5.2 Use Linear Equations in Slope-Intercept Form

Goal • Write an equation of a line using points on the line.

Your Notes

WRITING AN EQUATION OF A LINE IN SLOPE-INTERCEPT FORM

Step 1 Identify the slope __m__ . You can use the __slope formula__ to calculate the slope if you know two points on the line.

Step 2 Find the __y-intercept__ . You can substitute the __slope__ and the __coordinates__ of a point (x, y) on the line into $y = mx + b$. Then solve for __b__ .

Step 3 Write an equation using __$y = mx + b$__ .

Example 1 *Write an equation given the slope and a point*

Write an equation of the line that passes through the point (1, 2) and has a slope of 3.

Solution

Step 1 Identify the slope. The slope is __3__ .

Step 2 Find the y-intercept. Substitute the slope and the coordinates of the given point into $y = mx + b$. Solve for b.

> Be careful not to mix up the *x*- and *y*-values when you substitute.

$y = mx + b$ Write slope-intercept form.

$\underline{2} = \underline{3}(\underline{1}) + b$ Substitute __3__ for *m*, __1__ for *x*, and __2__ for *y*.

$\underline{-1} = b$ Solve for __b__ .

Step 3 Write an equation of the line.

$y = mx + b$ Write slope-intercept form.

$y = \underline{3x - 1}$ Substitute __3__ for *m* and __−1__ for *b*.

✔ *Checkpoint* **Complete the following exercise.**

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1. Write an equation of the line that passes through the point (2, 2) and has a slope of 4.

$y = 4x - 6$

Example 2 *Write an equation given two points*

Write an equation of the line that passes through (2, −3) and (−2, 1).

Solution

Step 1 Calculate the slope.

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

$$= \frac{\boxed{1} - \boxed{(-3)}}{\boxed{-2} - \boxed{2}}$$

$$= \frac{\boxed{4}}{\boxed{-4}} = \underline{-1}$$

> You can also find the *y*-intercept using the coordinates of the other given point.

Step 2 Find the *y*-intercept. Use the slope and the point (2, −3).

$y = mx + b$ Write slope-intercept form.

$-3 = \underline{-1}\ (\ \underline{2}\ ) + b$ Substitute __−1__ for *m*, __2__ for *x*, and __−3__ for *y*.

$\underline{-1} = b$ Solve for *b*.

Step 3 Write an equation of the line.

$y = mx + b$ Write slope-intercept form.

$y = \underline{-x - 1}$ Substitute __−1__ for *m* and __−1__ for *b*.

✔ *Checkpoint* **Complete the following exercise.**

2. Write an equation for the line that passes through (−8, −13) and (4, 2).

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

3. Write an equation for the line that passes through (−3, 4) and (1, −2).

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

HOW TO WRITE EQUATIONS IN SLOPE-INTERCEPT FORM

1. Given slope *m* and *y*-intercept *b*.

Substitute _*m*_ and _*b*_ in the equation _$y = mx + b$_.

2. Given slope *m* and one point.

Substitute _*m*_ and the _coordinates_ of the point in _$y = mx + b$_. Solve for _*b*_. Write the _equation_.

Homework

3. Given two points.

Use the points to find the slope _*m*_. Then substitute _*m*_ and the _coordinates_ of _one point_ in _$y = mx + b$_. Solve for _*b*_. Write the _equation_.