

## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Introduction



**Today's Lesson**

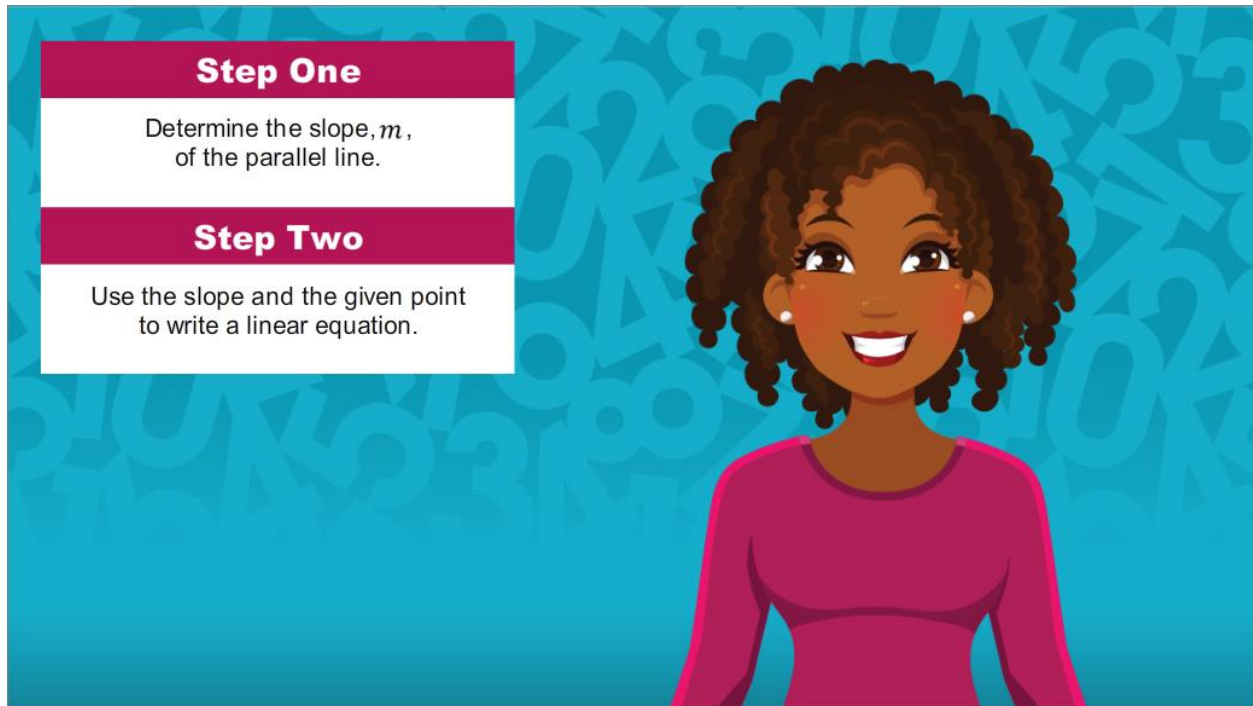
- You will learn how to write the equation of a line that is parallel to a given line and passes through a given point.

Hi there! I'm so glad you could join me for this lesson in Algebra I. In this lesson, you will learn how to write the equation of a line that is parallel to a given line and passes through a given point.

## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Anticipatory Set



The graphic features a woman with curly hair and a pink top on the right side. On the left, there are two white boxes with pink headers. The first box is titled 'Step One' and contains the text 'Determine the slope,  $m$ , of the parallel line.' The second box is titled 'Step Two' and contains the text 'Use the slope and the given point to write a linear equation.'

**Step One**

Determine the slope,  $m$ , of the parallel line.

**Step Two**

Use the slope and the given point to write a linear equation.

Use the following steps to guide you in the process of writing the equation of a line that is parallel to a given line and passes through a given point.

**Step 1:** Determine the slope,  $m$ , of the parallel line.

**Step 2:** Use the slope and the given point to write a linear equation.

Keep these steps in mind as you work through the following examples.

