Lesson 13: Two Graphs for Each Relationship

Let's use tables, equations, and graphs to answer questions about proportional relationships.

13.1: True or False: Fractions and Decimals

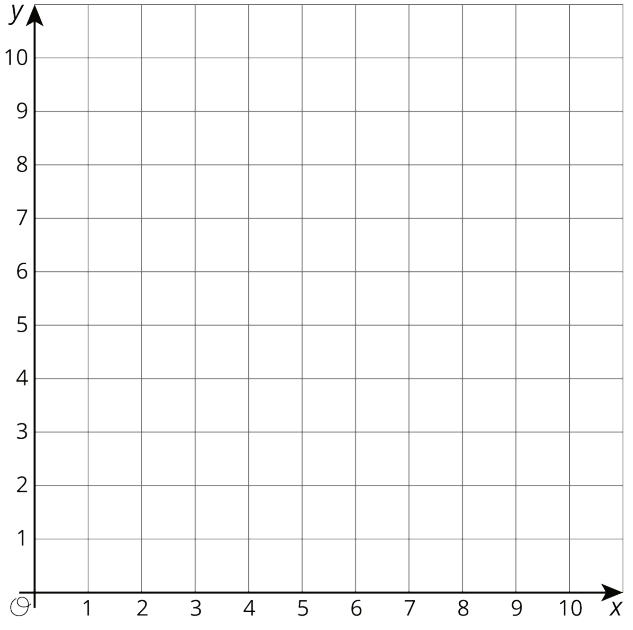
Decide whether each equation is true or false. Be prepared to explain your reasoning.

1. $\frac{3}{2} \cdot 16 = 3 \cdot 8$
2. $\frac{3}{4} \div \frac{1}{2} = \frac{6}{4} \div \frac{1}{4}$
3. $(2.8) \cdot (13) = (0.7) \cdot (52)$

13.2: Tables, Graphs, and Equations

Your teacher will assign you *one* of these three points:

$$A = (10, 4),\ B = (4, 5),\ C = (8, 5).$$



x	y	$\frac{y}{x}$
0		NA
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

1. On the graph, plot and label *only* your assigned point.
2. Use a ruler to line up your point with the origin, $(0, 0)$. Draw a line that starts at the origin, goes through your point, and continues to the edge of the graph.
3. Complete the table with the coordinates of points on your graph. Use a fraction to represent any value that is not a whole number.
4. Write an equation that represents the relationship between x and y defined by your point.

5. Compare your graph and table with the rest of your group. What is the same and what is different about:

   a. your tables?

   b. your equations?

   c. your graphs?

6. What is the y-coordinate of your graph when the x-coordinate is 1? Plot and label this point on your graph. Where do you see this value in the table? Where do you see this value in your equation?

7. Describe any connections you see between the table, characteristics of the graph, and the equation.

Are you ready for more?

The graph of an equation of the form $y = kx$, where k is a positive number, is a line through $(0, 0)$ and the point $(1, k)$.

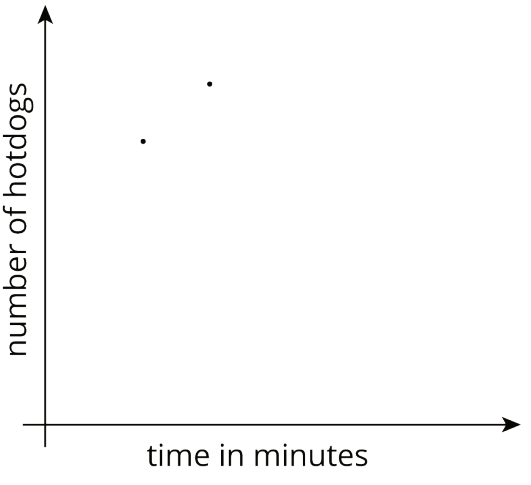
1. Name at least one line through $(0, 0)$ that cannot be represented by an equation like this.

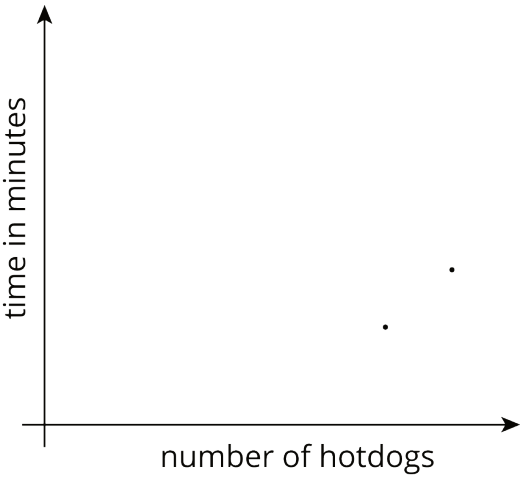
2. If you could draw the graphs of *all* of the equations of this form in the same coordinate plane, what would it look like?

