

2.4 Write Equations of Lines

Equations:

Slope-Intercept Form

$$y = mx + b$$

↑ slope ↑ y-int

Point-Slope Form

$$y - y_1 = m(x - x_1)$$

↑ slope ↑ point (x_1, y_1)

Standard Form

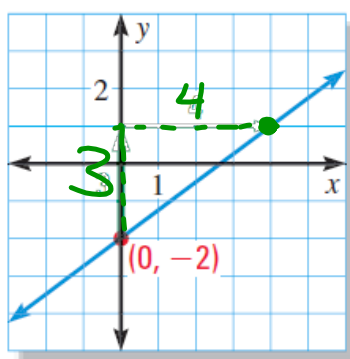
$$Ax + By = C$$

A, B, C are ints.

EXAMPLE 1 Write an equation given the slope and y-intercept

Write an equation of the line shown.

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



EXAMPLE 2 Write an equation given the slope and a point

Write an equation of the line that passes through (5, 4) and has a slope of -3.

$$y - y_1 = m(x - x_1)$$

$$x_1 = 5$$

$$y_1 = 4$$

$$m$$

$$y - 4 = -3(x - 5)$$

or

$$y = -3x + 19$$

EXAMPLE 3 Write equations of parallel or perpendicular lines

Write an equation of the line that passes through $(-2, 3)$ and is (a) parallel to, and (b) perpendicular to, the line $y = -4x + 1$.

parallel

$$m_{\parallel} = -4$$

$$(-2, 3)$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = -4(x + 2)$$

$$y = -4x - 5$$

$mx + b$

perp.

$$m_{\perp} = \frac{1}{4}$$

$$(-2, 3)$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{1}{4}(x + 2)$$

$$\text{or}$$

$$y = \frac{1}{4}x + \frac{7}{2}$$

EXAMPLE 4 Write an equation given two points

Write an equation of the line that passes through (5, -2) and (2, 10).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{10 - (-2)}{2 - 5} = \frac{12}{-3} = -4$$

$$y - y_1 = m(x - x_1)$$

$$y - 10 = -4(x - 2)$$

$$y - 10 = -4x + 8$$

$$y = -4x + 18$$

$$y + 2 = -4(x - 5)$$

$$y + 2 = -4x + 20$$

$$y = -4x + 18$$