope of the line and b is its y-intercept.

6.4 Slope-Intercept Form of the Equation for a Linear Function
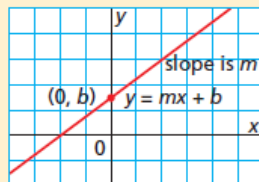
Slope-Intercept Form

$$y = mx + b$$

slope

y-intercept

Example 1 Writing an Equation of a Linear Function Given Its Slope and y-Intercept

The graph of a linear function has slope $\frac{3}{5}$ and y-intercept -4.

Write an equation for this function.

$m = \frac{3}{5}$ $y\text{-int} = -4$

$y = mx + b$

$$y = \frac{3}{5}x - 4$$ ✓

General Form of an Equation

$$AX + BY + C = 0$$

$(5)\, y = \frac{3}{5}x - 4 \,(5)$

$5y = 3x - 20$

$-3x + 5y + 20 = 0$

6.4 Slope-Intercept Form of the Equation for a Linear Function

$3x - 5y - 20 = 0$

YOUR TURN...

1. The graph of a linear function has slope $-\dfrac{7}{3}$ and y-intercept 5.

    Write an equation for this function.

$$m = -\dfrac{7}{3} \quad b = 5$$

$$y = mx + b$$

$$y = -\dfrac{7}{3}x + 5$$

$$3y = -7x + 15$$

$$7x + 3y - 15 = 0$$

Example 3   Writing the Equation of a Linear Function Given Its Graph

Write an equation to describe this function. Verify the equation.
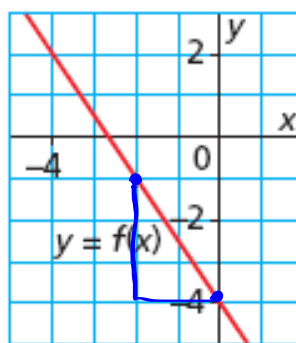
$$y = mx + b$$

$$m = \dfrac{\text{rise}}{\text{run}} \quad b = -4$$
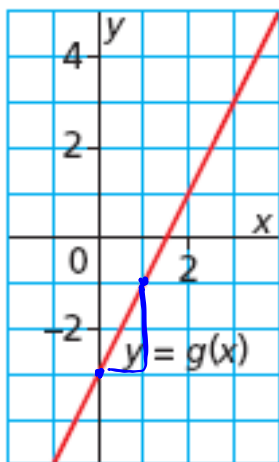
$$= \dfrac{3}{-2}$$

$$= -\dfrac{3}{2} \qquad y = mx + b$$

$$y = -\dfrac{3}{2}x - 4 \checkmark$$

$y = f(x)$

6.4 Slope-Intercept Form of the Equation for a Linear Function

YOUR TURN...

3. Write an equation to describe this function. Verify the equation.

$y = g(x)$

$y = \dfrac{m}{\uparrow} x + \dfrac{b}{\uparrow}$

$m = \dfrac{rise}{run} \qquad b = -3$

$= \dfrac{2}{1}$

$= 2$

$y = mx + b$

$y = 2x - 3 \quad \checkmark$

$2x - y - 3 = 0$

ex: Determine the **slope** and **y-intercept** of the following line.

$y = mx + b$

$2(3y - 1) = -2(x + 7)$

$6y - 2 = -2x - 14$

$6y = -2x - 14 + 2$

$\dfrac{6y}{6} = \dfrac{-2x}{6} - \dfrac{12}{6}$

$y = -\dfrac{1}{3}x - 2$

$m = -\dfrac{1}{3} \qquad b = -2$

$y = mx + b$

$y = 5x - 3$ $m = 5$ $b = -3$

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

$y = -4 + \frac{1}{5}x$ $m = \frac{1}{5}$ $b = -4$

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

$y + 2x = 6$

$y = -2x + 6$ $m = -2$ $b = 6$

EXAMPLE:

Determine the equation of the line that passes through the points (3, -4) & (0, 4)

$y = mx + b$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $b = 4$ $y = mx + b$

$= \frac{-4 - 4}{3 - 0}$ $y = -\frac{8}{3}x + 4$

$= -\frac{8}{3}$

Practice Problems...

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#4, 5, 8, 11, 12, 18, 19, 20