

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Introduction



**Today's Lesson**

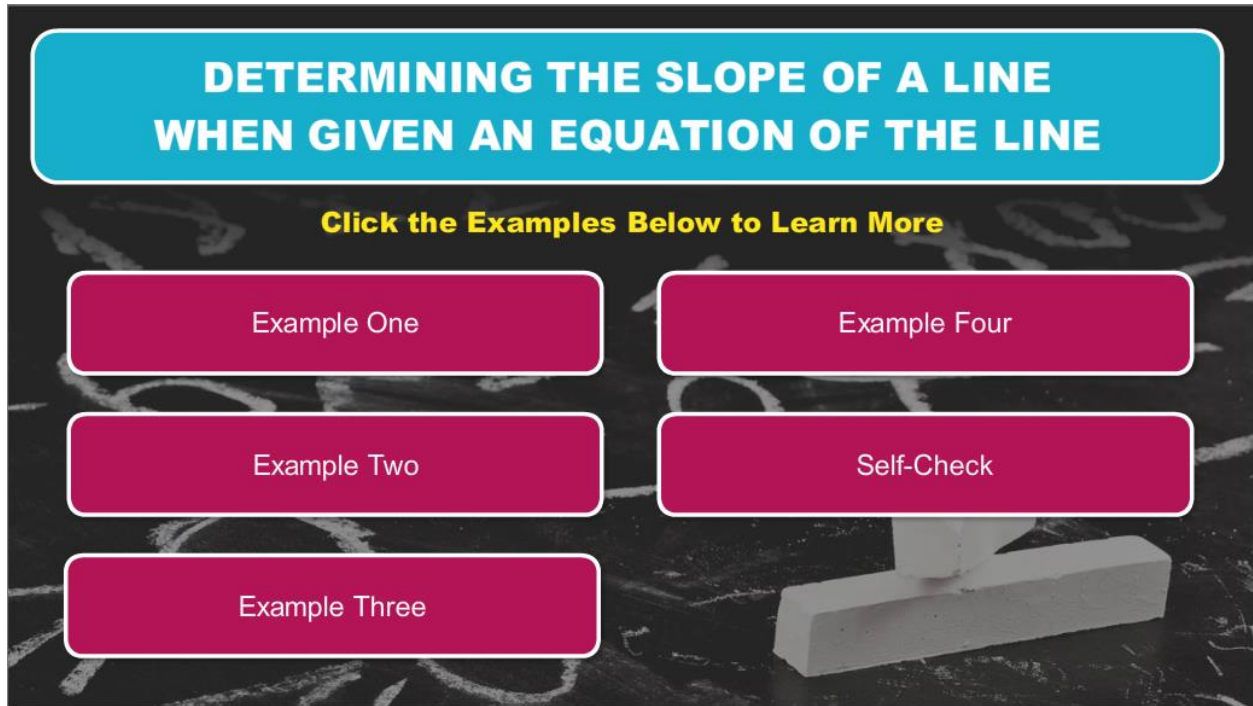
- You will learn how to determine the slope of a line when given its equation.

Hi there! I'm so glad you could join me for this lesson in Algebra I, where you will learn how to determine the slope of a line when given its equation.

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Determining the Slope of a Line When Given an Equation of the Line



The graphic features a dark background with faint chalkboard markings. At the top, a blue rounded rectangle contains the title "DETERMINING THE SLOPE OF A LINE WHEN GIVEN AN EQUATION OF THE LINE" in white, bold, uppercase letters. Below this, a yellow text prompt reads "Click the Examples Below to Learn More". Five pink rounded rectangular buttons are arranged in two columns: "Example One", "Example Two", and "Example Three" on the left; "Example Four" and "Self-Check" on the right. A white eraser is visible in the bottom right corner of the graphic.