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

Writing the Equation of a Line Parallel to a Given Line

**WRITING THE EQUATION OF A LINE  
PARALLEL TO A GIVEN LINE**

**Click the Examples Below to Learn More**

Example One

Self-Check

Example Two

Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

**Example 1**

**EXAMPLE 1**

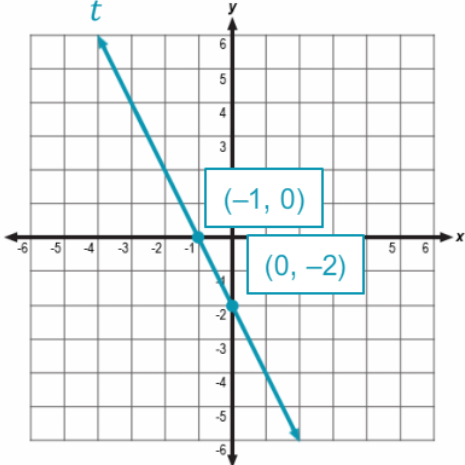
Write an equation in slope-intercept form of the line that passes through the point  $(1, 6)$  and is parallel to the line  $t$ .

**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

The slope of line  $t$  is...

12 $-\frac{1}{2}$ -2



Write an equation in slope-intercept form of the line that passes through the point  $(1, 6)$  and is parallel to line  $t$ .

**Step 1:** Determine the slope,  $m$ , of the parallel line.

Recall that parallel lines have equal slopes. You will need to determine the slope of line  $t$  in order to find the slope of a line parallel to line  $t$ .

Begin by locating two points on line  $t$  with integral coordinates. You can choose the points  $(-1, 0)$  and  $(0, -2)$ .

The slope of line  $t$  is ...

- A) 1
- B) 2
- C)  $-\frac{1}{2}$
- D) -2

## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Example 1 (continued)

**EXAMPLE 1**

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to the line  $t$ .

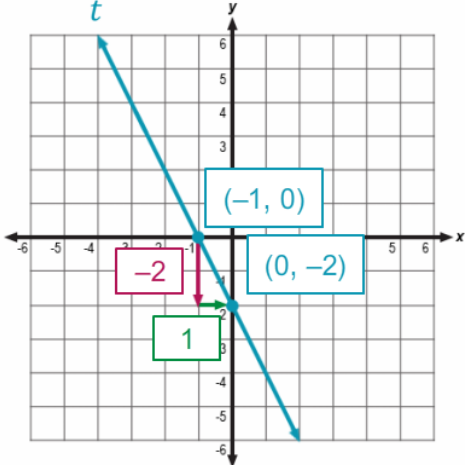
**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

$$m = \frac{\text{change in } y \text{ - values}}{\text{change in } x \text{ - values}}$$
$$= \frac{\text{vertical change}}{\text{horizontal change}} = \frac{-2}{1} = -2$$

The slope of the line is  $-2$ .

**-2**



**Next**

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to line  $t$ .

**Step 1:** Determine the slope,  $m$ , of the parallel line.

$$m = \frac{\text{change in } y \text{ - values}}{\text{change in } x \text{ - values}}$$
$$= \frac{\text{vertical change}}{\text{horizontal change}} = \frac{-2}{1} = -2$$

The slope of the line is  $-2$ .

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

Example 1 (continued)

**EXAMPLE 1**

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to the line  $t$ .

**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

**STEP TWO**

Use the slope and the given point to write a linear equation.

$$y = mx + b$$
$$m = -2$$
$$(x, y) = (1, 6)$$

Which of the following equations represents a line that passes through the point (1, 6) and has a slope of  $-2$ ?

$y = -2x + 8$

$y = -2x + 6$

$y = -2x + 1$

$y = -2x$

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to line  $t$ .

**Step 1:** Determine the slope,  $m$ , of the parallel line.

**Step 2:** Use the slope and the given point to write a linear equation.

$$y = mx + b$$

$$m = -2$$

$$(x, y) = (1, 6)$$

In this example, you are asked to write an equation in the form  $y = mx + b$ . Now that Step 1 is complete, you know that the slope,  $m$ , is  $-2$ .

