Lesson 10: Interpreting Graphs of Proportional Relationships

Classwork

Example 1

Grandma's Special Chocolate Chip Cookie recipe, which yields 4 dozen cookies, calls for 3 cups of flour.

Using this information, complete the chart:

Create a table comparing the amount of flour used to the amount of cookies.

Cups of flour (x)	Dozens of cookies (y)	$\frac{y}{x}$
3	4	$\frac{4}{3}$
6	8	$\frac{4}{3}$
9	12	$\frac{4}{3}$

$\frac{4}{3} = 1\frac{1}{3} = 1.3\overline{3}$

Is the number of cookies proportional to the amount of flour used? Explain why or why not.

Yes, there is a constant ($\frac{4}{3}$) for each of the sets of numbers

What is the unit rate of cookies to flour ($\frac{y}{x}$) and what is the meaning in the context of the problem?

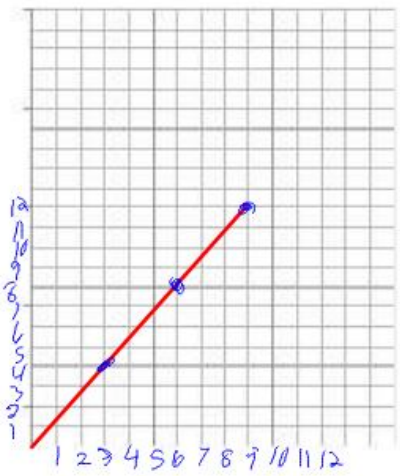
The unit rate is $\frac{4}{3}$ or $1\frac{1}{3}$.

We can make $1\frac{1}{3}$ dozens of cookies for each 1 cup of flour (16 cookies)

$12 + 4 = 16$

$1 + \frac{1}{3}$

Model the relationship on a graph.



Does the graph show the two quantities being proportional to each other? Explain

yes, the graph is a straight line and goes through the origin.

Write an equation that can be used to represent the relationship.

$D = \frac{4}{3} f$

or

$D = 1\frac{1}{3} f$

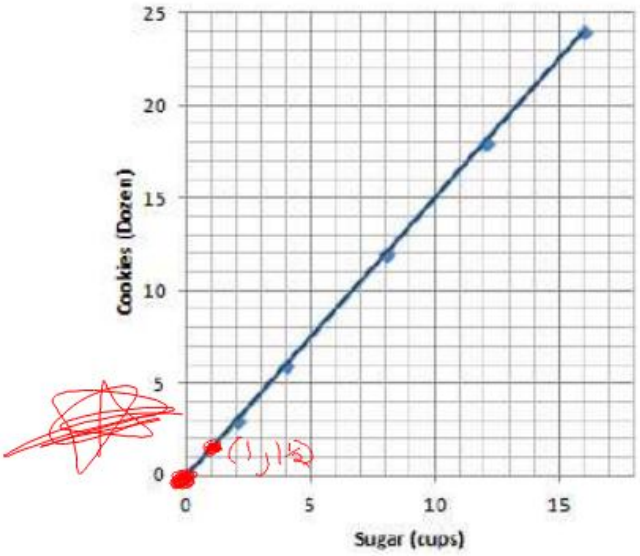
or

$D = 1.\overline{3} f$

Example 2

Below is a graph modeling the amount of sugar required to make Grandma's Chocolate Chip Cookies.

(1, ___) ↑ unit rate



x Sugar (cups)	y cookies (Dozen)
0	0
2	3
4	6
8	12
12	18
16	24

a. Record the coordinates from the graph in a table. What do these ordered pairs represent?

(0,0) → 0 cups of sugar yields 0 dozens of cookies
(2,3) → 2 cups of sugar will make 3 dozen cookies
(16,24) → 16 cups of sugar will yield 24 dozen cookies

b. Grandma has 1 remaining cup of sugar. How many dozen cookies will she be able to make? Plot the point on the graph above.

$k = \frac{y}{x} = \frac{3}{2} = 1\frac{1}{2}$

she will be able to make 1½ dozen of cookies

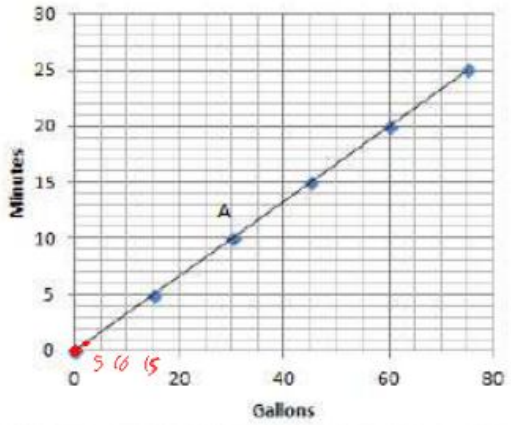
$\frac{1\frac{1}{2}}{1}$ (1, 1½) (1 sugar, 1½ dozens of cookies)

c. How many dozen cookies can grandma make if she has no sugar? Can you graph this on the coordinate plane provided above? What do we call this point?

She can make 0 dozen of cookies. Yes. The point is called the origin.

Exercises

1. The graph below shows the amount of time a person can shower with a certain amount of water.



a. Can you determine by looking at the graph whether the length of the shower is proportional to the number of gallons of water? Explain how you know.

b. How long can a person shower with 15 gallons of water? How long can a person shower with 60 gallons of water?

c. What are the coordinates of point A? Describe point A in the context of the problem.

d. Can you use the graph to identify the unit rate?

The unit rate is located at ( ), r)