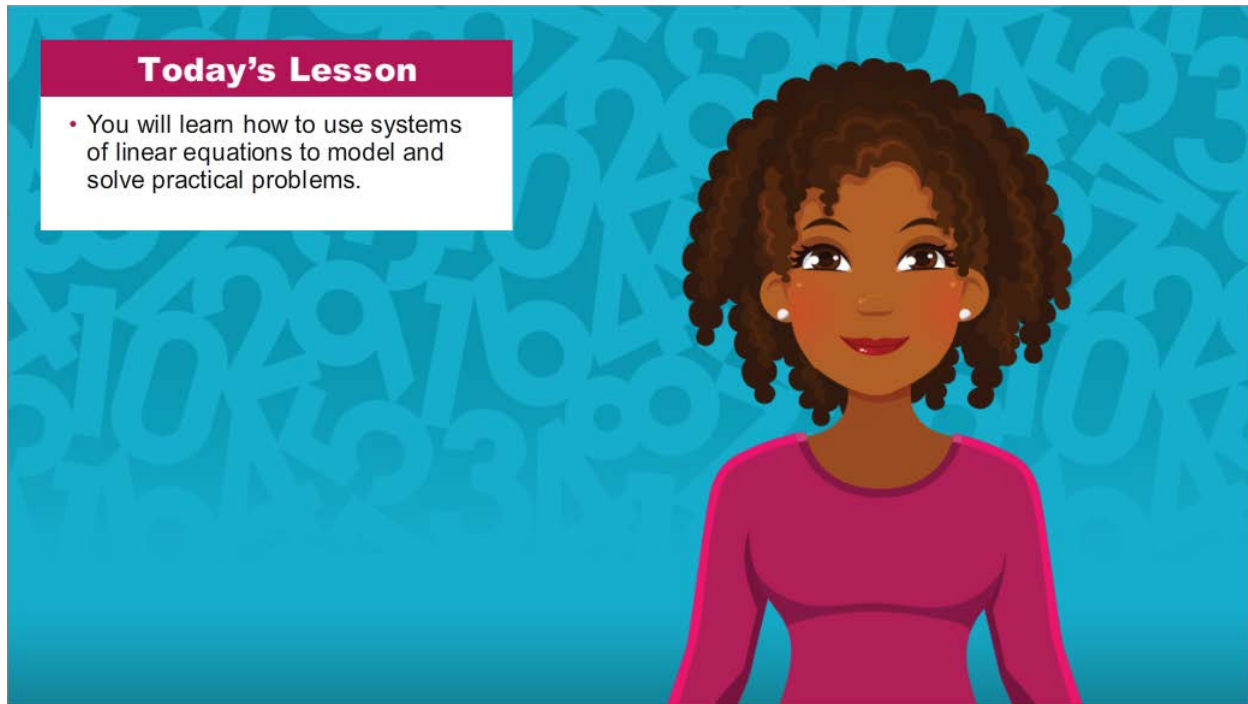


Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Introduction



Today's Lesson

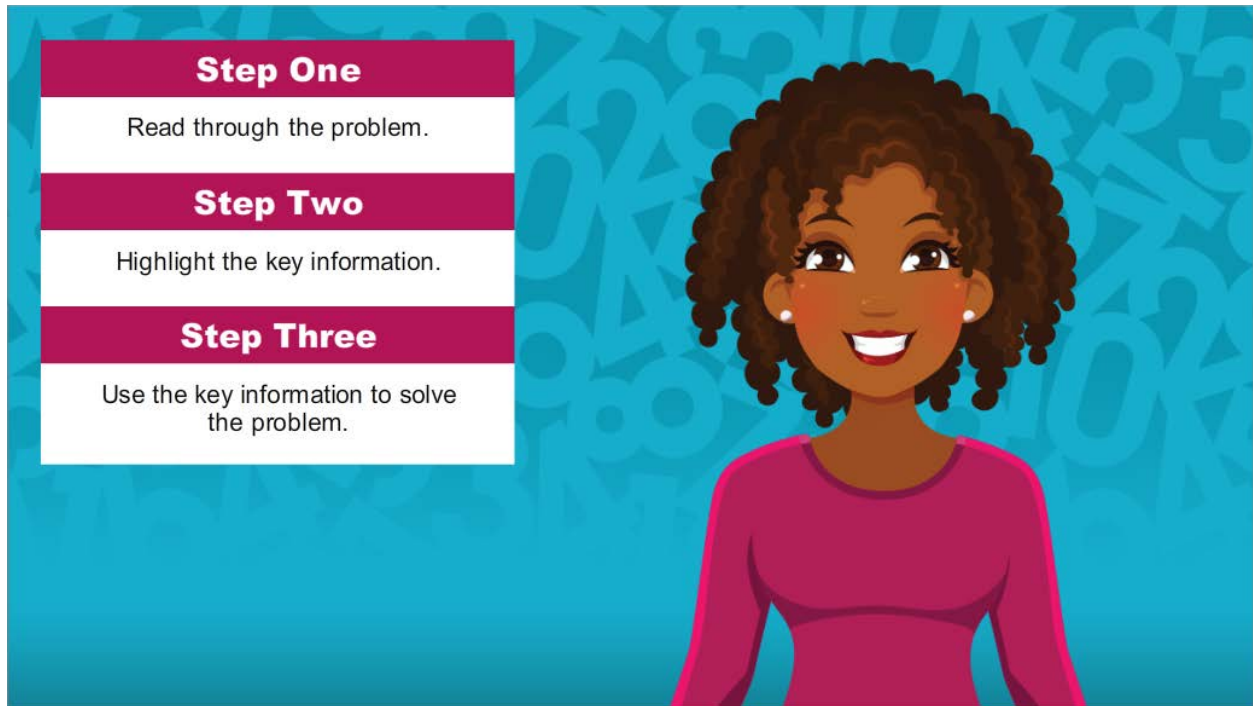
- You will learn how to use systems of linear equations to model and solve practical problems.

Hi there! I'm so glad you could join me for this lesson in Algebra I, where you will learn how to use systems of linear equations to model and solve practical problems.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Anticipatory Set



Use the following steps to guide you in the process of using systems of linear equations to solve real-world problems.

Step 1: Read through the problem.

Step 2: Highlight the key information.

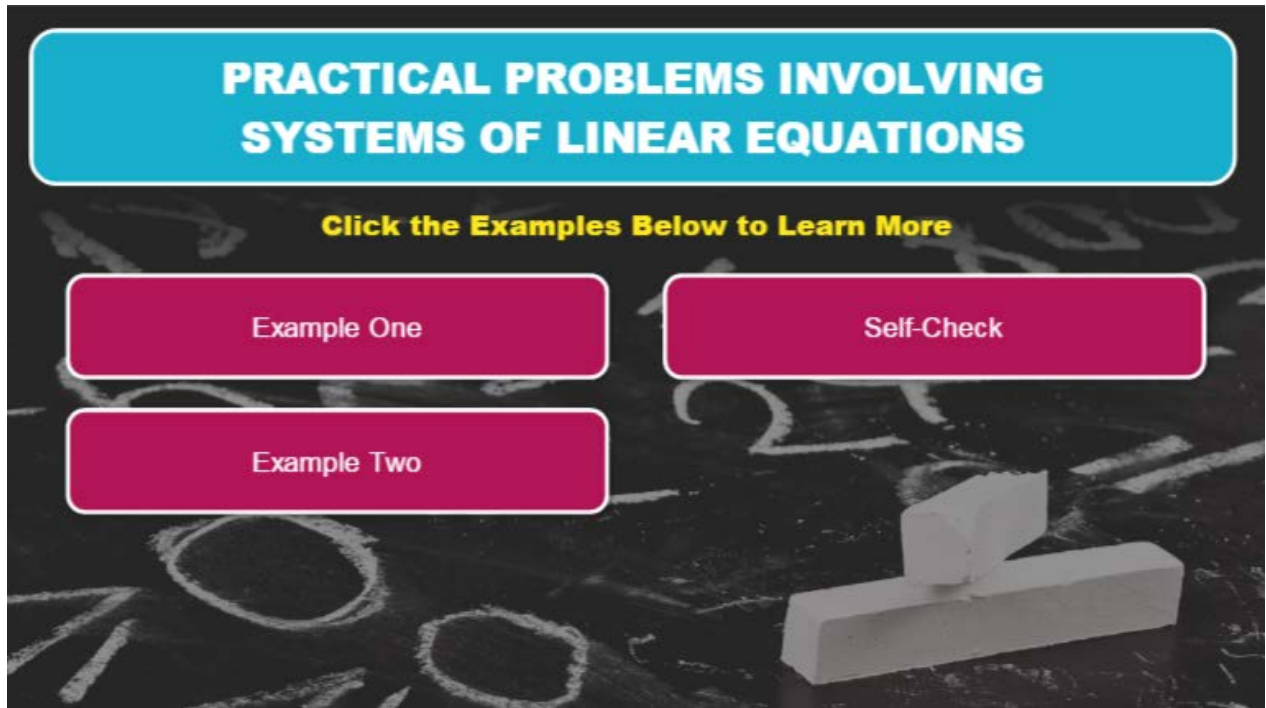
Step 3: Use the key information to solve the problem.

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

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Practical Problems Involving Systems of Linear Equations



The graphic features a dark background with faint chalkboard-style drawings of circles and arrows. At the top, a blue rounded rectangle contains the text "PRACTICAL PROBLEMS INVOLVING SYSTEMS OF LINEAR EQUATIONS" in white. Below this, a yellow text prompt reads "Click the Examples Below to Learn More". Three pink rounded rectangular buttons are arranged: "Example One" and "Self-Check" are in the top row, and "Example Two" is in the bottom row. In the bottom right corner, there is a 3D rendering of a white rectangular block with a smaller white rectangular block on top of it.


Click the examples below to learn more.

- Example One
- Example Two
- Self-Check

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1



Example 1

A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour.

Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.

**Read through the problem above.
Click to highlight important passages.**

Next

Take a few moments to read Example 1. Highlight the information you think is necessary to solve the problem.

A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour. Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.

Read through the problem above. Click to highlight important passages.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



Example 1

A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour.

Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.

Did you highlight the important facts?

A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour. Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.

- A local studio rents for \$120 plus \$40 per hour
- A studio in a neighboring city rents for \$80 plus \$60 per hour
- x represents the number of hours
- y represents the total cost
- Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

Example 1	
<p>x number of hours spent in the studio</p> <p>y the total cost</p> <p>\$120 initial local studio recording fee</p> <p>\$40 local studio cost per hour</p> <p>\$80 initial neighboring city recording fee</p> <p>\$60 neighboring city studio cost per hour</p> $\begin{cases} y = 40x + 120 \\ y = 60x + 80 \end{cases}$	<p>A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour.</p> <p>Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.</p>

Recall that a system of equations is a group of equations. Therefore, you will write more than one equation to model this situation. In this scenario, x represents the number of hours the band spends in the studio and y represents the total cost.

