Linear Equations: Tables and Graphs

A Closer Look at the Video

After watching the *Linear Equations: Tables and Graphs* video, make sense of the mathematics by reading through the problem situation and solution. Use the comments and questions in bold to help you create tables and graphs for the situation.

Problem: Scott and Shawn each set up camp at two different places along a trail. Scott is at checkpoint A and Shawn is one mile down the trail at checkpoint B. Scott leaves checkpoint A and runs 10 miles down the trail before Shawn starts running. Scott is running at 4 mph and Shawn is running at 7 mph. How many hours will it take for Shawn to catch up with Scott, and where will they meet?

How can a table help you find the solution to the problem?
One strategy that may be used to solve mathematics problems is creating a table.
By creating a table, you can compare the number of hours each person ran and their distances from checkpoint A. The table will look something like this:

Number of Hours	Scott's distance from checkpoint A	Shawn's Distance from checkpoint A

At the start, Scott is at mile marker 10 and Shawn is at mile marker 1.

Number of Hours	Scott's distance from checkpoint A	Shawn's Distance from checkpoint A
0	10	1

Recall that Scott travels at 4 mph and Shawn travels at 7 mph. After 1 hour, Shawn will have traveled an additional 7 miles for a total of 1 + 7, or 8 miles. After 1 hour, Scott will have traveled an additional 4 miles for a total of 10 + 4, or 14 miles.

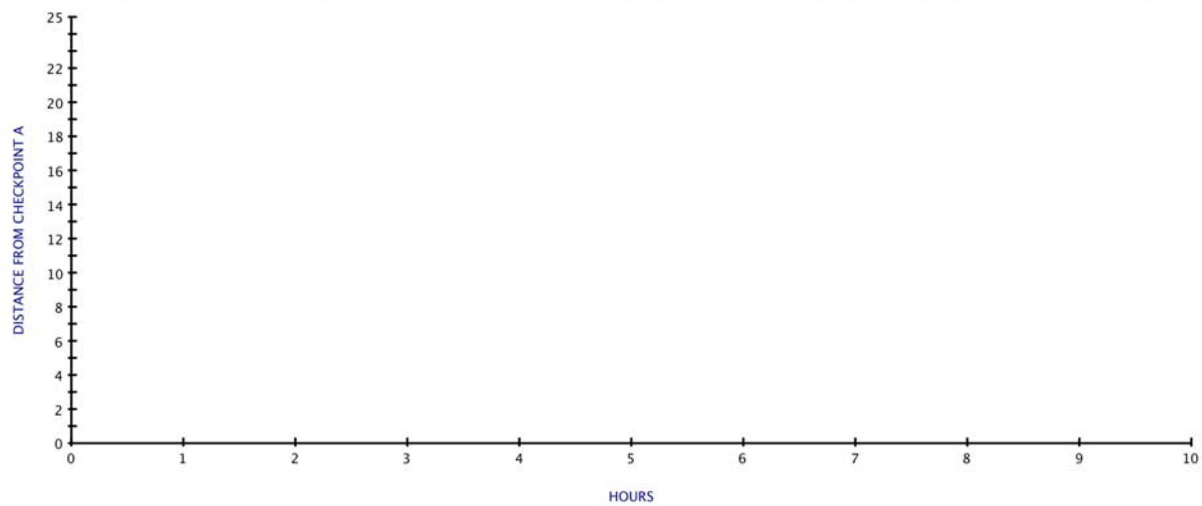
Number of Hours	Scott's distance from checkpoint A	Shawn's Distance from checkpoint A
0	10	1
	+4	+7
1	14	8

After 2 hours, Shawn has traveled 8 + 7, or 15 miles. After 2 hours, Scott has traveled 14 + 4, or 18 miles. Similarly, after 3 hours, Shawn has traveled 15 + 7, or 22 miles and Scott has traveled 18 + 4, or 22 miles.

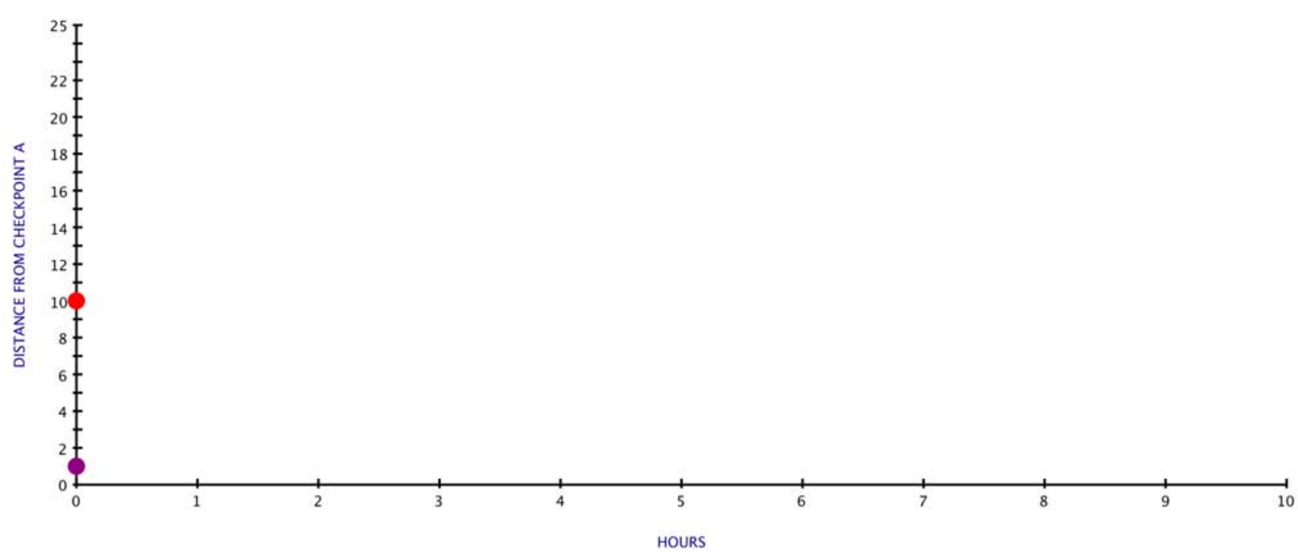
Number of Hours	Scott's distance from checkpoint A	Shawn's Distance from checkpoint A
0	10	1
	+4	+7
1	14	8
	+4	+7
2	18	15
	+4	+7
3	22	22

