BARTLETT

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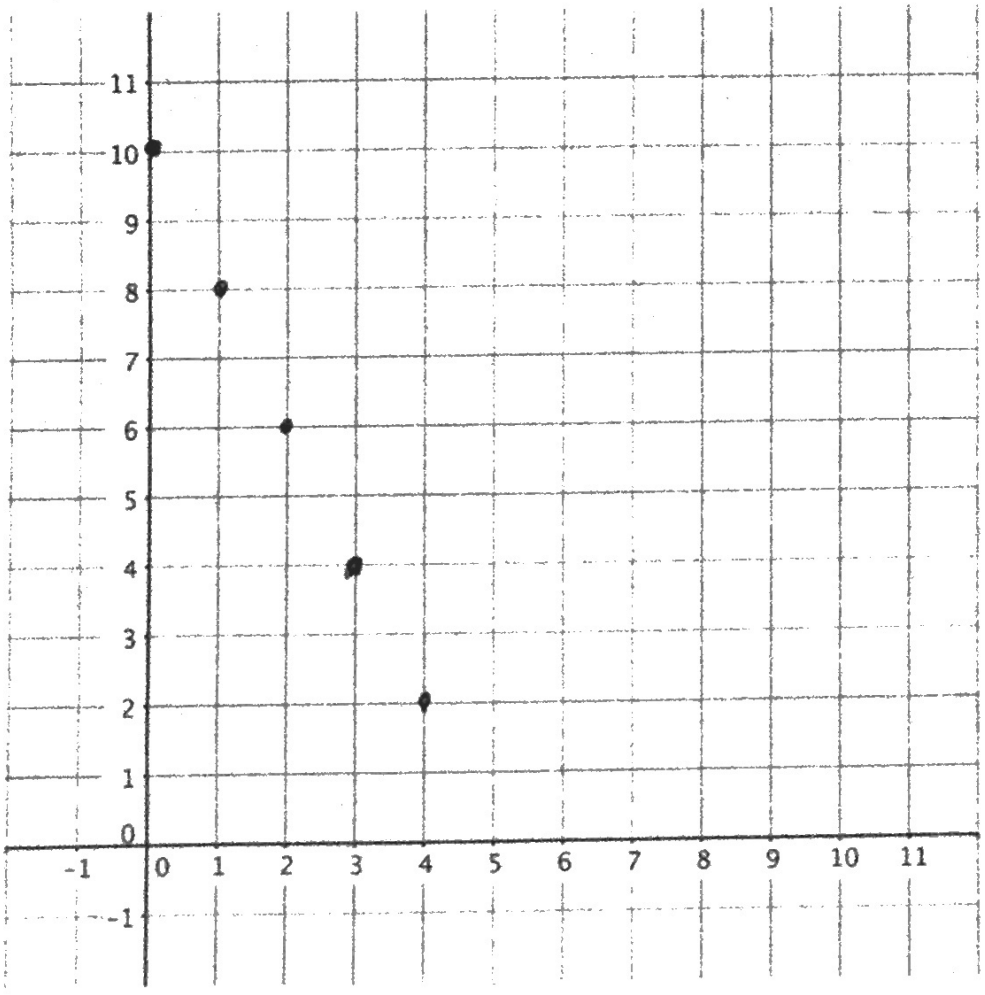
Unit 2, Lesson 10: Introducing Graphs of Proportional Relationships

Let's see how graphs of proportional relationships differ (are different) from graphs of other relationships.

10.1: Notice These Points

m.openup.org/1/7-2-10-1

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



2. What do you notice about the graph?

- The points line up, could be connected
- Line goes down when reading left to right
- Every time x-coordinate goes up 1, y-coordinate goes down 2

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Rhodes 5 min quiet worktime, pair-share, whole class

10.2: T-shirts for Sale

m.openup.org/1/7-2-10-2

Some T-shirts cost $8 each.

