DIRECT VARIATION GRAPHS Notice that a direct variation equation, $y = ax$, is a linear equation in slope-intercept form, $y = mx + b$, with $m = a$ and $b = 0$. The graph of a direct variation equation is a line with a slope of a and a y-intercept of 0. So, the line passes through the origin.

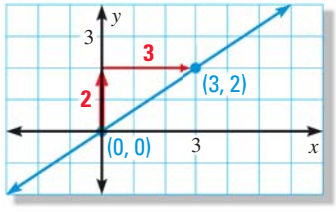
EXAMPLE 2 Graph direct variation equations

Graph the direct variation equation.

a. $y = \frac{2}{3}x$ **b.** $y = -3x$

Solution

a. Plot a point at the origin. The slope is equal to the constant of variation, or $\frac{2}{3}$. Find and plot a second point, then draw a line through the points.



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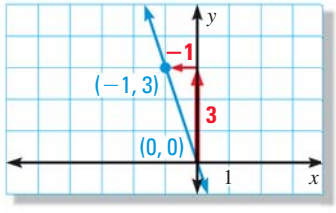
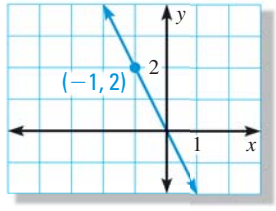
b. Plot a point at the origin. The slope is equal to the constant of variation, or -3. Find and plot a second point, then draw a line through the points.



DRAW A GRAPH
If the constant of variation is positive, the graph of $y = ax$ passes through Quadrants I and III. If the constant of variation is negative, the graph of $y = ax$ passes through Quadrants II and IV.

EXAMPLE 3 Write and use a direct variation equation

The graph of a direct variation equation is shown.



a. Write the direct variation equation.

b. Find the value of y when $x = 30$.

Solution

a. Because y varies directly with x, the equation has the form $y = ax$. Use the fact that $y = 2$ when $x = -1$ to find a.

$y = ax$ **Write direct variation equation.**

$2 = a(-1)$ **Substitute.**

$-2 = a$ **Solve for a.**

▶ A direct variation equation that relates x and y is $y = -2x$.

b. When $x = 30$, $y = -2(30) = -60$.

GUIDED PRACTICE for Examples 2 and 3

4. Graph the direct variation equation $y = 2x$.

5. The graph of a direct variation equation passes through the point $(4, 6)$. Write the direct variation equation and find the value of y when $x = 24$.