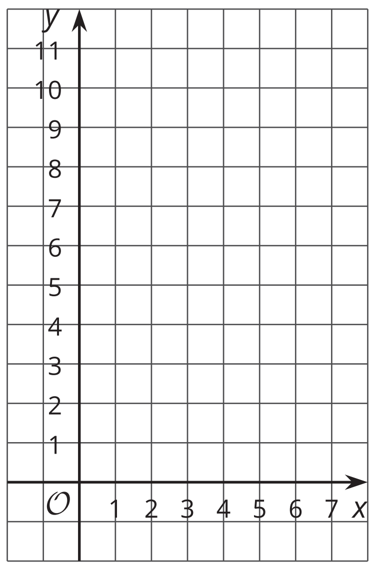
Introducing Graphs of Proportional Relationships

Let's see how graphs of proportional relationships differ from graphs of other relationships.

10.1 Notice These Points

1. Plot the points $(0, 10), (1, 8), (2, 6), (3, 4), (4, 2)$.



2. What do you notice about the graph?

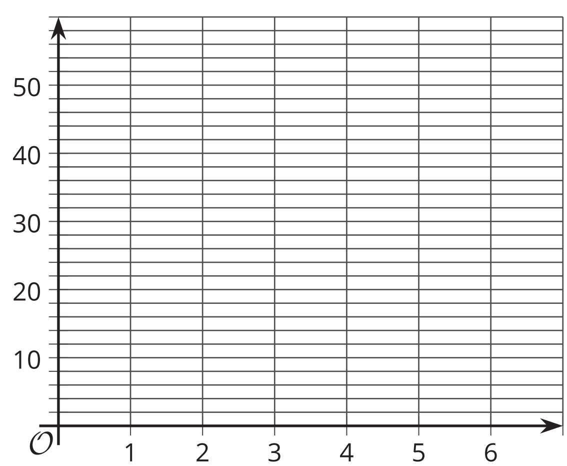
10.2 T-shirts for Sale

Some T-shirts cost $8 each.

x	y
1	8
2	16
3	24
4	32
5	40
6	48

1. Use the table to answer these questions.
   a. What does x represent?
   b. What does y represent?
   c. Is there a proportional relationship between x and y?

2. Plot the pairs in the table on the coordinate plane.



3. What do you notice about the graph?

10.3 Card Sort: Tables and Graphs

Your teacher will give you a set of cards that show representations of relationships.

1. Sort the cards into categories of your choosing. Be prepared to describe your categories.

   Pause for a whole-class discussion.

2. Take turns with your partner to match a table with a graph.
   a. For each match that you find, explain to your partner how you know it's a match.
   b. For each match that your partner finds, listen carefully to their explanation. If you disagree, discuss your thinking and work to reach an agreement.

3. Which of the relationships are proportional?

4. What do you notice about the graphs of proportional relationships? Do you think this will hold true for all graphs of proportional relationships?

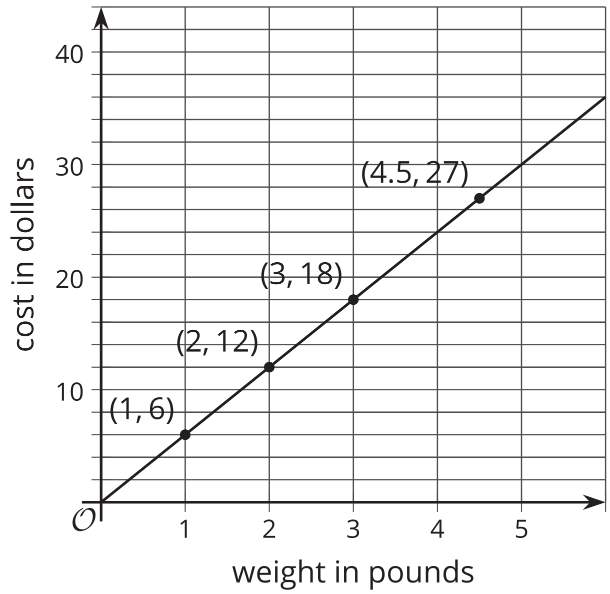
Are you ready for more?

1. All the graphs in this activity show points where both coordinates are positive. Would it make sense for any of them to have one or more coordinates that are negative?

2. The equation of a proportional relationship is of the form $y = kx$, where k is a positive number, and the graph is a line through $(0, 0)$. What would the graph look like if k were a negative number?

Lesson 10 Summary

One way to represent a proportional relationship is with a graph. Here is a graph that represents different amounts that fit the situation, “Blueberries cost $6 per pound.”



Different points on the graph tell us, for example, that 2 pounds of blueberries cost $12, and 4.5 pounds of blueberries cost $27.

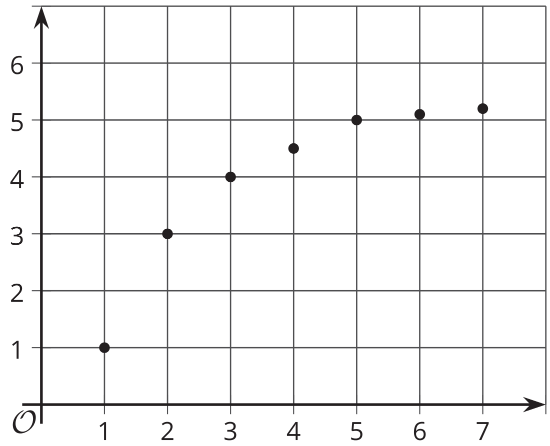
Sometimes it makes sense to connect the points with a line, and sometimes it doesn’t. For example, we could buy 4.5 pounds of blueberries or 1.875 pounds, or any other part of a whole pound. So all the points between the whole numbers make sense in the situation, and any point on the line is meaningful.

If the graph represented the cost for different *numbers of sandwiches* (instead of pounds of blueberries), it might not make sense to connect the points with a line, because it is often not possible to buy 4.5 sandwiches or 1.875 sandwiches. Even if only points make sense in the situation, though, sometimes we connect them with a line anyway to make the relationship easier to see.

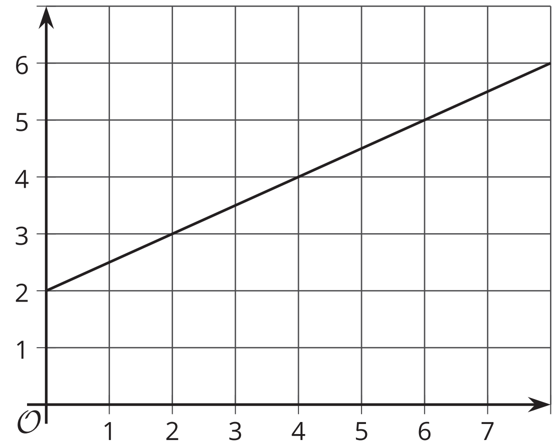
Graphs that represent proportional relationships all have a few things in common:

- Points that satisfy the relationship lie on a straight line.
- The line that they lie on passes through the **origin**, $(0, 0)$.

Here are some graphs that do *not* represent proportional relationships:



These points do not lie on a line.



This is a line, but it doesn't go through the origin.