If the band chooses to reserve time at the local studio, the total cost will be \$120 plus \$40 per hour. Therefore, this part of the scenario can be represented by the equation:

$$y = 40x + 120$$

If the band chooses the studio located in a neighboring city, the total cost will be \$80 plus \$60 per hour. So, this part of the scenario can be represented by the equation:

$$y = 60x + 80$$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

Example 1	
x number of hours spent in the studio	A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour.
y the total cost	
\$120 initial local studio recording fee	Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.
\$40 local studio cost per hour	
\$80 initial neighboring city recording fee	
\$60 neighboring city studio cost per hour	
$\begin{cases} y = 60x + 80 \\ y = 40x + 120 \end{cases}$	

Now, you have written the two linear equations necessary to complete the system:

$$\begin{cases} y = 40x + 120 \\ y = 60x + 80 \end{cases}$$

It is worth it to mention that the equations in a system can be written in any order. If you were to switch the order that the equations were written, the system would still correctly model the situation.

$$\begin{cases} y = 60x + 80 \\ y = 40x + 120 \end{cases}$$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

Example 1	
$\begin{cases} y = 60x + 80 \\ y = 40x + 120 \end{cases}$ <p>There are three methods to solve a system of linear equations</p> <ul style="list-style-type: none">• Graphing• Substitution method• Elimination method	<p>A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour.</p> <p>Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.</p>

$$\begin{cases} y = 40x + 120 \\ y = 60x + 80 \end{cases}$$

There are three methods to solve a system of linear equations:

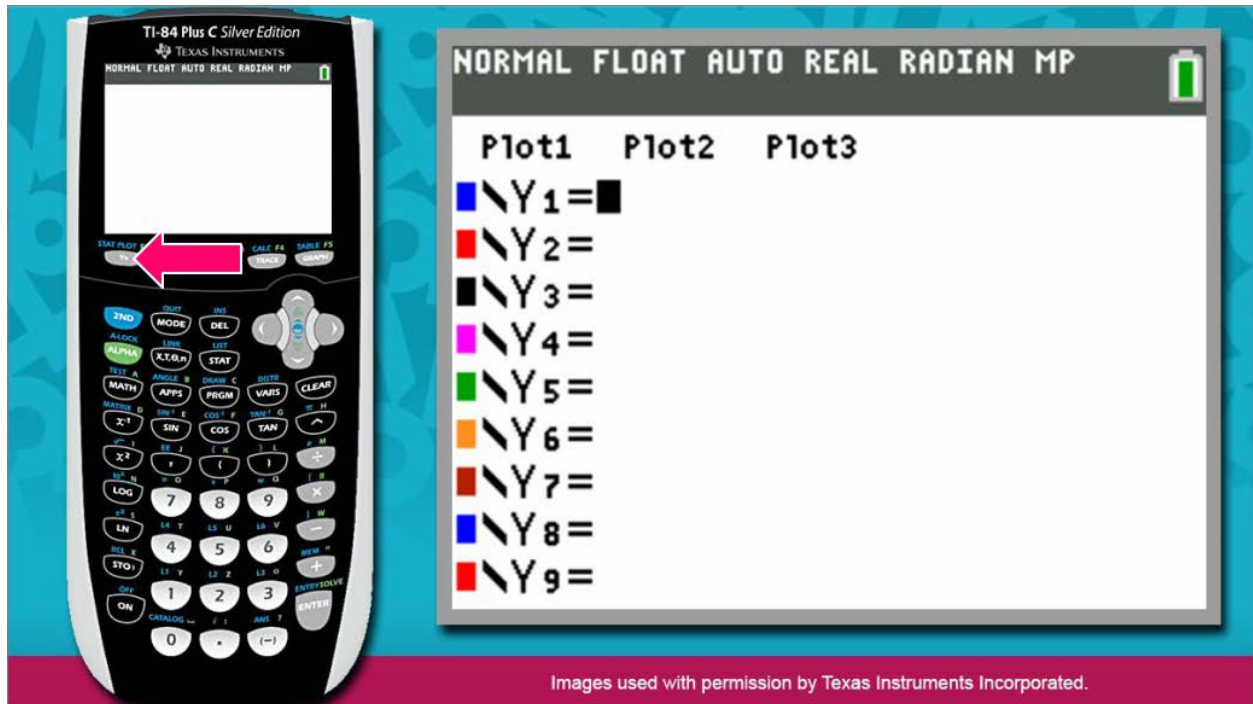
- By graphing;
- By the substitution method; and
- By the elimination method.

You may choose any of these methods to determine the solution to the system of linear equations. For this example, because both equations include relatively large numbers and are already solved for y , the solution will be determined by using the graphing calculator to graph the system.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

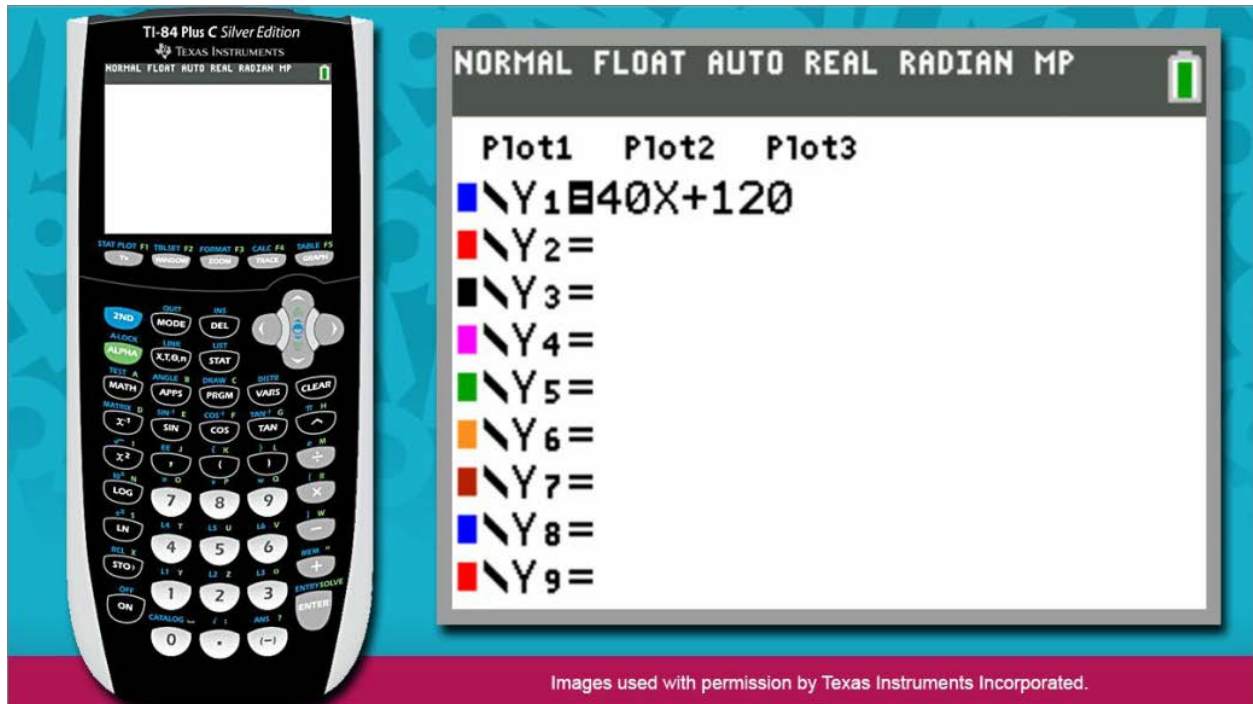
Example 1 (continued)



Begin by clearing the calculator's memory. Press the Y= key, located in the top left corner of the keys.

Module 5: Solving Linear Equations
Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

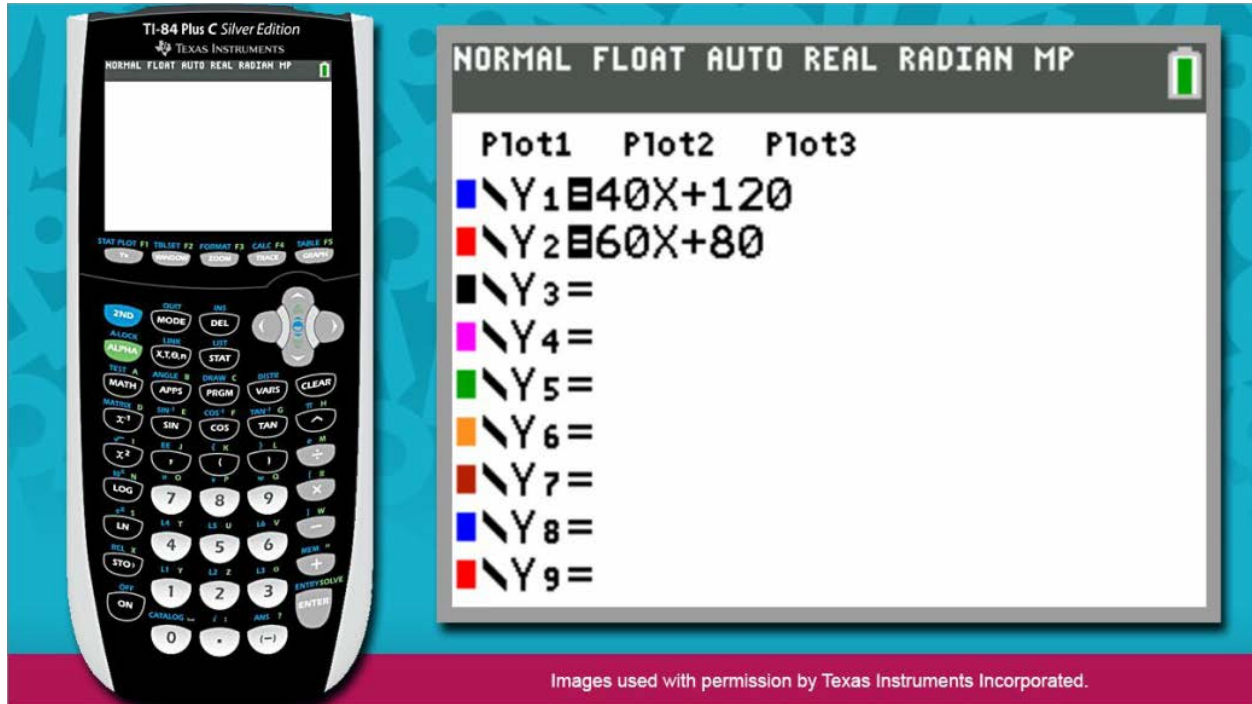


Enter the right side of the first equation to the right of Y1.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

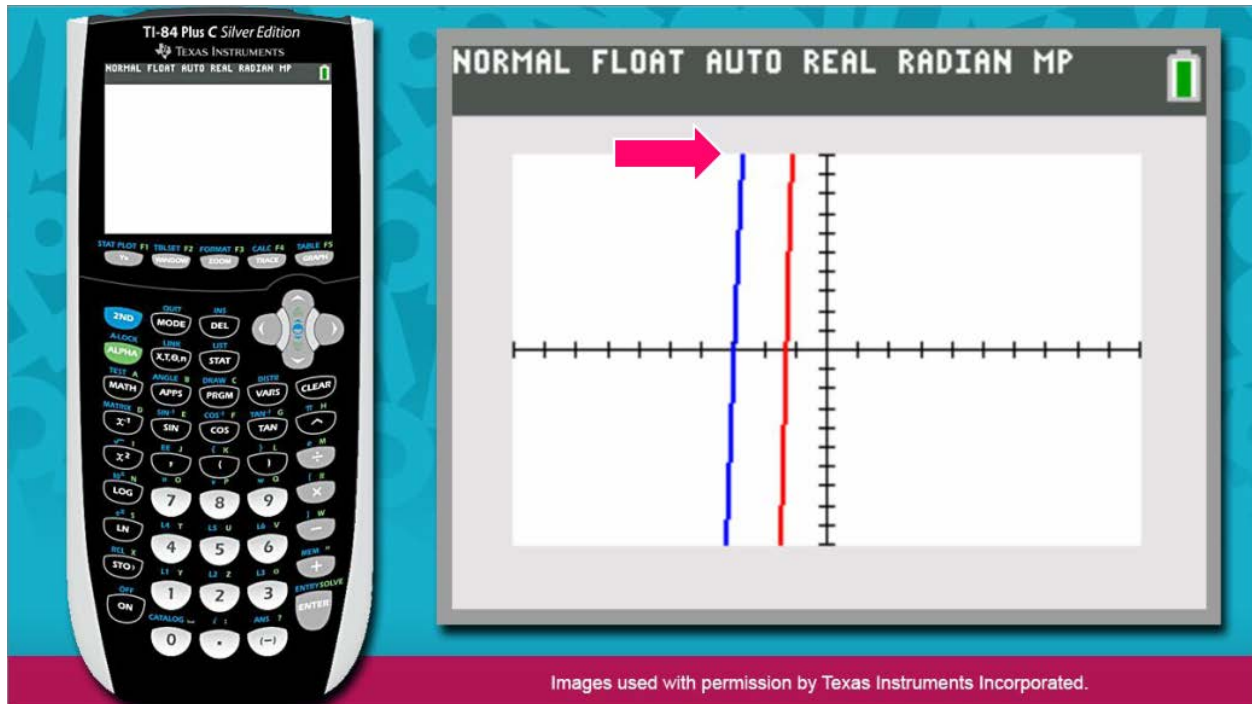


Press the down arrow key. Then enter the right side of the second equation to the right of Y2.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