Click the examples below to learn more

- [Example One](#)
- [Example Two](#)
- [Example Three](#)
- [Example Four](#)
- [Self-Check](#)

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example One

#### EXAMPLE 1

Determine the slope of the line given by the equation below.

$$y = -6x + 1$$

#### Slope-Intercept Form

$$y = mx + b$$

$$y = -6x + 1$$

Determine the slope of the line given by the equation below.

$$y = -6x + 1$$

The slope-intercept form of a linear equation is  $y = mx + b$ , where  $m$  represents the slope of the line and  $b$  represents the  $y$ -intercept of the line.

The linear equation  $y = -6x + 1$  is in slope-intercept form. The slope of the line is  $-6$  and the  $y$ -intercept is  $1$ .

$$y = mx + b$$

$$y = -6x + 1$$

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Two

#### EXAMPLE 2

Determine the slope of the line given by the equation below.

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

#### Point-Slope Form

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

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

$$(x_1, y_1) = (1, 2) \quad m = \frac{1}{3}$$

Determine the slope of the line given by the equation below.

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

The point-slope form of a linear equation is  $y - y_1 = m(x - x_1)$ , where  $m$  represents the slope of the line and  $x_1$  and  $y_1$  represent the coordinates of a point on the line.

The linear equation  $y - 2 = \frac{1}{3}(x - 1)$  is in point-slope form. The line passes through the point  $(1, 2)$  and has a slope of  $\frac{1}{3}$ .

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

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

$$(x_1, y_1) = (1, 2)$$

$$m = \frac{1}{3}$$

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Three

### EXAMPLE 3

Determine the slope of the line given by the equation below.

$$2x + 4y = 12$$

$$Ax + By = C$$

One method of finding the slope of a line when given its equation in standard form is to represent the equation in slope-intercept form.

Determine the slope of the line given by the equation below.

$$2x + 4y = 12$$

The linear equation in this example is given in standard form:  $Ax + By = C$ , where  $A$ ,  $B$ , and  $C$  are integers and  $A$  and  $B$  are not both equal to 0.

One method of finding the slope of a line when given its equation in standard form is to represent the equation in slope-intercept form. To do this, solve the given equation for  $y$ .

$$Ax + By = C$$

$$2x + 4y = 12$$

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Three (continued)

### EXAMPLE 3

Determine the slope of the line given by the equation below.

$$\begin{array}{r} 2x + 4y = 12 \\ -2x \quad -2x \\ \hline 4y = -2x + 12 \\ \frac{4y}{4} = \frac{-2x}{4} + \frac{12}{4} \\ y = -\frac{1}{2}x + 3 \end{array}$$

Determine the slope of the line given by the equation below.

$$2x + 4y = 12$$

In this equation, begin by subtracting  $2x$  from each side. The result is  $4y = -2x + 12$ . Next, divide each term by 4.

You find that  $y = -\frac{1}{2}x + 3$ .

$$\begin{array}{r} 2x + 4y = 12 \\ -2x \quad -2x \\ \hline 4y = -2x + 12 \\ \frac{4y}{4} = \frac{-2x}{4} + \frac{12}{4} \\ y = -\frac{1}{2}x + 3 \end{array}$$

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Three (continued)

### EXAMPLE 3

Determine the slope of the line given by the equation below.

$$\begin{aligned} 2x + 4y &= 12 \\ \underline{-2x} \quad \quad \underline{-2x} & \\ 4y &= -2x + 12 \\ \underline{4} \quad \quad \underline{4} \quad \underline{4} & \\ y &= -\frac{1}{2}x + 3 \\ y &= mx + b \end{aligned}$$

Determine the slope of the line given by the equation below.

$$2x + 4y = 12$$

Now that you have represented the equation in slope-intercept form you can identify the slope.