To find  $b$ , substitute  $-2$ , for  $m$  and the coordinates of the given point (1, 6) for  $x$  and  $y$ . Then, solve for  $b$ .

Which of the following equations represents a line that passes through the point (1, 6) and has a slope of  $-2$ ?

- A)  $y = -2x + 8$
- B)  $y = -2x + 6$
- C)  $y = -2x + 1$
- D)  $y = -2x$

## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Example 1 (continued)

**EXAMPLE 1**

Write an equation in slope-intercept form of the line that passes through the point  $(1, 6)$  and is parallel to the line  $t$ .

**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

**STEP TWO**

Use the slope and the given point to write a linear equation.

$$y = mx + b$$
$$m = -2$$
$$(x, y) = (1, 6)$$

The equation  $y = -2x + 8$  represents a line that passes through the point  $(1, 6)$  and has a slope of  $-2$ .

[View Work](#) [Next](#)

Write an equation in slope-intercept form of the line that passes through the point  $(1, 6)$  and is parallel to line  $t$ .

**Step 1:** Determine the slope,  $m$ , of the parallel line.

**Step 2:** Use the slope and the given point to write a linear equation.

$$y = mx + b$$

$$m = -2$$

$$(x, y) = (1, 6)$$

The equation  $y = -2x + 8$  represents a line that passes through the point  $(1, 6)$  and has a slope of  $-2$ .

## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Example 1 (continued)

**EXAMPLE 1**

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to the line  $t$ .

**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

**STEP TWO**

Use the slope and the given point to write a linear equation.

$$y = mx + b$$

$$m = -2$$

$$(x, y) = (1, 6)$$

In this example,  $m = -2$  and  $(x, y) = (1, 6)$ . Begin by substituting  $-2$  for  $m$ , 1 for  $x$ , and 6 for  $y$ .

$$y = mx + b$$

$$6 = -2(1) + b$$

$$6 = -2 + b$$

$$\begin{array}{r} +2 \quad +2 \\ \hline 8 = b \end{array}$$

Then, solve for  $b$ . Start by finding the product of  $-2$  and 1.

Next, add 2 to both sides of the equation.

Now that you know that  $m = -2$  and  $b = 8$ , you can write the equation of the line in slope-intercept form.

$$y = mx + b$$

$$y = -2x + 8$$

Next

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to line  $t$ .

In this example,  $m = -2$  and  $(x, y) = (1, 6)$ . So, begin by substituting  $-2$  for  $m$ , 1 for  $x$ , and 6 for  $y$ .

$$y = mx + b$$

$$6 = -2(1) + b$$

Then, solve for  $b$ . Start by finding the product of  $-2$  and 1.

$$6 = -2 + b$$

$$6 = -2 + b$$

$$\begin{array}{r} +2 \quad +2 \\ \hline 8 = b \end{array}$$

Next, add 2 to both sides of the equation.

Now that you know that  $m = -2$  and  $b = 8$ , you can write the equation of the line in slope-intercept form.

$$y = mx + b$$

$$y = -2x + 8$$



**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

Example 1 (continued)

**EXAMPLE 1**

Write an equation in slope-intercept form of the line that passes through the point (1, 6) and is parallel to the line  $t$ .

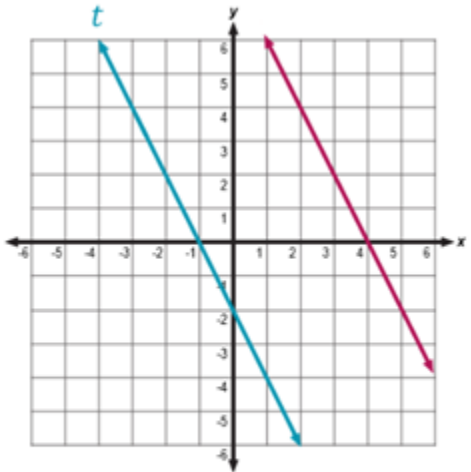
**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

**STEP TWO**

Use the slope and the given point to write a linear equation.

$$y = mx + b$$
$$y = -2x + 8$$



[Menu](#)

Your work is complete. You have written the equation of a line parallel to line  $t$  that passes through the point (1, 6).

