Write/Graph Equations of Lines Pgs 180-183

Slope Intercept Form VS. Standard Form

EXAMPLE 1   Write an equation of a line from a graph

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

Solution

STEP 1 **Find** the slope. Choose two points on the
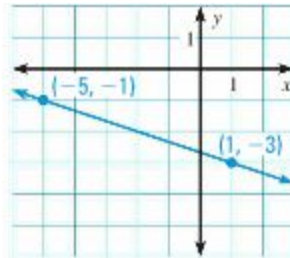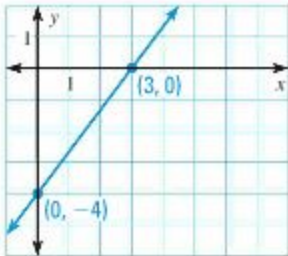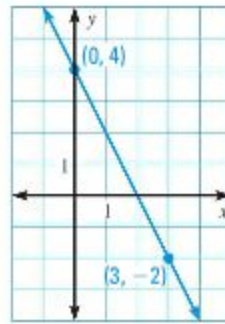graph of the line, (0, 4) and (3, −2).

$$m = \frac{4 - (-2)}{0 - 3} = \frac{6}{-3} = -2$$

STEP 2 **Find** the y-intercept. The line intersects the
y-axis at the point (0, 4), so the y-intercept is **4**.

STEP 3 **Write** the equation.

$y = mx + b$ **Use slope-intercept form.**

$y = -2x + 4$ **Substitute −2 for m and 4 for b.**

EXAMPLE 2   **Write an equation of a parallel line**

Write an equation of the line passing through the point $(-1, 1)$ that is parallel to the line with the equation $y = 2x - 3$.

Solution

STEP 1 **Find** the slope m. The slope of a line parallel to $y = 2x - 3$ is the same as the given line, so the slope is 2.

IS

STEP 2 **Find** the y-intercept b by using $m = 2$ and $(x, y) = (-1, 1)$.

$y = mx + b$	Use slope-intercept form.
$1 = 2(-1) + b$	Substitute for x, y, and m.
$3 = b$	Solve for b.

e
:n
ion

▶ Because $m = 2$ and $b = 3$, an equation of the line is $y = 2x + 3$.

Write an equation of the line passing through point $(0, -1)$ that is parallel to the line with the equation $y = -2x + 3$.

EXAMPLE 3 **Write an equation of a perpendicular line**

Write an equation of the line j passing through the point $(2, 3)$ that is perpendicular to the line k with the equation $y = -2x + 2$.

Solution

STEP 1 Find the slope m of line j. Line k has a slope of -2.

$$-2 \cdot m = -1 \qquad \text{The product of the slopes of } \perp \text{ lines is } -1.$$

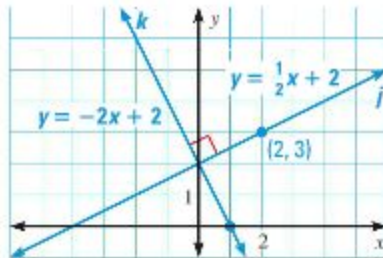$$m = \frac{1}{2} \qquad \text{Divide each side by } -2.$$

STEP 2 Find the y-intercept b by using $m = \frac{1}{2}$ and $(x, y) = (2, 3)$.

$$y = mx + b \qquad \text{Use slope-intercept form.}$$

$$3 = \frac{1}{2}(2) + b \qquad \text{Substitute for } x, y, \text{ and } m.$$

$$2 = b \qquad \text{Solve for } b.$$

▶ Because $m = \frac{1}{2}$ and $b = 2$, an equation of line j is $y = \frac{1}{2}x + 2$. You can check that the lines j and k are perpendicular by graphing, then using a protractor to measure one of the angles formed by the lines.

Write an equation of the line that passes through point P and is perpendicular to the line with the given equation.

P(-8, 0), 3x - 5y = 6

EXAMPLE 4 **Write an equation of a line from a graph**

GYM MEMBERSHIP The graph models the total cost of joining a gym. Write an equation of the line. Explain the meaning of the slope and the y-intercept of the line.

Gym Membership Cost

Solution

STEP 1 Find the slope.

$$m = \frac{363 - 231}{5 - 2} = \frac{132}{3} = 44$$

STEP 2 Find the y-intercept. Use the slope and one of the points on the graph.

$y = mx + b$	Use slope-intercept form.
$231 = 44 \cdot 2 + b$	Substitute for x, y, and m.
$143 = b$	Simplify.

STEP 3 Write the equation. Because $m = 44$ and $b = 143$, an equation of the line is $y = 44x + 143$.

▶ The equation $y = 44x + 143$ models the cost. The slope is the monthly fee, $44, and the y-intercept is the initial cost to join the gym, $143.

What are other real life applications that you could use this method with?

EXAMPLE 5 **Graph a line with equation in standard form**

Graph $3x + 4y = 12$.