Recall that in slope-intercept form,  $m$  represents the slope and  $b$  represents the  $y$ -intercept. Therefore, for this equation the slope is  $-\frac{1}{2}$ .

$$\begin{aligned} 2x + 4y &= 12 \\ \underline{-2x} \quad \quad \underline{-2x} & \\ 4y &= -2x + 12 \\ \underline{4} \quad \quad \underline{4} \quad \underline{4} & \\ y &= -\frac{1}{2}x + 3 \\ y &= -\frac{1}{2}x + 3 \\ y &= mx + b \end{aligned}$$

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Four

#### EXAMPLE 4

What is the slope of the line given by the equation below?

$$21x - 7y = 14$$

After solving the given equation for  $y$ , you find that...

$$y = -3x + 2$$

$$y = 3x - 2$$

$$y = -3x - 2$$

$$y = 3x + 2$$

What is the slope of the line given by the equation below?

$$21x - 7y = 14$$

Remember, you can determine the slope of a line when given its equation in standard form by representing the equation in slope-intercept form. To do this, solve the given equation for  $y$ .

After solving the given equation for  $y$ , you find that...

- A)  $y = -3x + 2$
- B)  $y = 3x - 2$
- C)  $y = -3x - 2$
- D)  $y = 3x + 2$



## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Four (continued)

#### EXAMPLE 4

What is the slope of the line given by the equation below?

$$21x - 7y = 14$$

When you solve for  $y$ , you find  $y = 3x - 2$ .

$$y = 3x - 2$$

[View Work](#)

[Next](#)

What is the slope of the line given by the equation below?

$$21x - 7y = 14$$

When you solve for  $y$ , you find that  $y = 3x - 2$ .

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Four (continued)

#### EXAMPLE 4

What is the slope of the line given by the equation below?

$$21x - 7y = 14$$

$$\frac{-21x}{-7} \quad \frac{-21x}{-7}$$

$$\frac{-7y}{-7} = \frac{-21x}{-7} + \frac{14}{-7}$$

$$y = 3x - 2$$

Next

What is the slope of the line given by the equation below?

$$21x - 7y = 14$$

$$21x - 7y = 14$$

$$\frac{-21x}{-7} \quad \frac{-21x}{-7}$$

$$\frac{-7y}{-7} = \frac{-21x}{-7} + \frac{14}{-7}$$

$$y = 3x - 2$$

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Four (continued)

**EXAMPLE 4**

What is the slope of the line given by the equation below?

$$y = 3x - 2$$

The slope of the line is

Enter the correct value above and click submit.

**Submit**

What is the slope of the line given by the equation below?

$$y = 3x - 2$$

The slope of the line is ?

Enter the correct value above and click submit.

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Example Four (continued)

#### EXAMPLE 4

What is the slope of the line given by the equation below?

$$y = 3x - 2$$

The slope-intercept form of a line is

$$y = mx + b$$

$m$  represents the slope and  $b$  represents the  $y$ -intercept. The equation

$$y = 3x - 2$$

is in slope-intercept form. The slope of the line is 3.

Menu

What is the slope of the line given by the equation below?