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

**Example 2**

**EXAMPLE 2**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

Standard Form:  $Ax + By = C$

Slope-Intercept Form:  $y = mx + b$

What is the slope of a line parallel to  $x + y = 3$ ? (Hint: solve the equation for  $y$ .)

1   3   -1   -3

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**Step 1:** Determine the slope,  $m$ , of the parallel line.

Recall that when given a linear equation in standard form, you can determine the slope of the line by representing the equation in slope-intercept form. Keep in mind that parallel lines have equal slopes.

$$\text{Standard Form: } Ax + By = C$$

$$\text{Slope-Intercept Form: } y = mx + b$$

What is the slope of a line parallel to  $x + y = 3$ ? (Hint: Solve the equation for  $y$ .)

- A) 1
- B) 3
- C) -1
- D) -3

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

Example 2 (continued)

**EXAMPLE 2**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**STEP ONE**

Determine the slope,  $m$ , of the parallel line.

Standard Form:  $Ax + By = C$

Slope-Intercept Form:  $y = mx + b$

The slope of the line is  $-1$ .

$-1$  [View Work](#) [Next](#)

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**Step 1:** Determine the slope,  $m$ , of the parallel line.

The slope of the line is  $-1$ .

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

**Example 2 (continued)**

**EXAMPLE 2**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

Begin by finding the slope of the line represented by the equation  $x + y = 3$ .

$$\begin{array}{r} x + y = 3 \\ -x \quad -x \\ \hline y = -x + 3 \end{array}$$

Subtract  $x$  from both sides of the equation.

Now that you have represented the equation in slope-intercept form, you find that the slope of the line is  $-1$ . Because parallel lines have equal slopes, the slope of a line parallel to the given line is  $-1$ .

**Next**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

Begin by finding the slope of the line represented by the equation  $x + y = 3$ .

$$\begin{array}{r} x + y = 3 \\ -x \quad -x \\ \hline y = -x + 3 \end{array}$$

Subtract  $x$  from both sides of the equation.

Now that you have represented the equation in slope-intercept form, you find that the slope of the line is  $-1$ . Because parallel lines have equal slopes, the slope of a line parallel to the given line is  $-1$ .

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

**Example 2 (continued)**

**EXAMPLE 2**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**STEP TWO**

Use the slope and the given point to write a linear equation.

$m = -1$      $(x, y) = (-2, -3)$

Which of the following equations represents a line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ ?

$y = -x + 5$       $y = -x - 5$       $y = x + 5$       $y = x - 5$

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**Step 2:** Use the slope and the given point to write a linear equation.

$$m = -1 \quad (x, y) = (-2, -3)$$

You know that the parallel line has a slope of  $-1$  and passes through the point  $(-2, -3)$ .

Which of the following equations represents a line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ ?

- A)  $y = -x + 5$
- B)  $y = -x - 5$
- C)  $y = x + 5$
- D)  $y = x - 5$

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

Example 2 (continued)

**EXAMPLE 2**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**STEP TWO**

Use the slope and the given point to write a linear equation.

$m = -1$      $(x, y) = (-2, -3)$

The equation  $y = -x - 5$  represents a line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

$y = -x - 5$

[View Work](#)    [Menu](#)

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**Step 2:** Use the slope and the given point to write a linear equation.

$$m = -1 \quad (x, y) = (-2, -3)$$

The equation  $y = -x - 5$  represents a line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

**Example 2 (continued)**

**EXAMPLE 2**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

$y = mx + b$ $-3 = -1(-2) + b$ $-3 = 2 + b$ $\begin{array}{r} -2 \quad -2 \\ \hline -5 = b \end{array}$	<p>In this example, <math>m = -1</math> and <math>(x, y) = (-2, -3)</math>.            Begin by substituting <math>-1</math> for <math>m</math>, <math>-2</math> for <math>x</math>, and <math>-3</math> for <math>y</math>.</p> <p>Then, solve for <math>b</math>. Start by finding the product of <math>-1</math> and <math>-2</math>.</p> <p>Next, subtract 2 from both sides of the equation.</p>
---	---

Now that you know that  $m = -1$  and  $b = -5$ , you can write the equation of the line in slope-intercept form:  $y = mx + b$ .