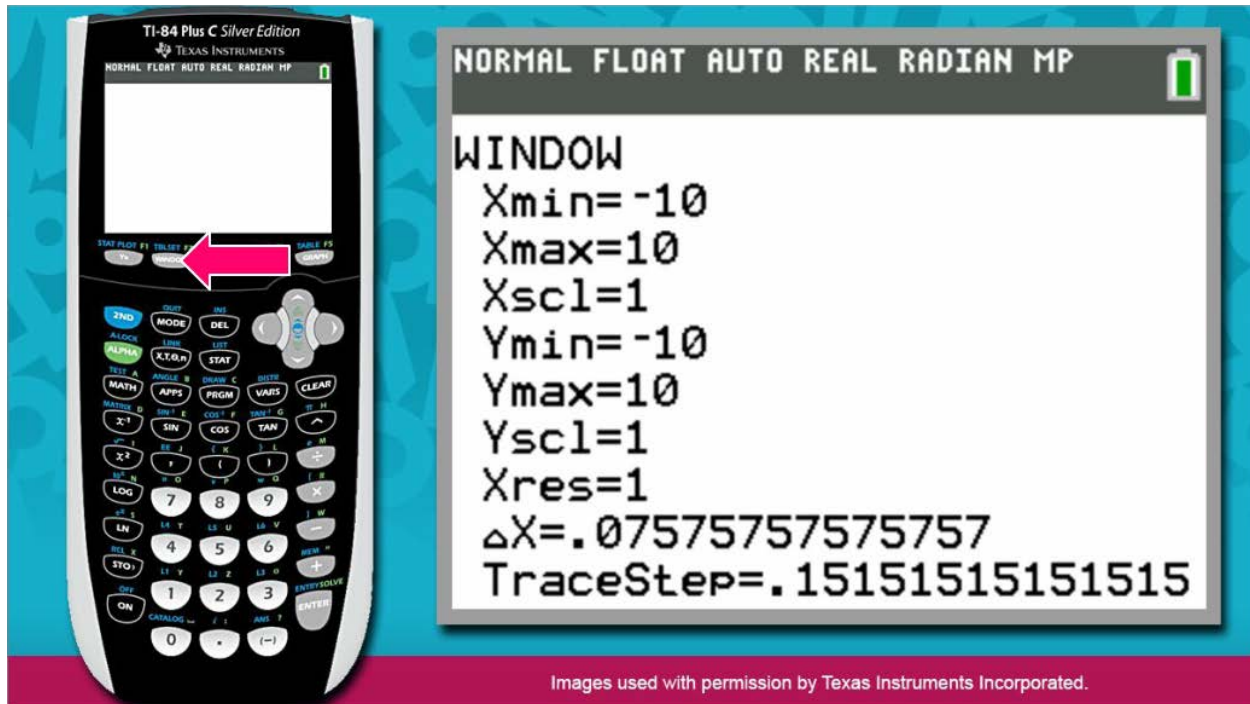
Now it's time to graph the system. Press the GRAPH key, located in the top right corner of the keys.

Notice that you are only able to view a small portion of the lines. Also, the distance between the lines appears to narrow near the top of the window. It is possible that the lines intersect at a point that you are currently unable to view. In order to view a larger portion of the graph of this system, you will need to adjust the scale along the x - and y -axes. This is the time for you to consider what values of x and y make sense for this real-world scenario.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



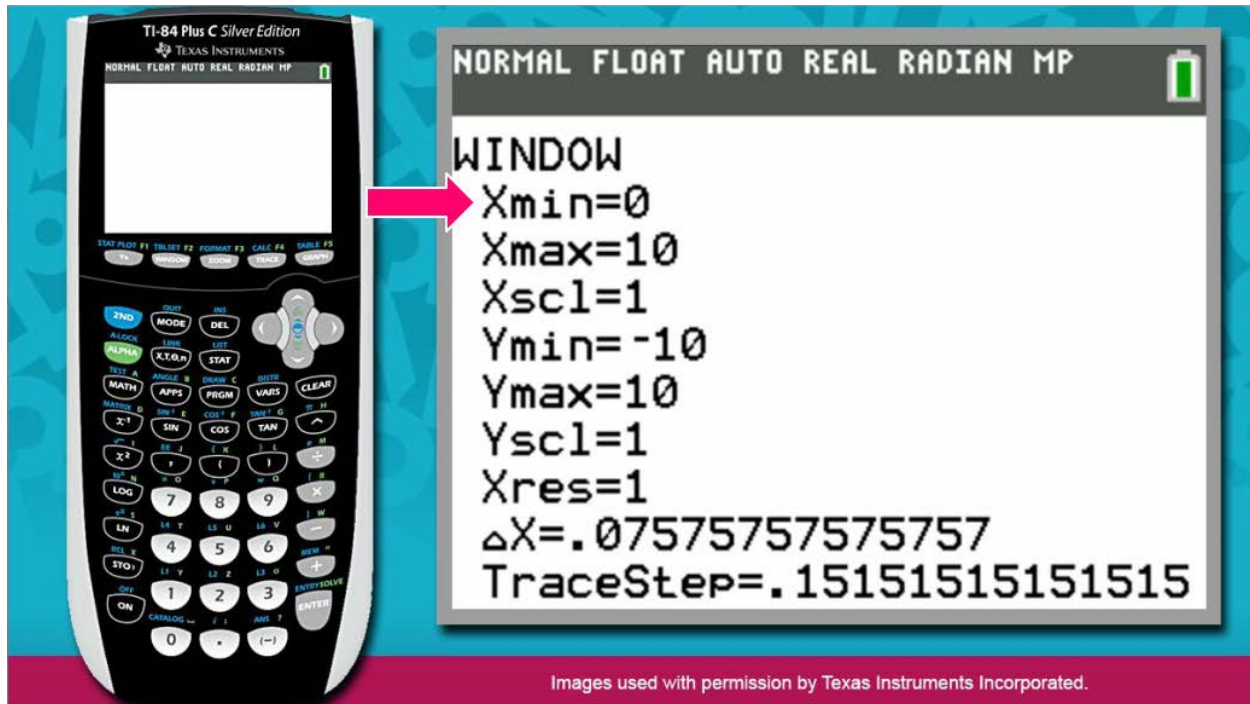
Press WINDOW, the key located to the right of the Y= key.

Notice a list of values appear. Here, you can adjust the scale of the x - and y -axes.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

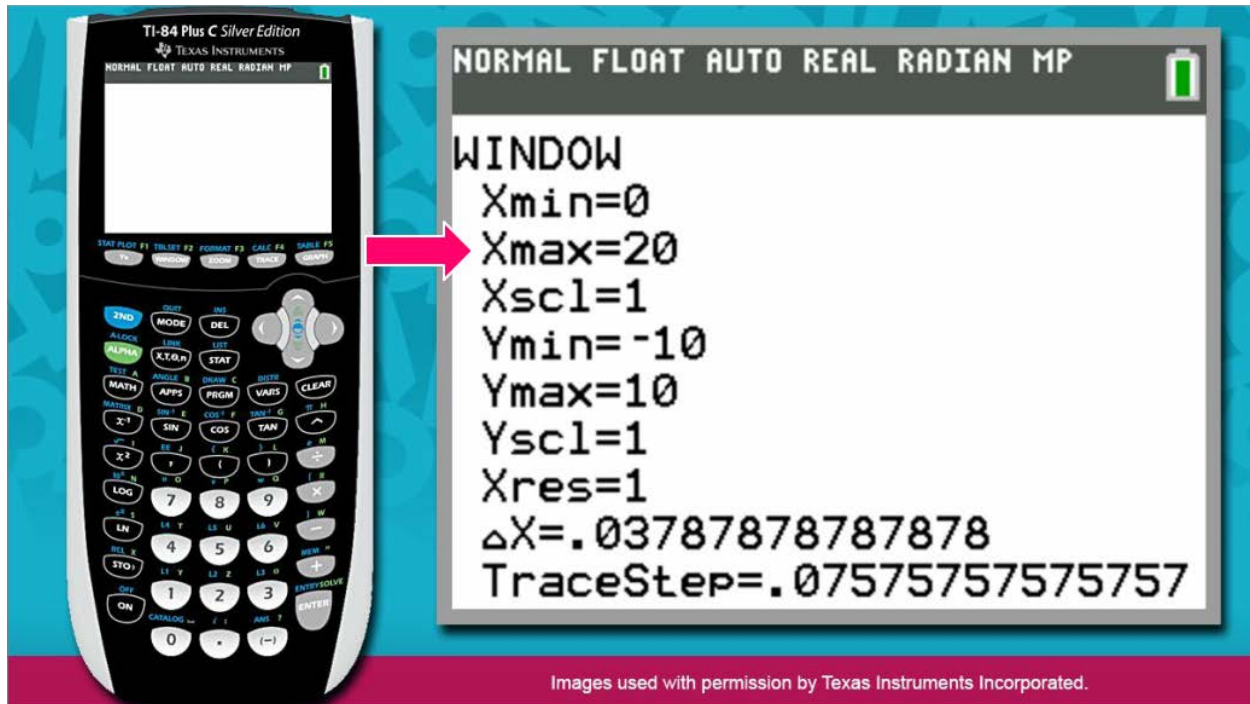


Because x represents the number of hours the band spends in the studio, negative x -values will not make sense. It is impossible to spend a negative number of hours in the studio. The smallest amount of time that the band can spend in the studio is 0 hours. So set the minimum x -value to 0.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

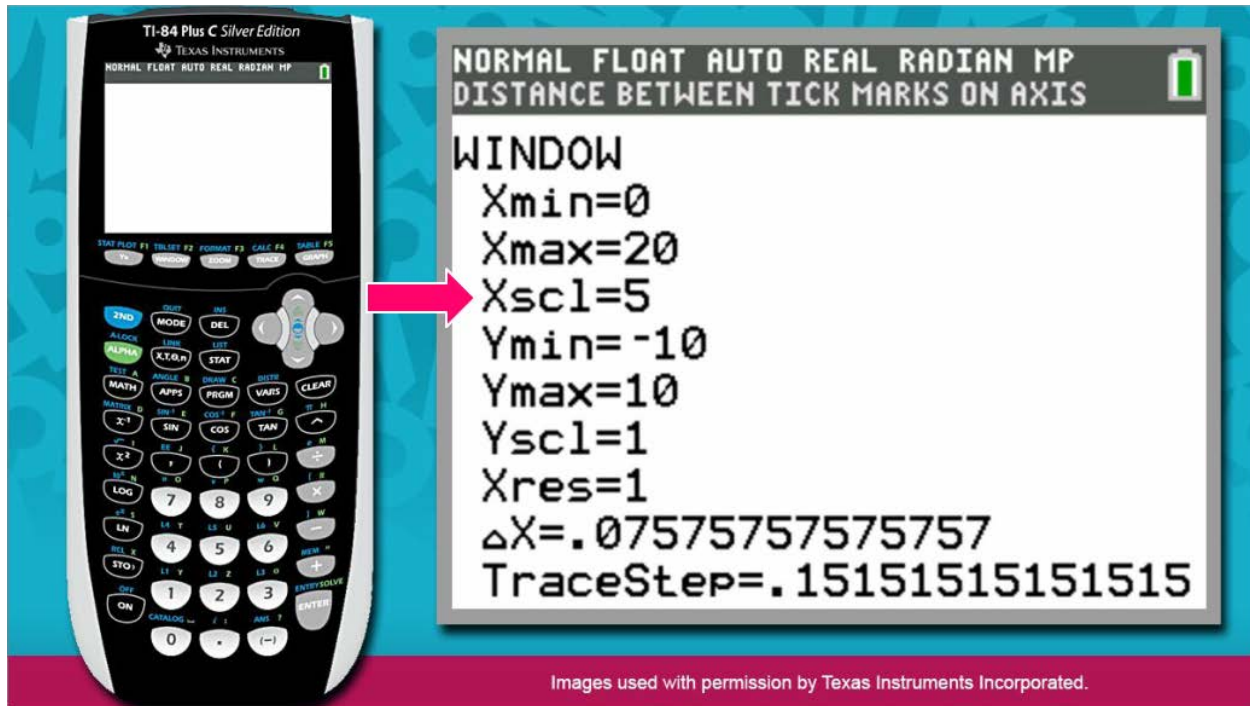


In theory, the band could spend an unlimited number of hours in the recording studio. So it is impossible to say for certain what the maximum x -value should be. You will have to use your best judgment to decide on this value. There are 24 hours in a day. The band members may not spend an entire day in the studio. So begin by setting the maximum x -value to 20. If you notice that this value is too small or too large, you can change it later.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