$$y = 3x - 2$$

The slope-intercept form of a line:  $y = mx + b$

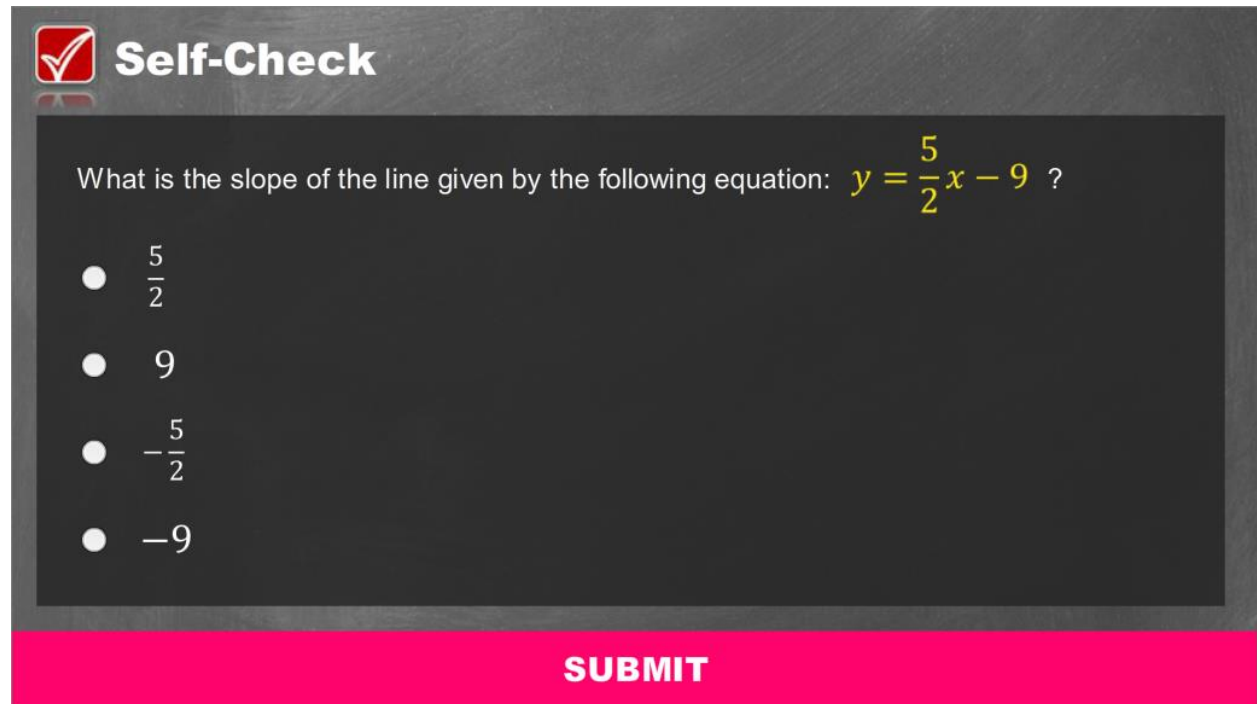
$m$  represents the slope     $b$  represents the  $y$ -intercept

The linear equation  $y = 3x - 2$  is in slope-intercept form. The slope of the line is 3.

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Self-Check 1

A digital interface for a self-check question. It features a dark grey background with a red checkmark icon and the text "Self-Check" in white. Below this, a question asks for the slope of a line given by the equation  $y = \frac{5}{2}x - 9$ . Four radio button options are listed:  $\frac{5}{2}$ , 9,  $-\frac{5}{2}$ , and -9. At the bottom of the interface is a bright pink button labeled "SUBMIT" in white capital letters.

**Self-Check**

What is the slope of the line given by the following equation:  $y = \frac{5}{2}x - 9$  ?

- $\frac{5}{2}$
- 9
- $-\frac{5}{2}$
- 9

**SUBMIT**

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

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Self-Check 1: Answer

**Correct**

That's correct! The slope-intercept form of a line is  $y = mx + b$ , where  $m$  represents the slope and  $b$  represents the y-intercept.

The linear equation  $y = \frac{5}{2}x - 9$  is in slope-intercept form.

The slope of the line is  $\frac{5}{2}$ .

Continue


**SUBMIT**

For your reference, the image above shows the correct solution to the self-check problem.

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Self-Check 2

 **Self-Check**

What is the slope of the line given by the equation below?

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

- 4
- 2
- 4
- 3

**SUBMIT**

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

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Self-Check 2: Answer

**Correct**

That's correct! The point-slope form of a line is  $y - y_1 = m(x - x_1)$  where  $m$  represents the slope and  $(x_1, y_1)$  represents a point on the line.

The linear equation  $y - 3 = -4(x + 2)$  is in point-slope form.

The slope of the line is  $-4$ .