$y = -1x - 5$  or simply  $y = -x - 5$ .

**Menu**

Write an equation in slope-intercept form of the line that passes through the point  $(-2, -3)$  and is parallel to the line  $x + y = 3$ .

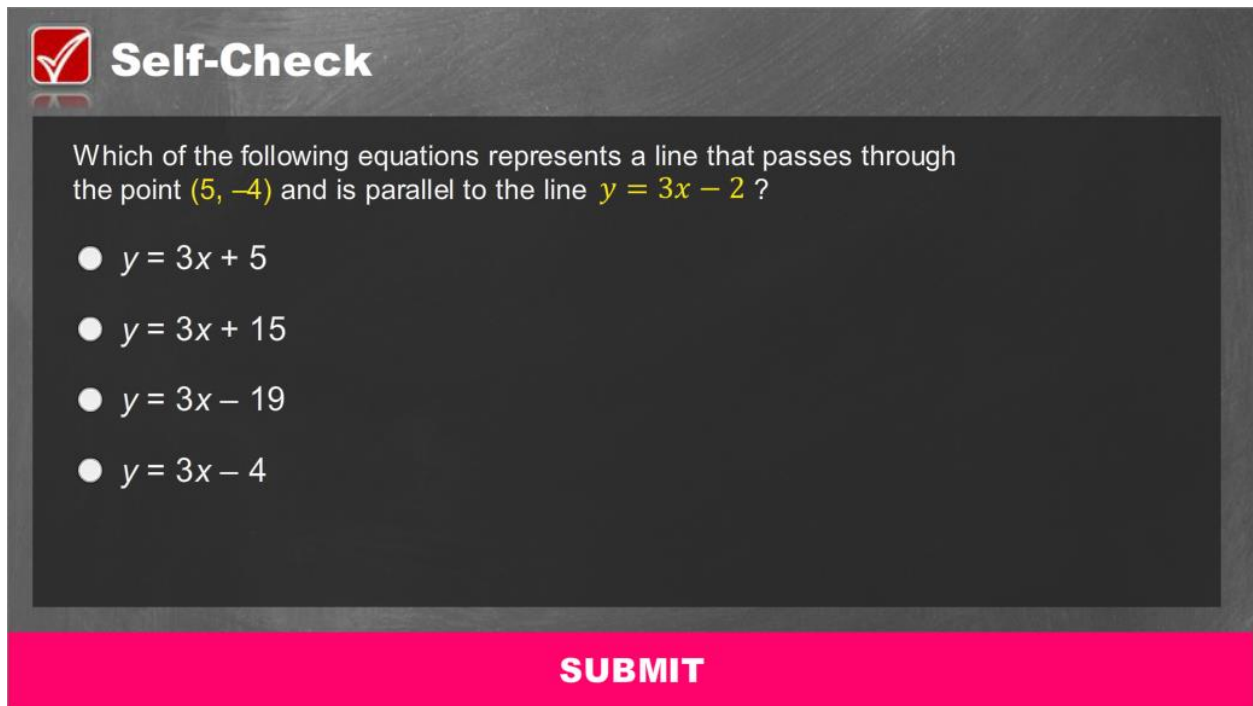
$y = mx + b$ $-3 = -1(-2) + b$ $-3 = 2 + b$ $\begin{array}{r} -2 \quad -2 \\ \hline -5 = b \end{array}$	<p>In this example, <math>m = -1</math> and <math>(x, y) = (-2, -3)</math>.</p> <p>Begin by substituting <math>-1</math> for <math>m</math>, <math>-2</math> for <math>x</math>, and <math>-3</math> for <math>y</math>.</p> <p>Then, solve for <math>b</math>. Start by finding the product of <math>-1</math> and <math>-2</math>.</p> <p>Next, subtract 2 from both sides of the equation.</p>
---	---

