Lesson 9-5

Example 1 Find Slopes and *y*-intercepts of Graphs

State the slope and the *y*-intercept of $y = \frac{3}{4}x - 2$.

$y = \frac{3}{4}x + (-2)$ Write the equation in the form $y = mx + b$.

    ↑   ↑

$y = mx + b$ $m = \frac{3}{4}, b = -2$

The slope of the graph is $\frac{3}{4}$, and the *y*-intercept is –2.

Example 2 Find Slopes and *y*-intercepts of Graphs
State the slope and the *y*-intercept of $x + y = 5$.

$x + y = 5$ Write the original equation.

$\underline{-x \qquad\quad -x}$ Subtract *x* from each side.

$y = 5 - x$ Simplify.

$y = -1x + 5$ Write the equation in the form $y = mx + b$. Recall that $-x$ means $-1x$.

     ↑   ↑

$y = mx + b$ $m = -1, b = 5$

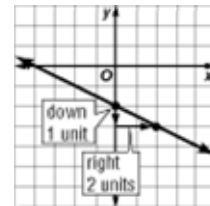The slope of the graph is –1, and the *y*-intercept is 5.

Example 3 Graph Using Slope-Intercept Form

Graph $y = -\frac{1}{2}x - 2$ using the slope and *y*-intercept.

Step 1   Find the slope and *y*-intercept.

         $y = -\frac{1}{2}x - 2$ slope $= -\frac{1}{2}$, *y*-intercept $= -2$

Step 2   Graph the *y*-intercept $(0, -2)$.

Step 3   Write the slope $-\frac{1}{2}$ as $\frac{-1}{2}$. Use it to locate a second point on the line.

         $m = \frac{-1}{2}$ change in *y*: down 1 unit; change in *x*: right 2 units

Step 4   Draw a line through the two points.

Example 4 Graph an Equation to Solve Problems
**PLUMBING A plumber charges $125 plus $50 per hour that she works. The total cost y can be represented by the equation $y = 50x + 125$, where x represents the number of hours. Graph the equation to find the cost for 3 hours.**

Find the slope and the y-intercept.
$y = 50x + 125$ slope = 50, y-intercept = 125

Plot the point (0, 125). Locate another point up 50 and right 1. Draw the line. The y-coordinate on the graph is 275 when the x-coordinate is 3, so the total cost is $275.
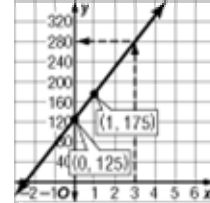
Example 5 Graph an Equation to Solve Problems
Describe what the slope and y-intercept represent.

The slope 50 represents the cost per hour, which is the rate of change. The y-intercept 125 is the one-time charge for a job.

Example 6 Graph an Equation to Solve Problems
Is the total cost proportional to the number of hours? Explain.

Compare the ratio of total cost to number of hours for two points.
$$\frac{175}{1} = \$175 \text{ per hour} \qquad \frac{275}{3} = \$91.67 \text{ per hour} \qquad \text{The ratios are different.}$$
So, the total cost is not proportional to the number of hours.