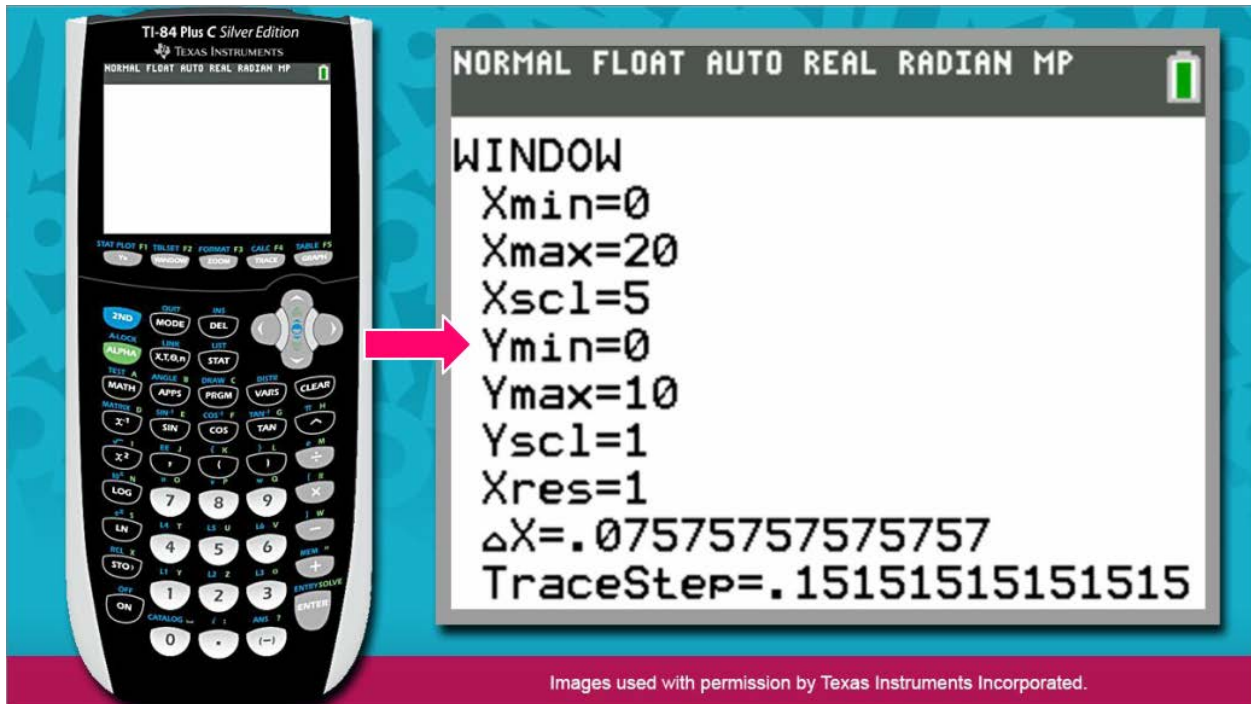


Because the minimum x -value is set to 0 and the maximum x -value is set to 20, it is appropriate to increase the x -scale, so that you will have a good view of the system once it is graphed. Change the x -scale from 1 to 5. Now, there will be 5 units between consecutive tick marks along the x -axis.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

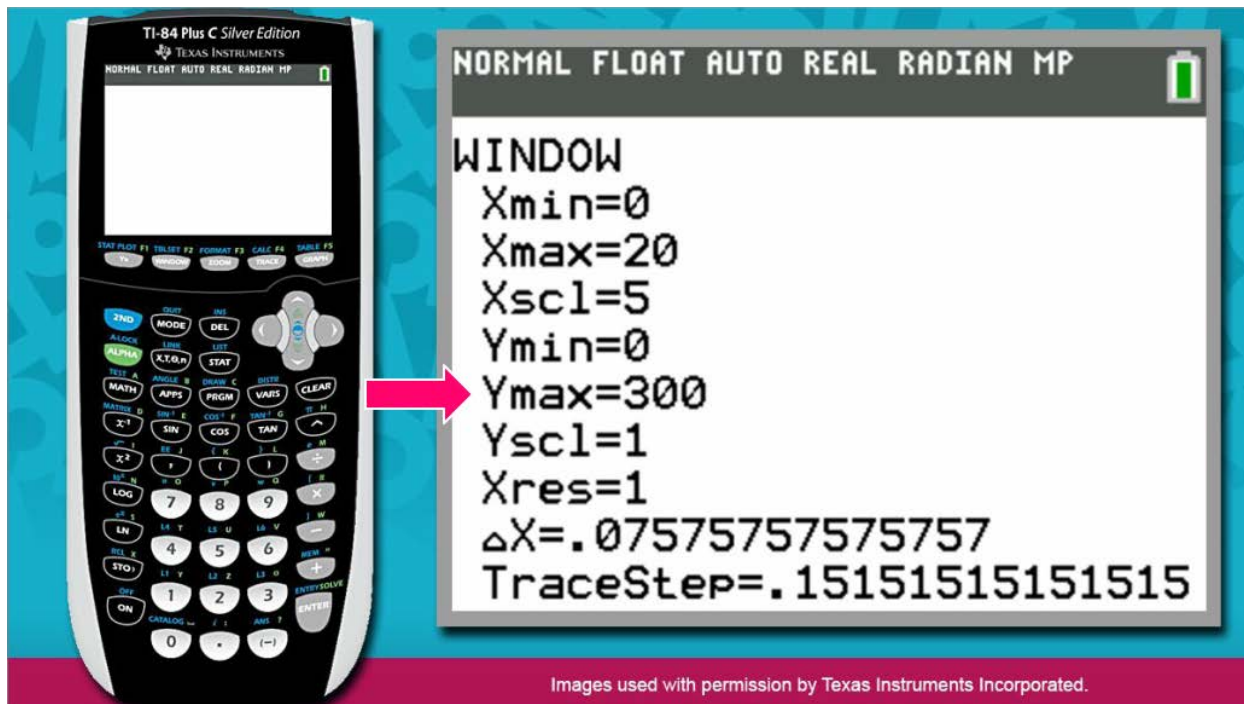


Now move on to adjust the values on the y-axis. Because y represents the total cost of renting the studio, negative y -values will not make sense. It is impossible for the total cost to be a negative amount. The smallest possible amount is \$0. So set the minimum y -value to 0.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

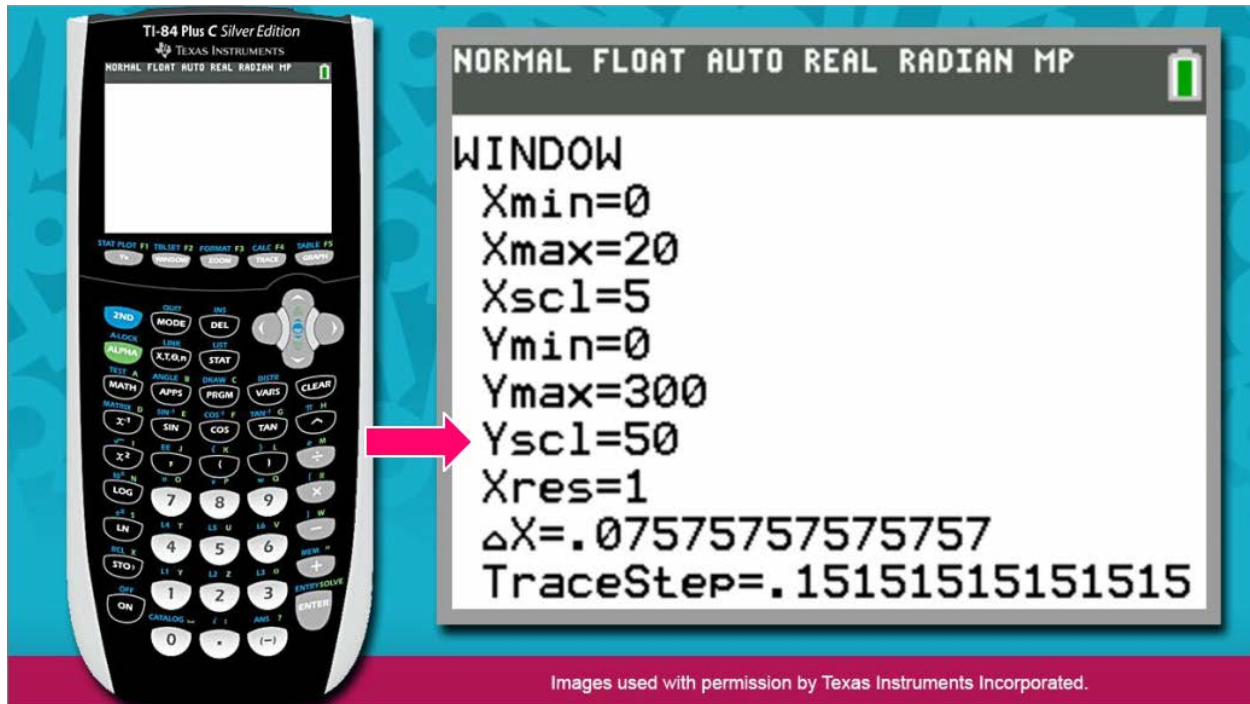


The total cost of renting the studio depends on the number of hours the band spends in the studio. So the maximum cost is unlimited. You will have to use your best judgment to determine a reasonable maximum y -value to input into the calculator. You know that the local studio rents for \$120 plus \$40 per hour and the studio in the neighboring city rents for \$80 plus \$60 per hour. It is safe to say that the band members could pay at least \$200 for their time in either studio. So set the maximum y -value to a value more than 200; say 300. If you notice that this value is too small or too large, you can change it later.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

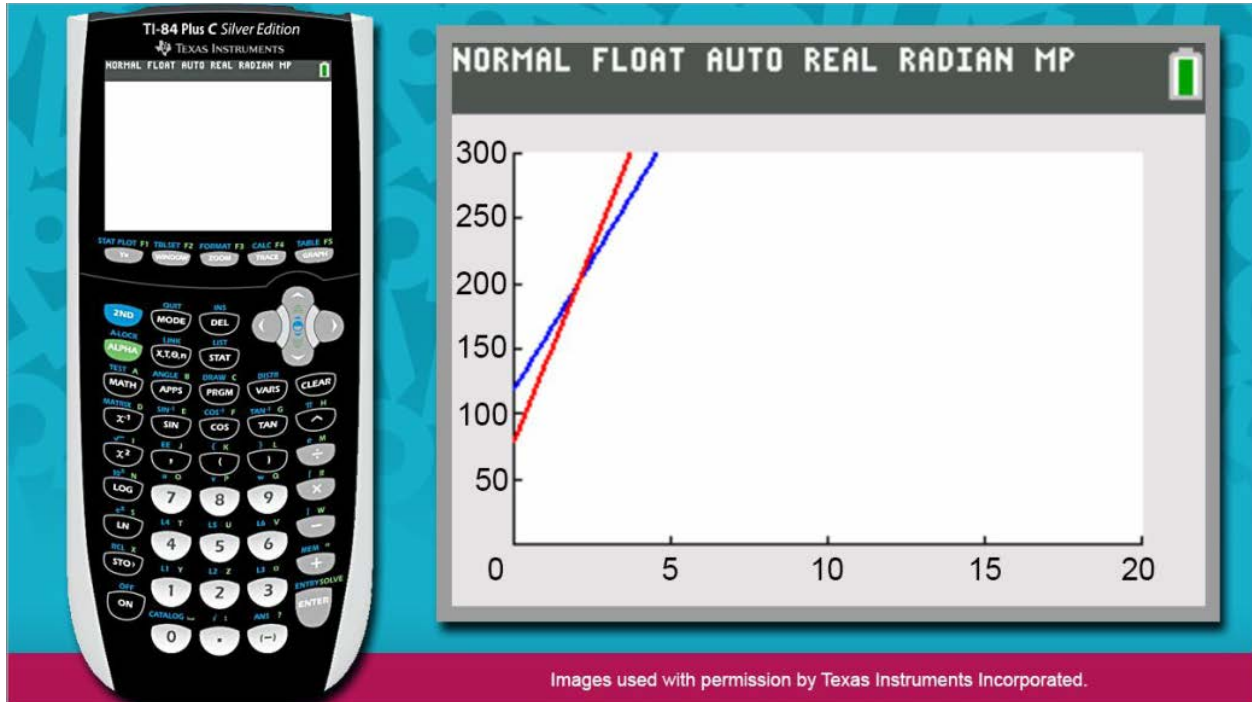


Because the minimum y -value is set to 0 and the maximum y -value is set to 300, it is appropriate to increase the y -scale so that you will have a good view of the system once it is graphed. Change the y -scale from 1 to 50. Now, the y -axis will count off by 50s. Leave the remaining values as they are.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