Now that you know that  $m = -1$  and  $b = -5$ , you can write the equation of the line in slope-intercept form:  $y = mx + b$

$y = -1x - 5$  or simply  $y = -x - 5$

**Module 9: Writing Linear Equations**  
**Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line**

Self-Check

A self-check interface with a dark grey background. At the top left is a red checkmark icon in a white square, followed by the text "Self-Check" in white. Below this is a dark grey rectangular area containing the question and four radio button options. At the bottom is a bright pink horizontal bar with the word "SUBMIT" in white capital letters.

**Self-Check**

Which of the following equations represents a line that passes through the point  $(5, -4)$  and is parallel to the line  $y = 3x - 2$  ?

- $y = 3x + 5$
- $y = 3x + 15$
- $y = 3x - 19$
- $y = 3x - 4$

**SUBMIT**

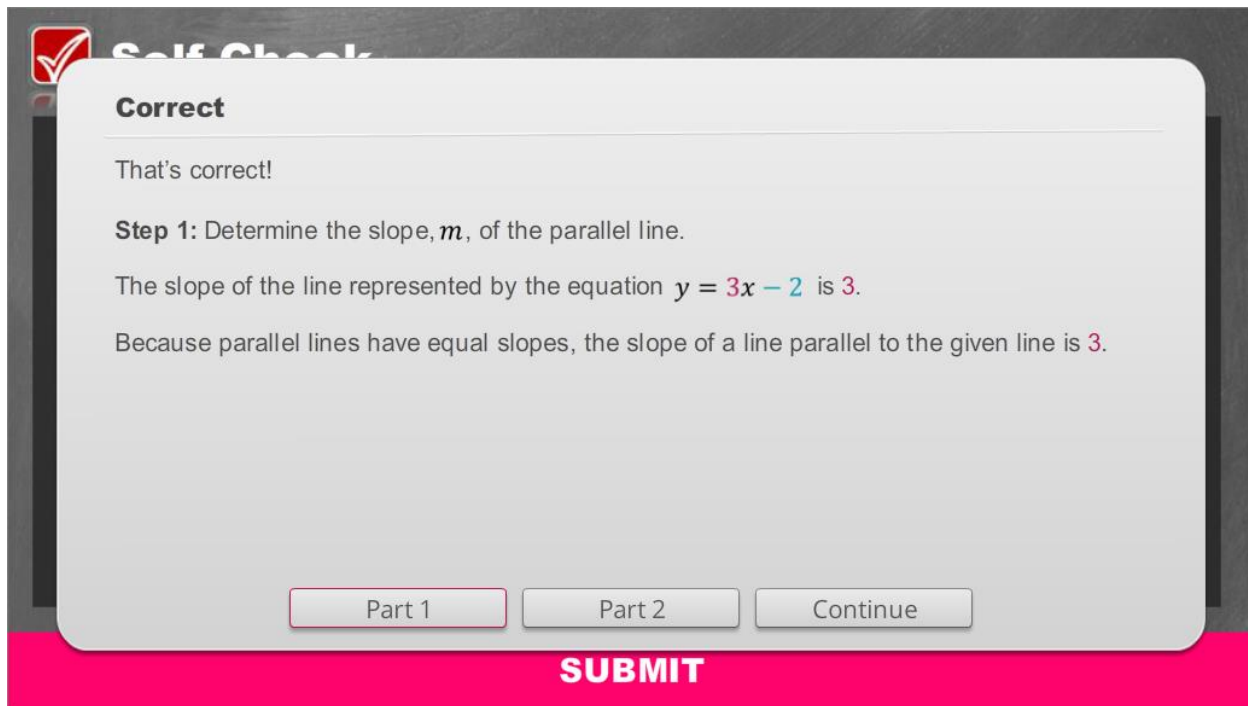
Solve the problem in the image above to check your understanding of the content.



## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Self-Check: Answer



**Correct**

That's correct!

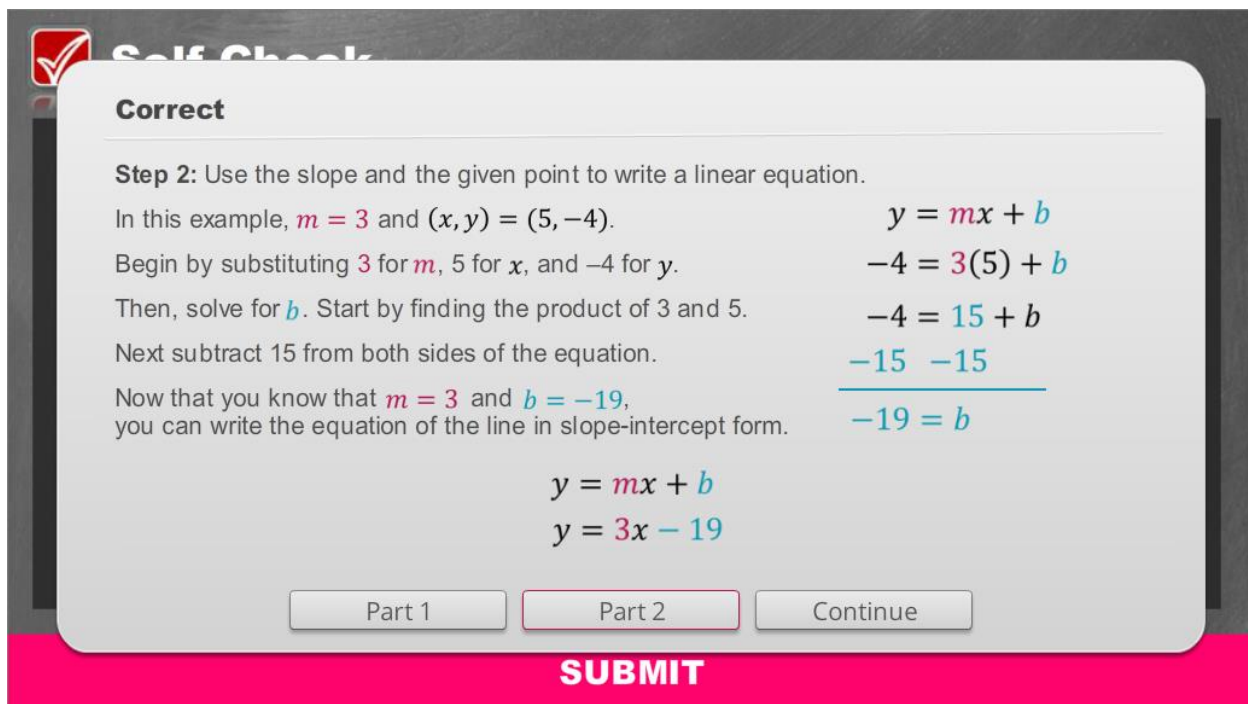
**Step 1:** Determine the slope,  $m$ , of the parallel line.

The slope of the line represented by the equation  $y = 3x - 2$  is 3.

Because parallel lines have equal slopes, the slope of a line parallel to the given line is 3.