Therefore, both Shawn and Scott will be at mile marker 22 in 3 hours.

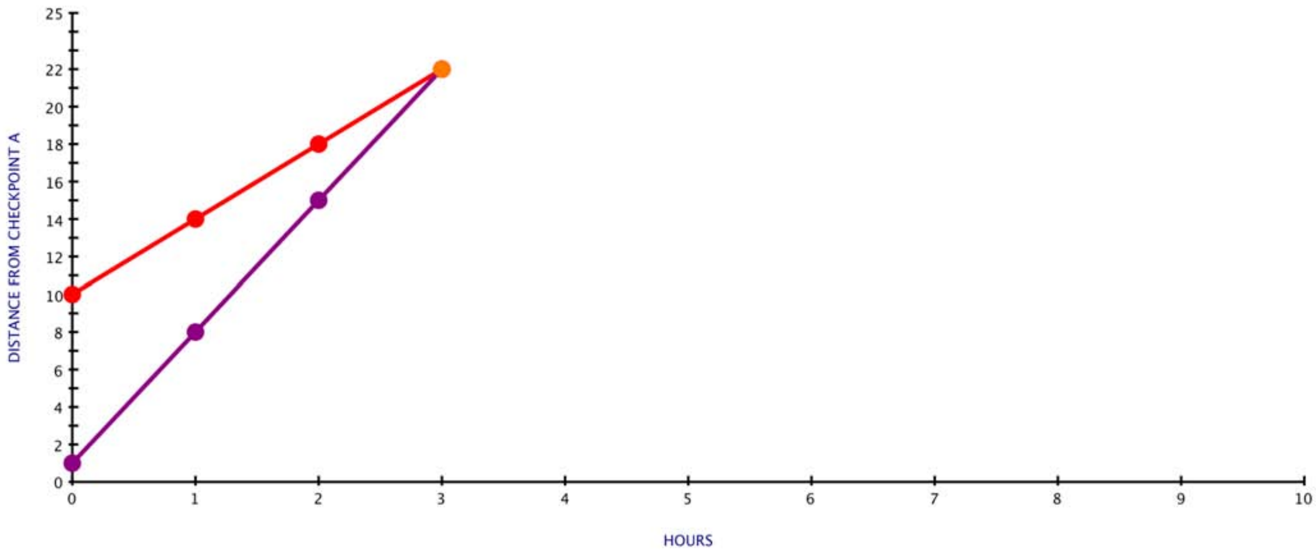
How can a graph be used to solve the problem?
Another strategy to use when solving a problem is to create a graph to help visualize the problem and determine the solution. In the graph that follows, the horizontal axis represents the number of hours and the vertical axis represents the distance from checkpoint A.



Represent where both men are when Shawn starts by plotting points. At 0 hours, Shawn is 1 mile from checkpoint A, so we put a point at (0,1). Scott is 10 miles from checkpoint A, so we put at point at (0,10). These points are shown below.



After one hour, Shawn is at mile marker 8 and Scott is at mile marker 14.



After two hours, Shawn is at mile marker 15 and Scott is at mile marker 18. You begin to see that both relationships are linear. Shawn's progress and Scott's progress are both represented by straight lines since they are both traveling at a constant speed. If you connect the points for Shawn and Scott, the point where the two lines intersect shows that Shawn and Scott have both traveled for 3 hours and are at mile marker 22.

How can an equation be used to check the solution?
This problem was represented with a number line diagram and with an equation in *Linear Equations: Expressions and Diagram.* This video used a table and a graph. The conclusion from each representation is the same.
The solution can be checked by substituting 3 into the equation for h.

<u>**Scott's distance**</u>

d = 4h + 10
d = 4(3) + 10
d = 12 + 10
d = 22

<u>**Shawn's distance**</u>

d = 7h + 1
d = 7(3) + 1
d = 21 + 1
d = 22

They will meet after 3 hours at mile marker 22.

Representing a problem in multiple ways connects equations, tables, and graphs. All three methods help make sense of mathematics.