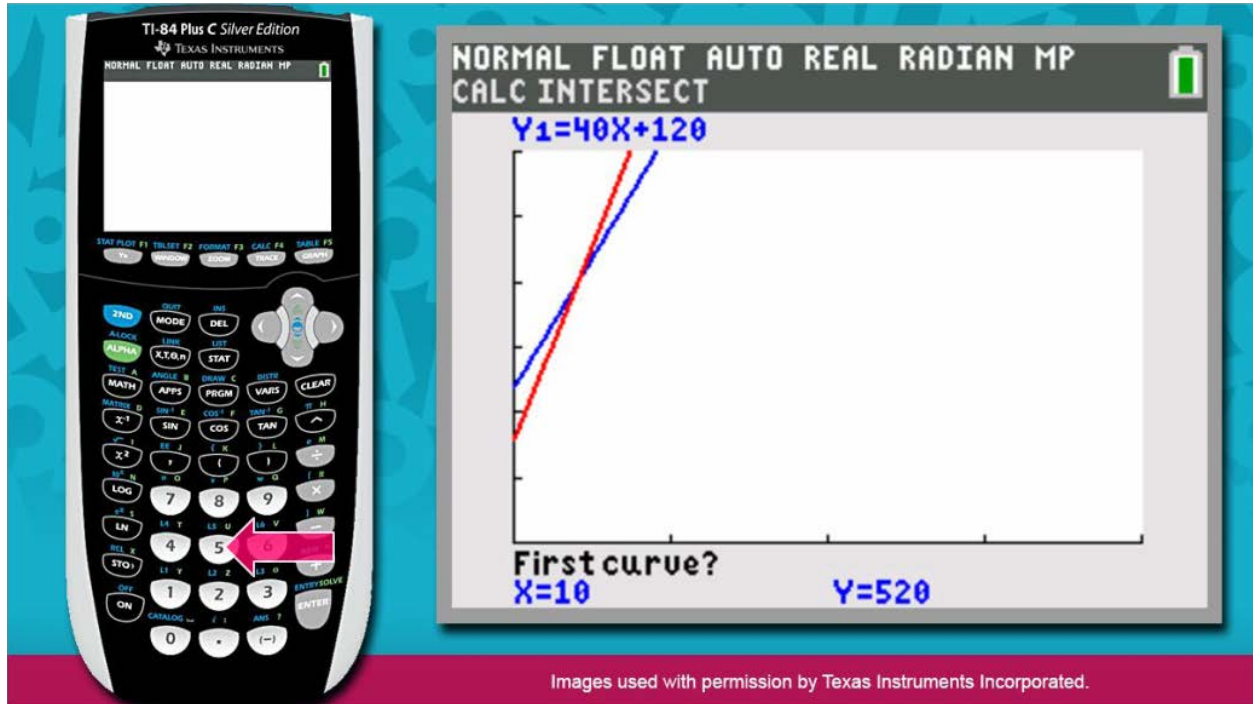


Notice that the calculator only shows the portion of the system included in the first quadrant. The x -axis counts off by fives, beginning at 0 and ending at 20. The y -axis counts off by 50s, beginning at 0 and ending at 300.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



Now, determine the coordinates of the point of intersection.

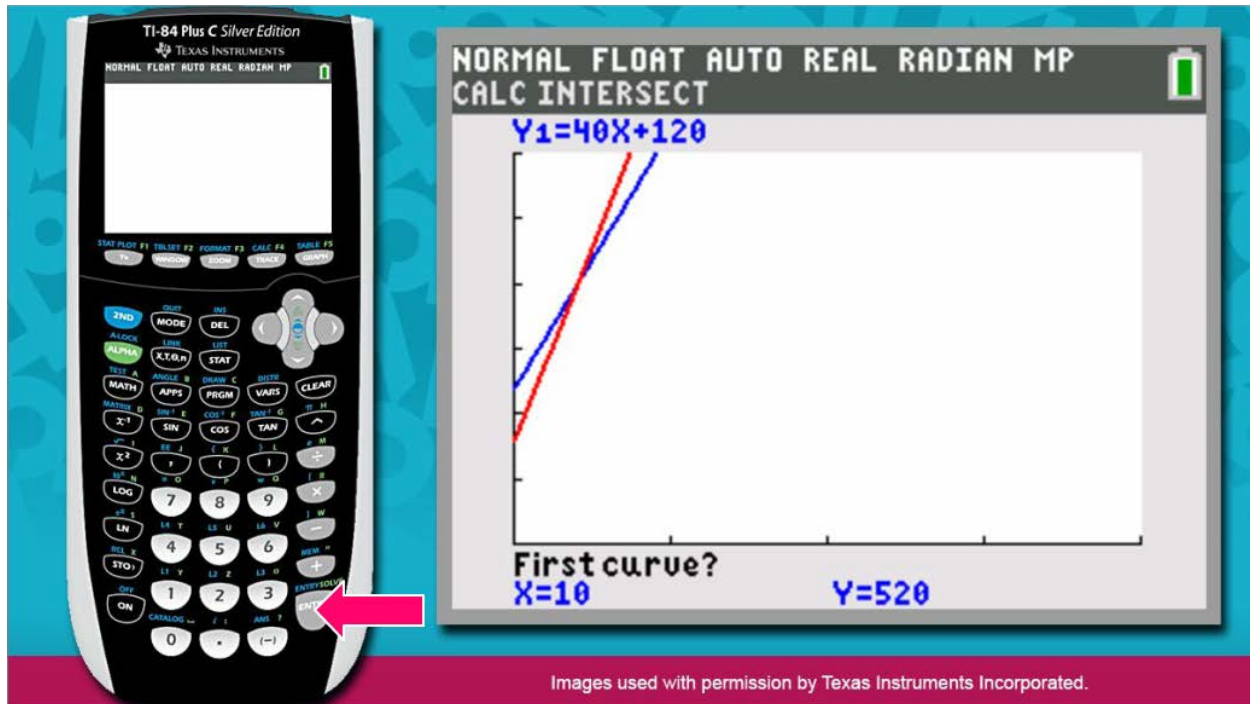
Press 2nd and then press TRACE to access the menu of CALCULATE functions.

Then press 5 to access the intersect function.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



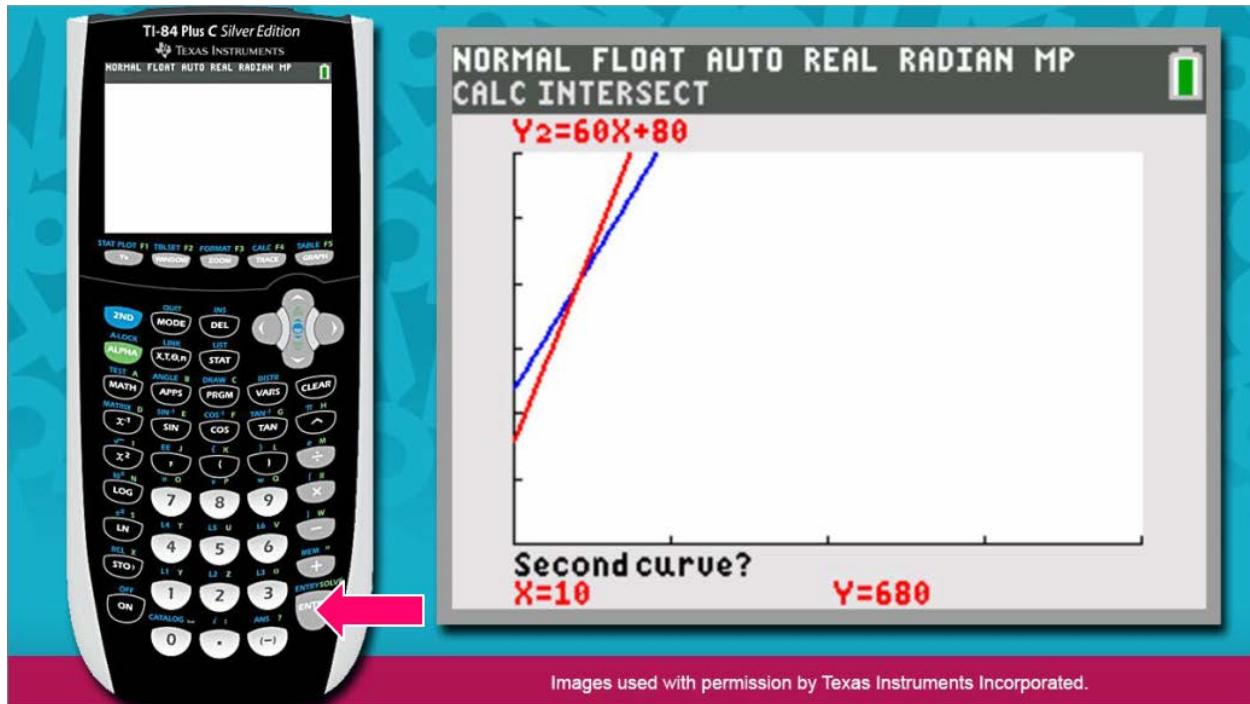
At this time, you will notice that you do not see the cursor blinking on the first line. It is at a point that is not viewable in the window. You can press the left and right arrow keys to move the cursor to a point that you are able to see, so that you can verify that it is blinking on the first line. Or, you can make this confirmation by verifying that the equation that appears directly above the graph is the first equation included in the system.

Because this is indeed the first equation included in the system, press ENTER to confirm.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



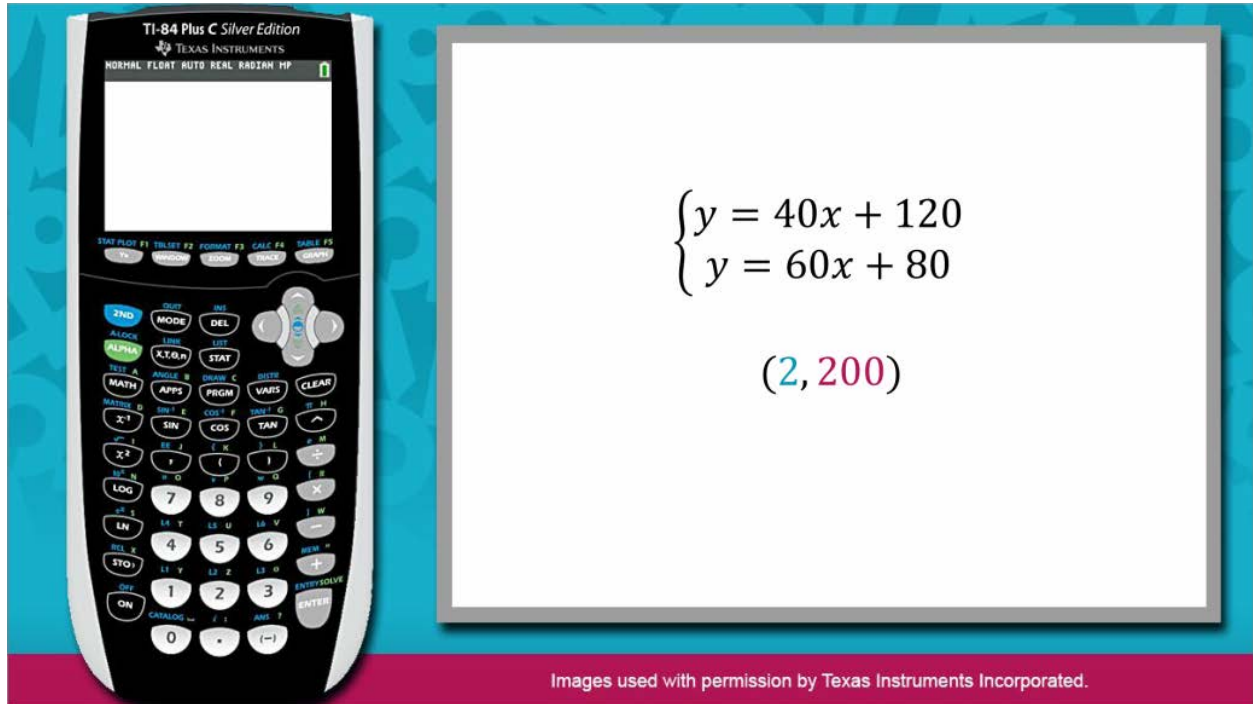
Notice, again, that you cannot see the cursor blinking on the second line. You can, however, confirm that it is located on the second line included in the system by verifying that the equation that now appears directly above the graph is the second equation included in the system.