Part 1    Part 2    Continue

**SUBMIT**



**Correct**

**Step 2:** Use the slope and the given point to write a linear equation.

In this example,  $m = 3$  and  $(x, y) = (5, -4)$ .  $y = mx + b$

Begin by substituting 3 for  $m$ , 5 for  $x$ , and  $-4$  for  $y$ .  $-4 = 3(5) + b$

Then, solve for  $b$ . Start by finding the product of 3 and 5.  $-4 = 15 + b$

Next subtract 15 from both sides of the equation.  $-15 \quad -15$

Now that you know that  $m = 3$  and  $b = -19$ , you can write the equation of the line in slope-intercept form.  $-19 = b$

$y = mx + b$   
 $y = 3x - 19$

Part 1    Part 2    Continue

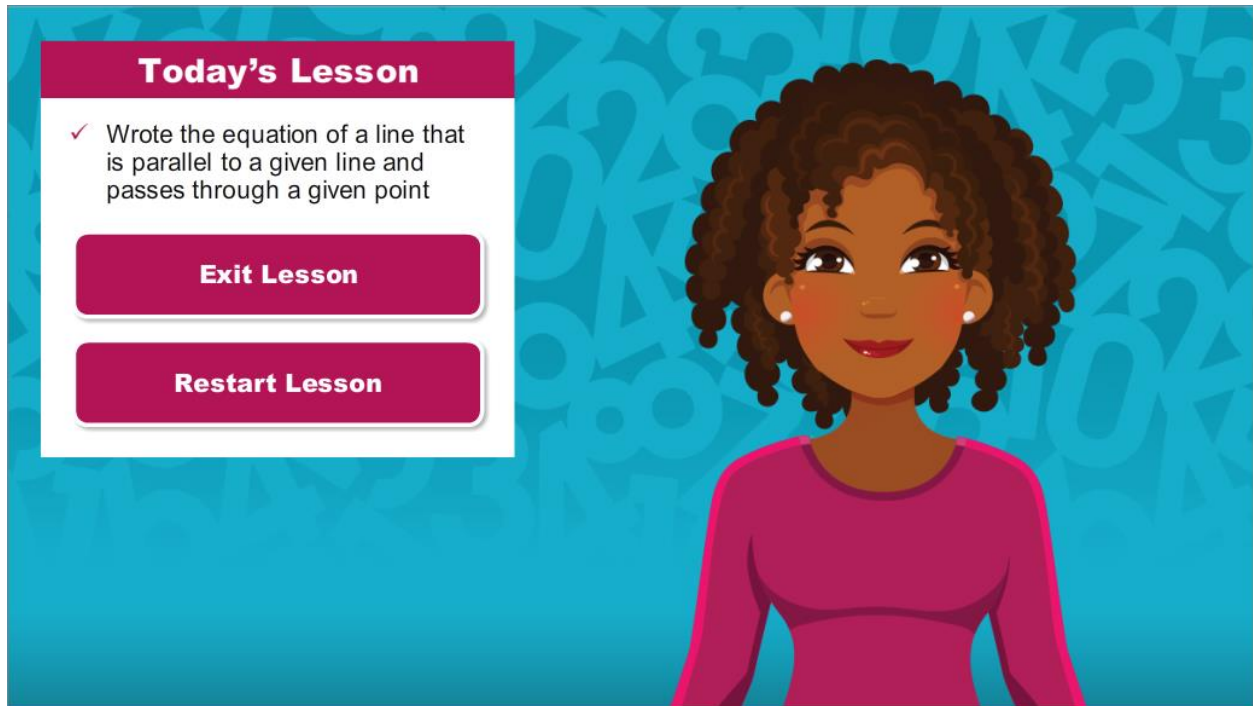
**SUBMIT**

For your reference, the images above show the correct solution to the self-check problem.

## Module 9: Writing Linear Equations

### Topic 3 Content: Writing the Equation of a Line Parallel to a Given Line

#### Conclusion



The image shows a digital lesson conclusion screen. On the right side, there is a stylized illustration of a woman with dark, curly hair, wearing a pink long-sleeved top. The background is a light blue with a pattern of faint, larger numbers. On the left side, there is a white rectangular box with a pink header that says "Today's Lesson". Inside the box, there is a checkmark icon followed by the text: "Wrote the equation of a line that is parallel to a given line and passes through a given point". Below this text are two pink buttons with white text: "Exit Lesson" and "Restart Lesson".

You have reached the conclusion of this lesson where you learned how to write the equation of a line that is parallel to a given line and passes through a given point.