Continue

**SUBMIT**

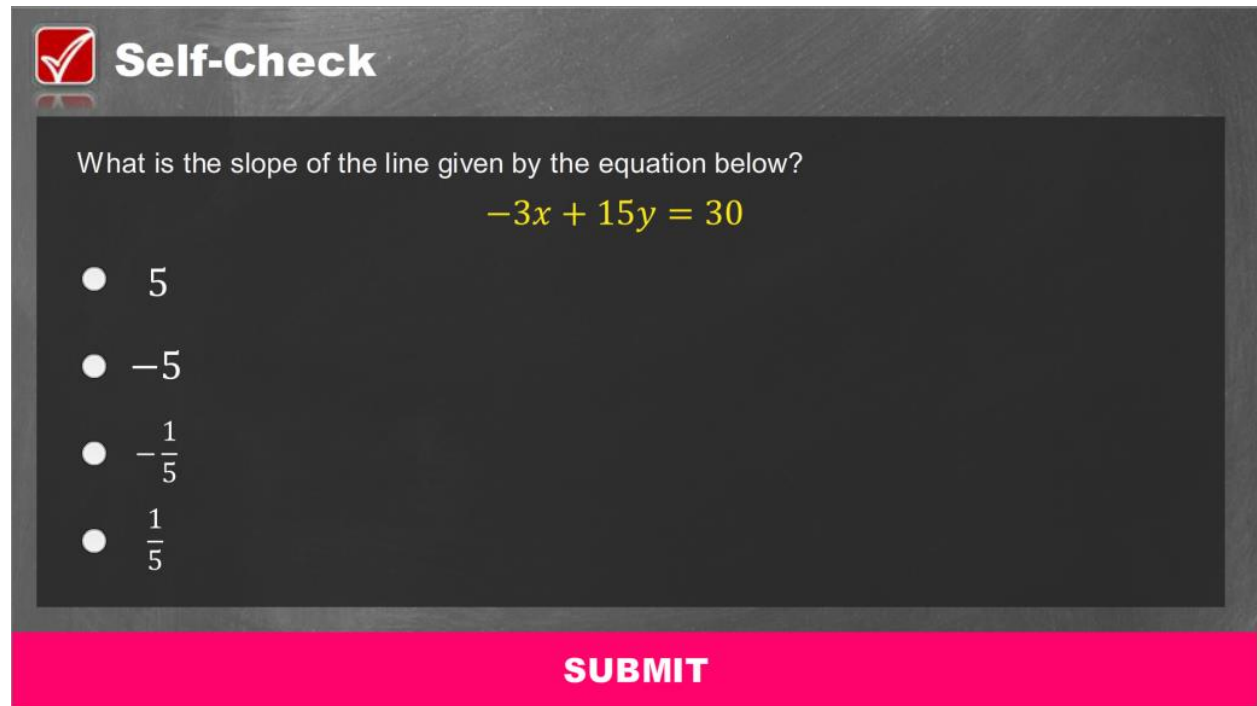
For your reference, the image above shows the correct solution to the self-check problem.



## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Self-Check 3

A digital interface for a self-check problem. It features a dark grey background with a red checkmark icon and the text "Self-Check" in white. Below this, the question "What is the slope of the line given by the equation below?" is displayed in white. The equation  $-3x + 15y = 30$  is shown in yellow. Four radio button options are listed: 5, -5,  $-\frac{1}{5}$ , and  $\frac{1}{5}$ . At the bottom, a bright pink bar contains the word "SUBMIT" in white capital letters.

**Self-Check**

What is the slope of the line given by the equation below?

$$-3x + 15y = 30$$

- 5
- 5
- $-\frac{1}{5}$
- $\frac{1}{5}$

**SUBMIT**

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

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Self-Check 3: Answer

**Correct**

That's correct! To determine the slope, represent the equation in slope-intercept form. To do this, solve the equation for  $y$ .