Because this is indeed the second equation included in the system, press ENTER to confirm.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)



The image shows a TI-84 Plus C Silver Edition calculator on the left and a whiteboard on the right. The whiteboard displays the following system of linear equations and its solution:

$$\begin{cases} y = 40x + 120 \\ y = 60x + 80 \end{cases}$$
$$(2, 200)$$

Images used with permission by Texas Instruments Incorporated.

Press ENTER again to confirm that you are ready for the calculator to determine the coordinates of the point of intersection.

Notice that the cursor now appears at the point of intersection and the coordinates of the point are provided below: $x = 2$ and $y = 200$.

The solution to the system can be represented by the ordered pair $(2, 200)$.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 1 (continued)

Example 1	
$\begin{cases} y = 40x + 120 \\ y = 60x + 80 \end{cases}$ $(2, 200)$ $\begin{cases} 200 = 40(2) + 120 \\ 200 = 60(2) + 80 \end{cases}$	<p>A local band is searching for a studio to record music. A local studio rents for \$120 plus \$40 per hour. A studio in a neighboring city rents for \$80 plus \$60 per hour.</p> <p>Let x represent the number of hours the band spends in the studio and let y represent the total cost. Using a system of linear equations, determine the number of hours at which the cost to rent the studios is the same.</p>

$$\begin{cases} y = 40x + 120 \\ y = 60x + 80 \end{cases}$$

$$(2, 200)$$

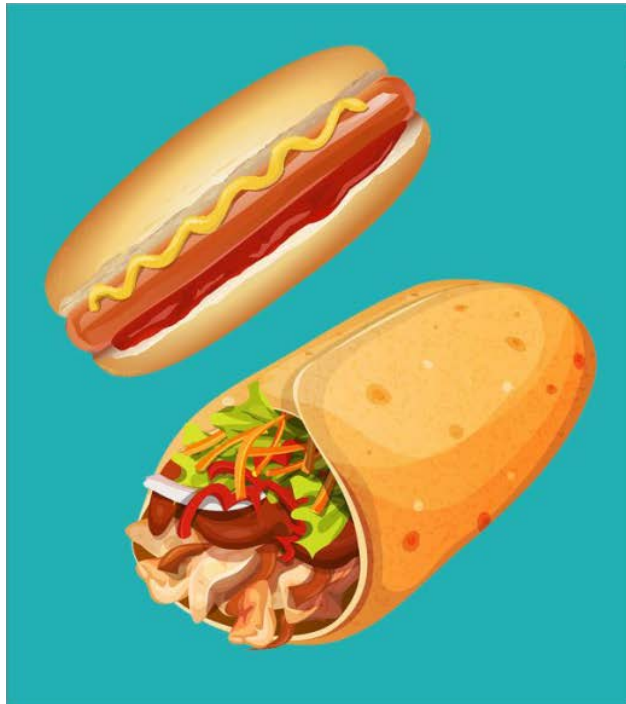
$$\begin{cases} 200 = 40(2) + 120 \\ 200 = 60(2) + 80 \end{cases}$$

The solution to a system of equations satisfies the equations of a system simultaneously. In this situation, the solution $(2, 200)$ informs you that regardless of which studio the band members choose to rent, if they spend 2 hours in a recording session they would pay a total of \$200.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2



Example 2

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

**Read through the problem above.
Click to highlight important passages.**

Next

Take a few moments to read Example 2. Highlight the information you think is necessary to solve the problem.

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

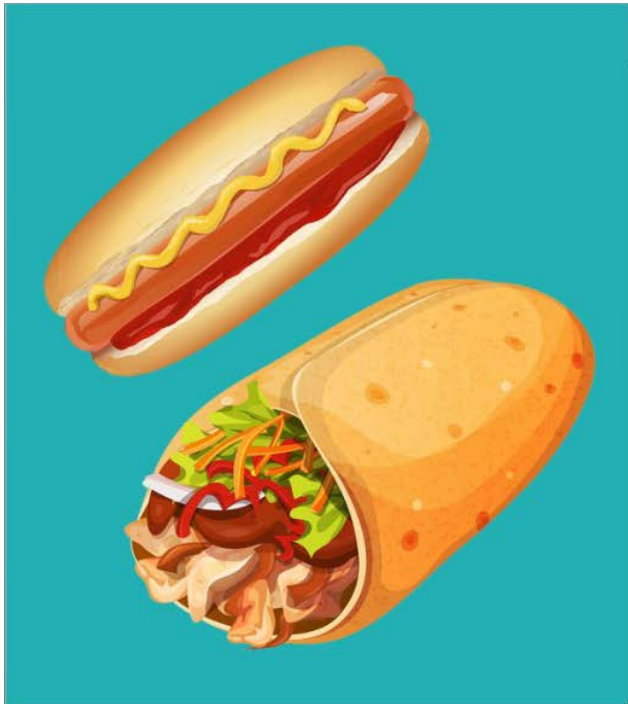
Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

Read through the problem above. Click to highlight important passages.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)



Example 2

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

Did you highlight the important facts?

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

- Eric sold 5 burritos and 2 hot dogs for a total of \$29.05
- He also sold 3 burritos and 6 hot dogs for a total of \$27.75
- x represents the number of burritos sold
- y represents the number of hot dogs sold
- Find the cost of a burrito and the cost of a hot dog

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
<p>Which of the following systems correctly models the situation?</p> <p>$\begin{cases} 7x + y = 27.75 \\ 9x + y = 29.05 \end{cases}$</p> <p>$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$</p> <p>$\begin{cases} 2x + 5y = 29.05 \\ 6x + 3y = 27.75 \end{cases}$</p>	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p>

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

Now that you have highlighted the key information, use it to help you solve the problem. Begin by writing a system of equations to model the situation.

Which of the following systems correctly models the situation?

- A)
$$\begin{cases} 7x + y = 27.75 \\ 9x + y = 29.05 \end{cases}$$
- B)
$$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$$
- C)
$$\begin{cases} 2x + 5y = 29.05 \\ 6x + 3y = 27.75 \end{cases}$$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

The following system correctly models the situation.

$$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$$

Example 2

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

View WorkNext

The following system correctly models the situation.

$$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

Example 2	
<p>During the first hour of the event, Eric sold 5 burritos and 2 hot dogs for a total of \$29.05. Since x represents the number of burritos sold and y represents the number of hot dogs sold, this part of the situation can be represented by the equation:</p> $5x + 2y = 29.05$ <p>During the second hour, Eric sold 3 burritos and 6 hot dogs for a total of \$27.75. This part of the situation can be represented by the equation:</p> $3x + 6y = 27.75$ <p>Therefore, the system that correctly models the situation is:</p> $\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p> <div style="text-align: right; margin-top: 20px;">Next</div>

During the first hour of the event, Eric sold 5 burritos and 2 hot dogs for a total of \$29.05. Since x represents the number of burritos sold and y represents the number of hot dogs sold, this part of the situation can be represented by the equation:

$$5x + 2y = 29.05$$

During the second hour, Eric sold 3 burritos and 6 hot dogs for a total of \$27.75. This part of the situation can be represented by the equation:

$$3x + 6y = 27.75$$

Therefore, the system that correctly models the situation is:

$$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$ <p>You can eliminate the y-terms in this system by...</p> <ul style="list-style-type: none">multiplying the first equation by 2 and then adding the equationsmultiplying the first equation by -2 and then adding the equationsmultiplying the first equation by -3 and then adding the equations	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p>

Remember that you can solve a system of linear equations by using the graphing method, the substitution method, or the elimination method. For this example, the elimination method may be the most effective way to solve the system.

$$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$$

You can eliminate the y -terms in this system by...

- A) multiplying the first equation by 2 and then adding the equations
- B) multiplying the first equation by -2 and then adding the equations
- C) multiplying the first equation by -3 and then adding the equations

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
$\begin{array}{r} -3(5x + 2y = 29.05) \\ 3x + 6y = 27.75 \\ -15x - 6y = -87.15 \\ + \quad 3x + 6y = 27.75 \\ \hline \end{array}$ <p data-bbox="261 800 753 898">multiplying the first equation by -3 and then adding the equations</p>	<p data-bbox="854 394 1406 590">Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p data-bbox="854 611 1406 737">Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p> <p data-bbox="1219 911 1393 968">Next</p>

$$\begin{array}{r} -3(5x + 2y = 29.05) \\ -15x - 6y = -87.15 \end{array}$$

$$\begin{array}{r} -15x - 6y = -87.15 \\ + \quad 3x + 6y = 27.75 \\ \hline \end{array}$$

The y -terms can be eliminated by multiplying the first equation by -3 and then adding the equations.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
$\begin{array}{r} -3(5x + 2y = 29.05) \\ 3x + 6y = 27.75 \\ -15x - 6y = -87.15 \\ + \quad 3x + 6y = 27.75 \\ \hline \end{array}$ <p>After eliminating the y-terms and solving for x, you find that...</p> <p><input type="radio"/> $x = 3.30$ <input type="radio"/> $x = 4.95$ <input type="radio"/> $x = 9.56$</p>	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p>

$$\begin{array}{r} -3(5x + 2y = 29.05) \\ -15x - 6y = -87.15 \end{array}$$

$$\begin{array}{r} -15x - 6y = -87.15 \\ + \quad 3x + 6y = 27.75 \\ \hline \end{array}$$

After eliminating the y -terms and solving for x , you find that...

- A) $x = 3.30$
- B) $x = 4.95$
- C) $x = 9.56$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
$\begin{array}{r} -3(5x + 2y = 29.05) \\ 3x + 6y = 27.75 \\ -15x - 6y = -87.15 \\ + \quad 3x + 6y = 27.75 \\ \hline -12x = -59.4 \\ \hline -12 \quad -12 \\ \hline x = 4.95 \end{array}$ <p>After eliminating the y-terms and solving for x, you find that $x = 4.95$.</p> <p>$x = 4.95$</p>	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p> <p>Next</p>

$$\begin{array}{r} -3(5x + 2y = 29.05) \\ -15x - 6y = -87.15 \end{array}$$

$$\begin{array}{r} -15x - 6y = -87.15 \\ + \quad 3x + 6y = 27.75 \\ \hline -12x = -59.4 \\ \hline -12 \quad -12 \\ \hline x = 4.95 \end{array}$$

After eliminating the y -terms and solving for x , you find that $x = 4.95$.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

Example 2	
$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$ <p>After substituting 4.95 for x in one of the original equations, you find that...</p> <p style="text-align: center;">$y =$ <input style="width: 50px; height: 20px;" type="text"/></p>	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p> <p style="text-align: center;">Enter the correct value to the left and then click submit.</p> <div style="text-align: right;"><input style="background-color: #800040; color: white; padding: 5px 15px; border: none; border-radius: 5px;" type="button" value="Submit"/></div>

$$\begin{cases} 5x + 2y = 29.05 \\ 3x + 6y = 27.75 \end{cases}$$

Now that you know that $x = 4.95$, substitute this value into one of the original equations of the system to find y .