1. Use the table to answer these questions.

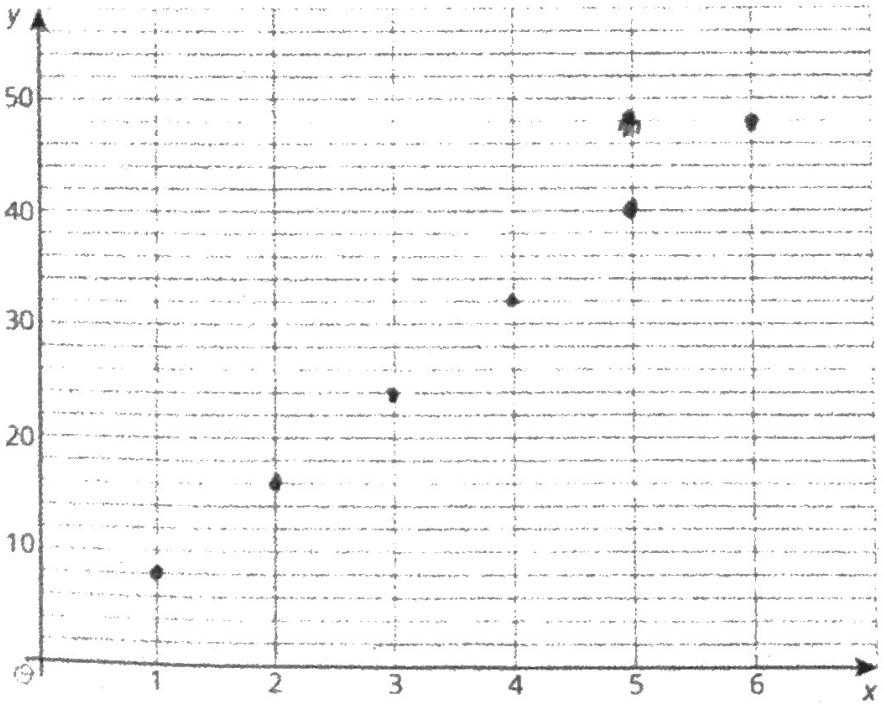
x	y
1	8
2	16
3	24
4	32
5	40
6	48

a. What does x represent?
x represents the number of t-shirts

b. What does y represent?
y represents the cost of the total number of shirts

c. Is there a proportional relationship between x and y?
There is a proportional relationship between x and y because for every x t-shirts

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



Q: What if the problem was about Cherries, $8 per pound? How would it change?

Q: Could we buy 0 shirts? 1/2 shirt?

3. What do you notice about the graph?

- Points are on a line
- Go through 0

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10.3: Matching Tables and Graphs

Your teacher will give you papers showing tables and graphs.

1. Examine the graphs closely. What is the same and what is different about the graphs?

   • All graphs have points that can be connected by a single, straight line

   • Some graphs go through (0,0), some do not

2. Sort the graphs into categories of your choosing. Label each category. Be prepared to explain why you sorted the graphs the way you did. Proportional vs. Non-proportional (May be more categories)

3. Take turns with a partner to match a table with a graph.

   a. For each match you find, explain to your partner how you know it is a match.

   b. For each match your partner finds, listen carefully to their explanation. If you disagree, work to reach an agreement. ~~3G~~ 3G, 1H, 2B, 4D, 5A, 6E, 7F, 8I, 9C, 10J

   Pause here so your teacher can review your work.

4. Trade places with another group. How are their categories the same as your group's categories? How are they different?

5. Return to your original place. Discuss any changes you may wish to make to your categories based on what the other group did.

6. Which of the relationships are proportional?

   2B, 4D, 7F, 8I, 9C

7. What have you noticed about the graphs of proportional relationships? Do you think this will hold true for *all* graphs of proportional relationships?

   • R is found when x is 1

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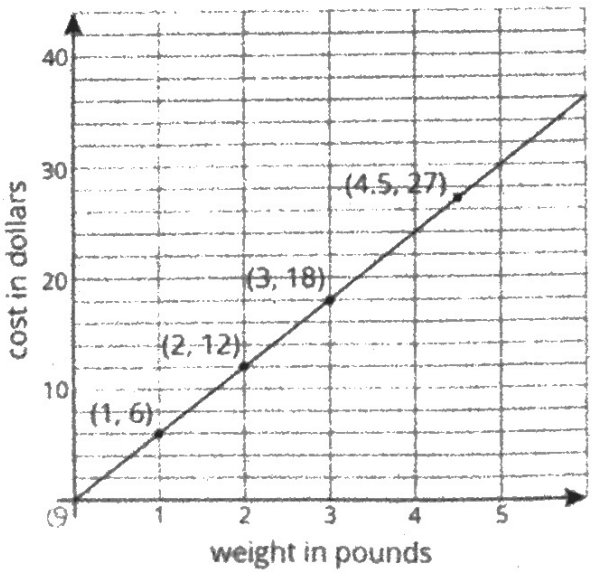
Are you ready for more?

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. We could buy, for example, 4.5 pounds of blueberries or 1.875 pounds of blueberries, so all the points in between the whole numbers make sense in the situation, so any point on the line is meaningful.

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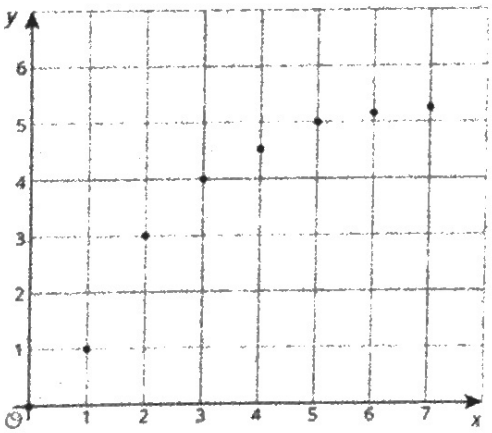
If the graph represented the cost for different *numbers of sandwiches* (instead of pounds of blueberries), it might not make sense to connect the points with a line, because it is often not possible to buy 4.5 sandwiches or 1.875 sandwiches. Even if only points make sense in the situation, though, sometimes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

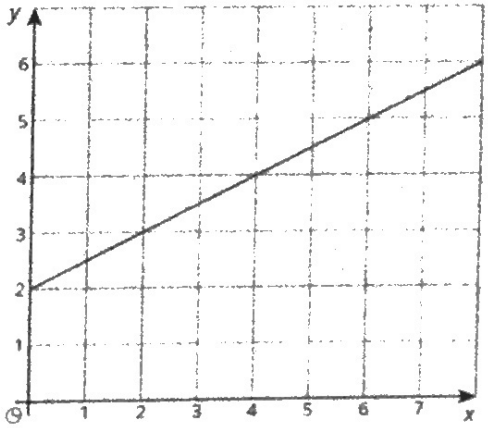
Graphs that represent proportional relationships all have a few things in common:

- 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.

Lesson 10 Glossary Terms

- origin