13.3: Hot Dog Eating Contest

Andre and Jada were in a hot dog eating contest. Andre ate 10 hot dogs in 3 minutes. Jada ate 12 hot dogs in 5 minutes.

Here are two different graphs that both represent this situation.





1. On the first graph, which point shows Andre's consumption and which shows Jada's consumption? Label them.

2. Draw two lines: one through the origin and Andre's point, and one through the origin and Jada's point.

3. Write an equation for each line. Use t to represent time in minutes and h to represent number of hot dogs.

    a. Andre:

    b. Jada:

4. For each equation, what does the constant of proportionality tell you?

5. Repeat the previous steps for the second graph.

    a. Andre:

    b. Jada:

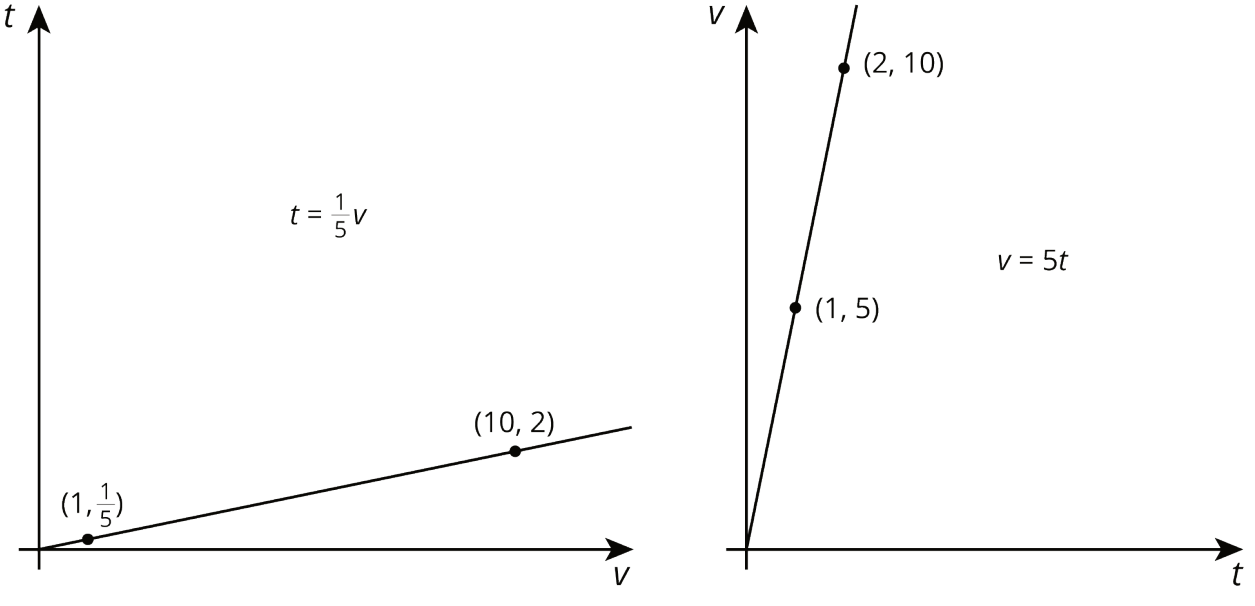
Lesson 13 Summary

Imagine that a faucet is leaking at a constant rate and that every 2 minutes, 10 milliliters of water leaks from the faucet. There is a proportional relationship between the volume of water and elapsed time.

- We could say that the elapsed time is proportional to the volume of water. The corresponding constant of proportionality tells us that the faucet is leaking at a rate of $\frac{1}{5}$ of a minute per milliliter.

- We could say that the volume of water is proportional to the elapsed time. The corresponding constant of proportionality tells us that the faucet is leaking at a rate of 5 milliliters per minute.

Let's use v to represent volume in milliliters and t to represent time in minutes. Here are graphs and equations that represent both ways of thinking about this relationship:



Even though the relationship between time and volume is the same, we are making a different choice in each case about which variable to view as the independent variable. The graph on the left has v as the independent variable, and the graph on the right has t as the independent variable.