After substituting 4.95 for x in one the original equations you find that $y = _\?_\$.

Enter the correct value to the left and then click submit.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
$\begin{aligned} 3x + 6y &= 27.75 \\ 3(4.95) + 6y &= 27.75 \\ 14.85 + 6y &= 27.75 \\ \underline{-14.85} \quad \underline{-14.85} & \\ 6y &= 12.90 \\ \underline{6} \quad \underline{6} & \\ y &= 2.15 \end{aligned}$ <p>Substituting 4.95 for x in either of the original equations will result in the same value. Above, you will find the work that would result from choosing the second equation.</p> $y = 2.15$	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p>

$$\begin{aligned} 3x + 6y &= 27.75 \\ 3(4.95) + 6y &= 27.75 \\ 14.85 + 6y &= 27.75 \\ \underline{-14.85} \quad \underline{-14.85} & \\ 6y &= 12.90 \\ \underline{6} \quad \underline{6} & \\ y &= 2.15 \end{aligned}$$

Substituting 4.95 for x in either of the original equations will result in the same value. Below, you will find the work that would result from choosing the second equation.

$$y = 2.15$$

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

	Example 2
<p>$x = 4.95$ $y = 2.15$</p> <p>Now you know that $x = 4.95$ and $y = 2.15$. Choose the statement that correctly explains the meaning of the solution in terms of the scenario.</p> <p>Burritos cost \$4.95 each and hot dogs cost \$2.15 each.</p> <p>Hot dogs cost \$4.95 each and burritos cost \$2.15 each.</p> <p>Eric sold 4.95 burritos and 2.15 hot dogs.</p>	<p>Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.</p> <p>Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.</p>

$$x = 4.95 \quad y = 2.15$$

Now you know that $x = 4.95$ and $y = 2.15$. Choose the statement that correctly explains the meaning of the solution in terms of the scenario.

- A) Burritos cost \$4.95 each and hot dogs cost \$2.15 each.
- B) Hot dogs cost \$4.95 each and burritos cost \$2.15 each.
- C) Eric sold 4.95 burritos and 2.15 hot dogs.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Example 2 (continued)

$x = 4.95$ $y = 2.15$

In the given scenario, x represents the cost of a burrito and y represents the cost of a hot dog. Therefore, the solution indicates that burritos cost \$4.95 and hot dogs cost \$2.15.

Burritos cost \$4.95 each and hot dogs cost \$2.15 each.

Example 2

Eric worked at the concession stand during a recent event at his school. During the first hour of the event, he sold 5 burritos and 2 hot dogs for a total of \$29.05. During the second hour, he sold 3 burritos and 6 hot dogs for a total of \$27.75.

Let x represent the number of burritos sold and y represent the number of hot dogs sold. Find the cost of a burrito and the cost of a hot dog.

Menu

$$x = 4.95 \quad y = 2.15$$

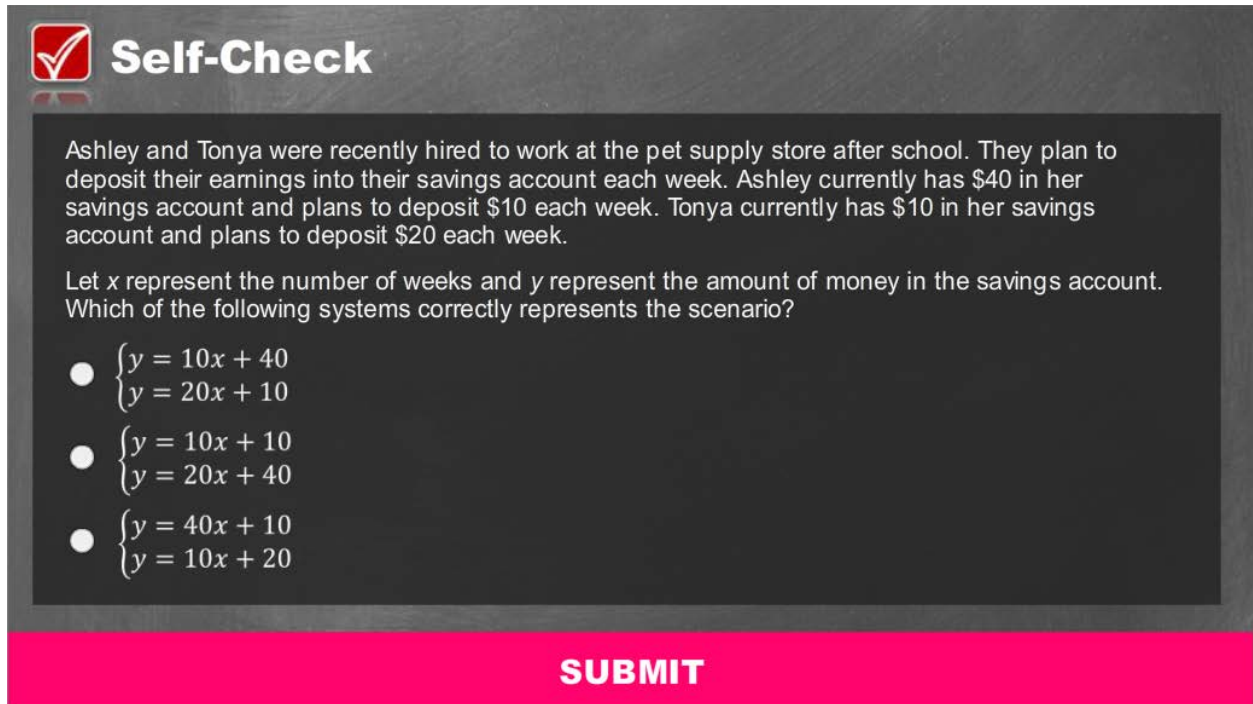
In the given scenario, x represents the cost of a burrito and y represents the cost of a hot dog. Therefore, the solution $x = 4.95$ and $y = 2.15$ indicates that a burrito costs \$4.95 and a hot dog costs \$2.15.

Burritos cost \$4.95 each and hot dogs cost \$2.15 each.

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Self-Check 1

The image shows a digital interface for a self-check. At the top left, there is a red square icon with a white checkmark, followed by the text "Self-Check" in white. Below this, the text describes a scenario where Ashley and Tonya are saving money. Ashley starts with \$40 and saves \$10 per week. Tonya starts with \$10 and saves \$20 per week. The question asks for the system of equations representing this. Three options are provided, each with a radio button. At the bottom, there is a large red button labeled "SUBMIT" in white capital letters.

Self-Check

Ashley and Tonya were recently hired to work at the pet supply store after school. They plan to deposit their earnings into their savings account each week. Ashley currently has \$40 in her savings account and plans to deposit \$10 each week. Tonya currently has \$10 in her savings account and plans to deposit \$20 each week.

Let x represent the number of weeks and y represent the amount of money in the savings account. Which of the following systems correctly represents the scenario?

- $\begin{cases} y = 10x + 40 \\ y = 20x + 10 \end{cases}$
- $\begin{cases} y = 10x + 10 \\ y = 20x + 40 \end{cases}$
- $\begin{cases} y = 40x + 10 \\ y = 10x + 20 \end{cases}$

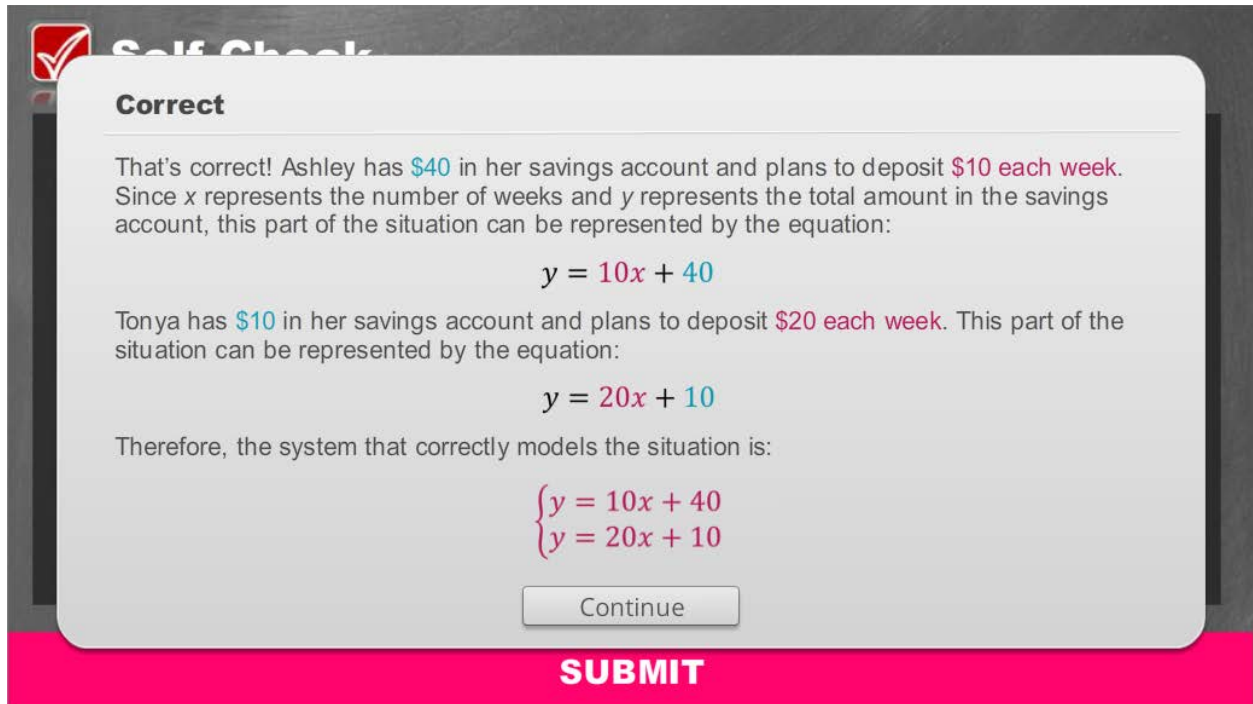
SUBMIT

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

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Self-Check 1: Answer



Correct

That's correct! Ashley has \$40 in her savings account and plans to deposit \$10 each week. Since x represents the number of weeks and y represents the total amount in the savings account, this part of the situation can be represented by the equation:

$$y = 10x + 40$$

Tonya has \$10 in her savings account and plans to deposit \$20 each week. This part of the situation can be represented by the equation:

$$y = 20x + 10$$

Therefore, the system that correctly models the situation is:

$$\begin{cases} y = 10x + 40 \\ y = 20x + 10 \end{cases}$$

Continue

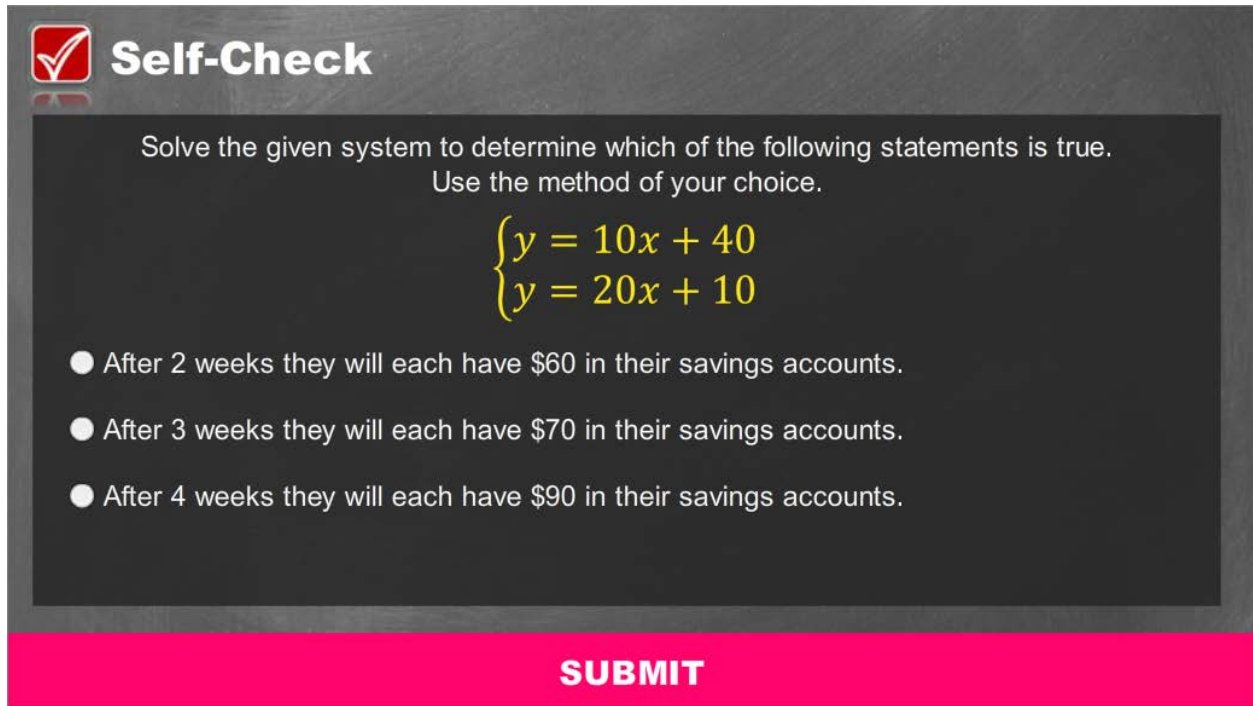
SUBMIT

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

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Self-Check 2

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 problem text is centered: "Solve the given system to determine which of the following statements is true. Use the method of your choice." The system of equations is displayed in yellow:
$$\begin{cases} y = 10x + 40 \\ y = 20x + 10 \end{cases}$$
 Three radio button options are listed below the equations. At the bottom of the interface is a bright pink bar with the word "SUBMIT" in white capital letters.

