

Writing Equations in Slope-Intercept Form Given Slope and a Point

**Remember that slope-intercept form is $y = mx + b$ where m is slope and b is the y-intercept.

Example 1: Write an Equation Given Slope and One Point

Write an equation of a line that passes through $(1, 5)$ with slope 2.

$$y = mx + b$$

We can replace m with 2 since we know the slope.

$$y = 2x + b$$

In the point $(1, 5)$, 1 is the x-value and 5 is the y-value. So, we can replace x with 1 and y with 5.

$$5 = 2(1) + b$$

Now we should multiply the $2 \cdot 1$.

$$5 = 2 + b$$

Solve for b :

$$5 = 2 + b$$

$$-2 \quad -2$$

$$3 = b$$

Our final answer is when we write the equation of the line with both the slope and y-intercept replaced.

$$y = 2x + 3$$

**The slope comes from the original problem. The y-intercept comes from our solving for b . This is our solution.

Example 2: Write an Equation Given Slope and One Point

$$(4, -2), m = 2$$

$$y = mx + b$$

We can replace m with 2 since we know the slope.

$$y = 2x + b$$

In the point $(4, -2)$, 4 is the x-value and -2 is the y-value. So, we can replace x with 4 and y with -2.

$$-2 = 2(4) + b$$

Now we should multiply the $2 \cdot 4$.

$$-2 = 8 + b$$

Solve for b:

$$-2 = 8 + b$$

$$-8 \quad -8$$

$$-10 = b$$

Our final answer is when we write the equation of the line with both the slope and y-intercept replaced.

$$y = 2x - 10$$

**The slope comes from the original problem. The y-intercept comes from our solving for b. This is our solution.

Example 3: Write an Equation Given Slope and One Point

$$(3, 7), m = -3$$

$$y = mx + b$$

We can replace m with -3 since we know the slope.

$$y = -3x + b$$

In the point $(3, 7)$, 3 is the x-value and 7 is the y-value. So, we can replace x with 3 and y with 7.

$$7 = -3(3) + b$$

Now we should multiply the $-3 \cdot 3$.

$$7 = -9 + b$$

Solve for b:

$$7 = -9 + b$$

$$+9 \quad +9$$

$$16 = b$$

Our final answer is when we write the equation of the line with both the slope and y-intercept replaced.

$$y = -3x + 16$$

**The slope comes from the original problem. The y-intercept comes from our solving for b. This is our solution.

Example 4: Write an Equation Given Slope and One Point

$$(-3, 5), m = -1$$

$$y = mx + b$$

We can replace m with -1 since we know the slope.

$$y = -1x + b$$

In the point $(-3, 5)$, -3 is the x-value and 5 is the y-value. So, we can replace x with -3 and y with 5.

$$5 = -1(-3) + b$$

Now we should multiply the $-1 \cdot -3$.

$$5 = 3 + b$$

Solve for b:

$$5 = 3 + b$$

$$-3 \quad -3$$

$$2 = b$$

Our final answer is when we write the equation of the line with both the slope and y-intercept replaced.

$$y = -x + 2$$

**The slope comes from the original problem. The y-intercept comes from our solving for b. This is our solution.

Example 5: Write an Equation Given Slope and One Point

$$(5, 3), m = \frac{1}{2}$$

$$y = mx + b$$

We can replace m with $\frac{1}{2}$ since we know the slope.

$$y = \frac{1}{2}x + b$$

In the point $(5, 3)$, 5 is the x-value and 3 is the y-value. So, we can replace x with 5 and y with 3.

$$5 = \frac{1}{2}(3) + b$$

Now we should multiply the $\frac{1}{2} \cdot 3$.

$$5 = 1\frac{1}{2} + b$$

Solve for b:

$$5 = 1\frac{1}{2} + b$$

$$-1\frac{1}{2} \quad -1\frac{1}{2}$$

$$3\frac{1}{2} = b$$

Our final answer is when we write the equation of the line with both the slope and y-intercept replaced.

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

**The slope comes from the original problem. The y-intercept comes from our solving for b. This is our solution.

Example 6: Write an Equation Given Slope and One Point

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

$$y = mx + b$$

We can replace m with $-\frac{2}{3}$ since we know the slope.

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

In the point $(-3, -1)$, -3 is the x-value and -1 is the y-value. So, we can replace x with -3 and y with -1.

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

Now we should multiply the $-\frac{2}{3} \cdot -3$.

$$-1 = 2 + b$$

Solve for b:

$$-1 = 2 + b$$

$$-2 \quad -2$$

$$-3 = b$$

Our final answer is when we write the equation of the line with both the slope and y-intercept replaced.

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

**The slope comes from the original problem. The y-intercept comes from our solving for b. This is our solution.

Example 7: Write an Equation Given Slope and One Point

$$(4, 2), m = 0$$

Slopes of zero define horizontal lines whose equations are of the form $y = \#$

In the point $(4, 2)$, 2 is the y-value. So, our equation must be:

$$y = 2$$

Example 8: Write an Equation Given Slope and One Point

$$(4, 2), m = \text{undefined}$$

Undefined slopes are vertical lines whose equations are $x = \#$.

In the point $(4, 2)$, 4 is the x-value. So, our equation must be:

$$x = 4$$