Lesson 1.5 Teacher Guide: Equations and Their Graphs

1.5.4: Writing, Graphing, and Solving a Linear Equation

1.5.4: Additional Resources

The following content is available to students who would like more support based on their experience with the self check. Students will not automatically have access to this content, so you may wish to share it with those who could benefit from it.

Feedback (Feedback ID: 8286141) from TEA states: "It would improve if the x-intercept was interpreted in the scenario, not just identified." Make the changes as denoted below.

Writing Equations Using Graphs in Situations

An equation that contains two unknown quantities or two quantities that vary is called an equation in two variables. A solution to such an equation is a pair of numbers that makes the equation true.

Suppose Tyler spends $40 on T-shirts and socks. A T-shirt costs $10 and a pair of socks costs $2.50. If t represents the number of T-shirts and p represents the number of pairs of socks that Tyler buys, what is an equation that represents the equation?

Example 1

Step 1 - Create a two-variable equation.
The cost is $10 per t-shirt ($10t$) plus $2.50 per pair of socks ($2.50p$) which equals $40.
$10t+2.50p=40$

Now, we have to graph the equation. We will let $t = x$ and $p = y$.

Step 2 - Find the x-intercept.
To find the x-intercept, let $p=0$.

$10t+2.50p=40$
$10t+2.50(0)=40$
$10t+0=40$
$t=4$

$(4,0)$ is the x-intercept.

The x-intercept is also called a solution or zero.
In this scenario, 4 represents the number of T-shirts Tyler can buy if he doesn't purchase any socks with the $40.

Step 3 - Find the y-intercept.
To find the y-intercept, let t=0.

$10t+2.50p=40$
$10(0)+2.50p=40$
$(0)+2.50p=40$
$2.50p=16$

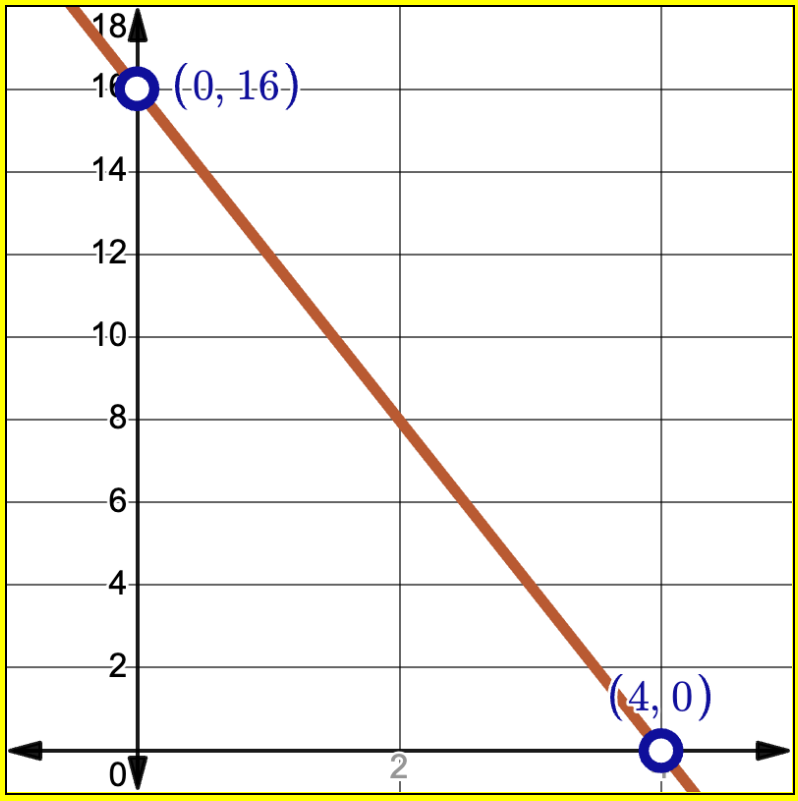
(0,16) is the y-intercept.
In this scenario, the y-intercept of 16 represents the number of socks Tyler can buy if he doesn't purchase any shirts with the $40.

Step 4 - Graph the line by connecting the intercepts.

Let's look at the graph of this equation:

[To accommodate TEA request, replace the current graph.]

IMAGE:
https://drive.google.com/file/d/1kXB3e1jL9arqAASn_JtG2TghA0iu7iiy/view?usp=sharing



Let's reflect about the graph and what it means.

Example 2

What is the slope of the graph?

Solution

$m=-4$

Example 3

What does the point $(4,6)$ mean on this graph?

Enter your answer here:

[To accommodate TEA request, changed scenario forces a change to this answer.]
Solution

Compare your answer:

If Tyler bought 4 T-shirts and 6 pairs of socks, it would cost more than $40.

Try It: Writing Equations Using Graphs in Situations

Use Desmos or a graphing calculator to create a graph for $40x+20y=180$

[Desmos interactive graphing calculator]

1. If x represents the number of pairs of shoes and y represents the number of pairs of jeans, what is one combination that is a solution?

Enter your answer here:

Solution

2. What does the combination you identified mean on the graph?

Enter your answer here:

Solution