Self-Check

Solve the given system to determine which of the following statements is true.
Use the method of your choice.

$$\begin{cases} y = 10x + 40 \\ y = 20x + 10 \end{cases}$$

- After 2 weeks they will each have \$60 in their savings accounts.
- After 3 weeks they will each have \$70 in their savings accounts.
- After 4 weeks they will each have \$90 in their savings accounts.

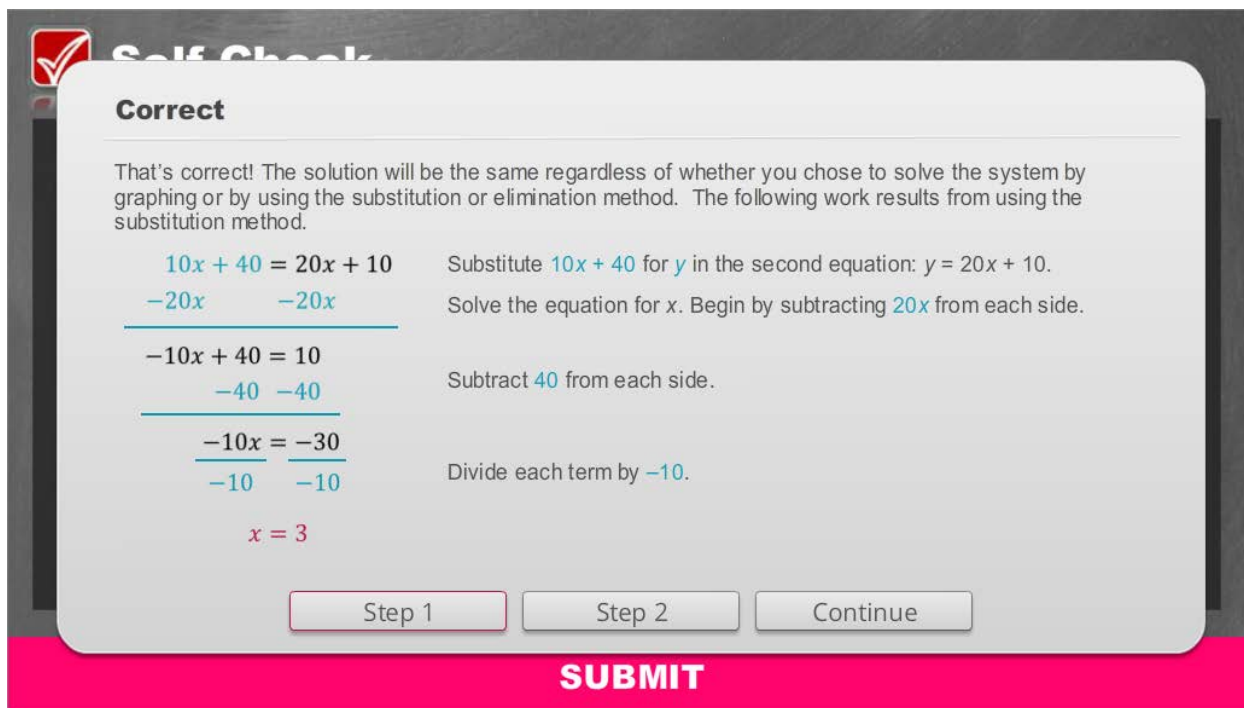
SUBMIT

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

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Self-Check 2: Answer



Correct

That's correct! The solution will be the same regardless of whether you chose to solve the system by graphing or by using the substitution or elimination method. The following work results from using the substitution method.

$$\begin{array}{r} 10x + 40 = 20x + 10 \\ -20x \quad -20x \\ \hline -10x + 40 = 10 \\ \quad -40 \quad -40 \\ \hline -10x = -30 \\ \quad -10 \quad -10 \\ \hline x = 3 \end{array}$$

Substitute $10x + 40$ for y in the second equation: $y = 20x + 10$.

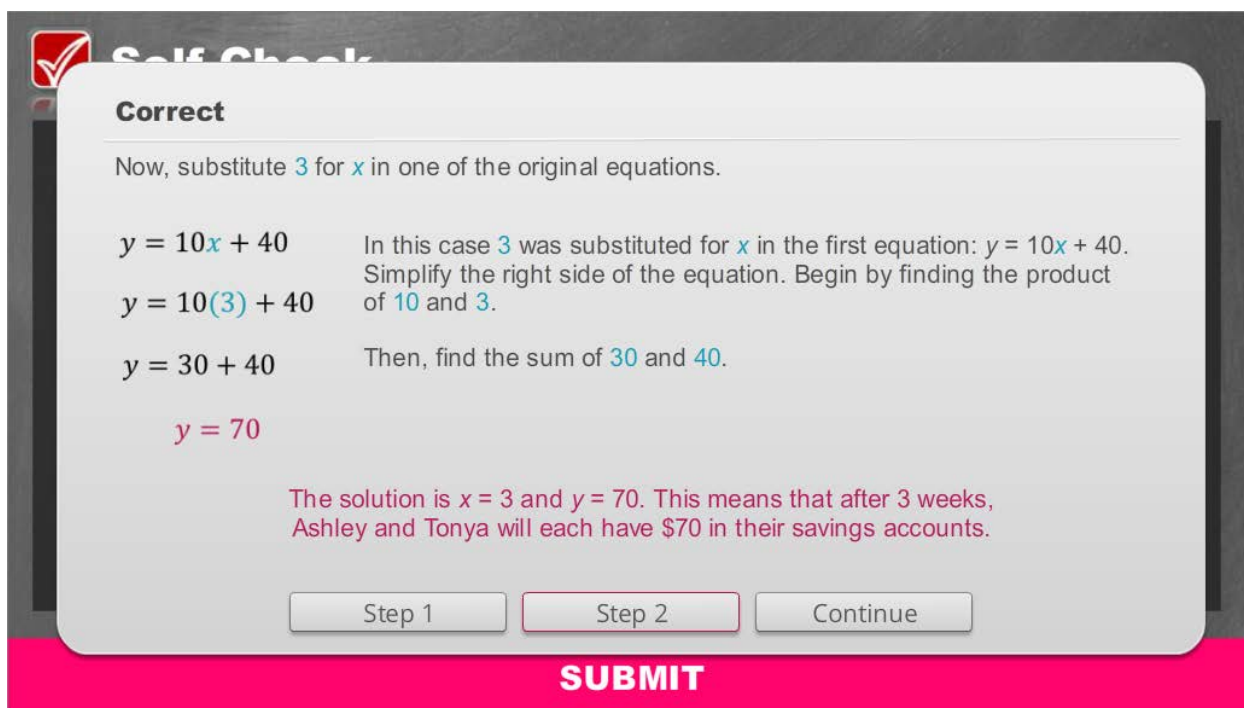
Solve the equation for x . Begin by subtracting $20x$ from each side.

Subtract 40 from each side.

Divide each term by -10 .

Step 1 Step 2 Continue

SUBMIT



Correct

Now, substitute 3 for x in one of the original equations.

$$\begin{array}{l} y = 10x + 40 \\ y = 10(3) + 40 \\ y = 30 + 40 \\ y = 70 \end{array}$$

In this case 3 was substituted for x in the first equation: $y = 10x + 40$. Simplify the right side of the equation. Begin by finding the product of 10 and 3 .

Then, find the sum of 30 and 40 .

The solution is $x = 3$ and $y = 70$. This means that after 3 weeks, Ashley and Tonya will each have \$70 in their savings accounts.

Step 1 Step 2 Continue

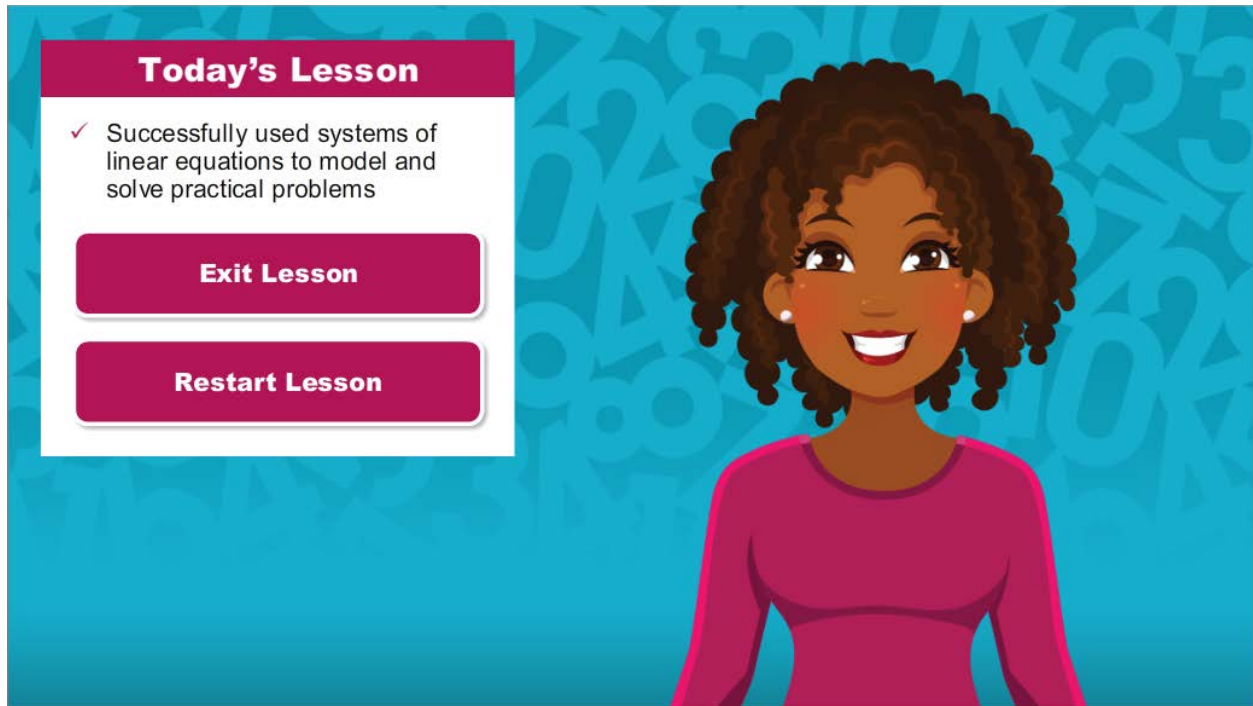
SUBMIT

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

Module 5: Solving Linear Equations

Topic 4 Content: Practical Problems Involving Systems of Linear Equations

Conclusion



You have reached the conclusion of this lesson where you learned how to use systems of linear equations to model and solve practical problems.