Begin by adding  $3x$  to each side.

$$\begin{array}{r} -3x + 15y = 30 \\ +3x \qquad \qquad +3x \\ \hline \end{array}$$

Then, divide each term by  $15$ .

$$\frac{15y}{15} = \frac{3x}{15} + \frac{30}{15}$$

Once the equation is in slope-intercept form, you can see that the slope of the line is  $\frac{1}{5}$ .

$$y = \frac{1}{5}x + 2$$

Continue

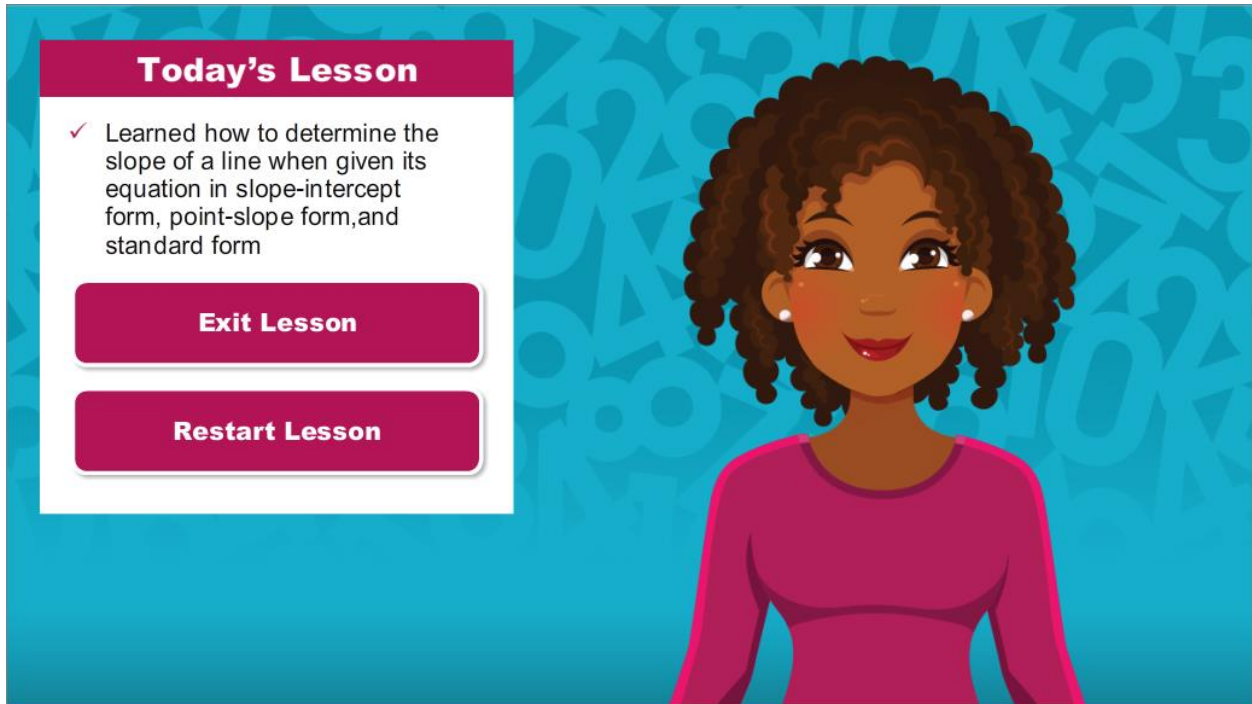
**SUBMIT**

For your reference, the image above shows the correct solution to the self-check problem.

## Module 9: Writing Linear Equations

### Topic 1 Content: Determining the Slope of a Line When Given an Equation of the Line

#### Conclusion



The image shows a digital interface for a lesson conclusion. On the right is a cartoon illustration of a woman with dark curly hair, wearing a pink long-sleeved top. On the left is a white box with a pink header that says "Today's Lesson". Below the header is a checkmark icon followed by the text: "Learned how to determine the slope of a line when given its equation in slope-intercept form, point-slope form, and standard form". Below this text are two pink buttons: "Exit Lesson" and "Restart Lesson". The background is a blue pattern of mathematical symbols.

You have reached the conclusion of this lesson where you will learn how to determine the slope of a line when given its equation in slope-intercept form, point-slope form, and standard form.