NAME BARTLETT DATE PERIOD

Unit 2, Lesson 2: Introducing Proportional Relationships with Tables

Let's solve problems involving proportional relationships using tables.

2.1: Notice and Wonder: Paper Towels by the Case

Here is a table that shows how many rolls of paper towels a store receives when they order different numbers of cases.

•12

number of cases they order	number of rolls of paper towels
1	12
3	36
5	60
10	120

•2 •2

What do you notice about the table? What do you wonder?

- To go from one row to another, multiply both columns by the same number
- To find the number of rolls, multiply the number of cases by 12
- There are 12 rolls in a case.

- How much does a case cost?
- How many paper towels are on a roll?
- Why would you need 120 rolls of paper towels?

2.2: Feeding a Crowd

1. A recipe says that 2 cups of dry rice will serve 6 people. Complete the table as you answer the questions. Be prepared to explain your reasoning.

(cups)

Q: Have you ever cooked rice?

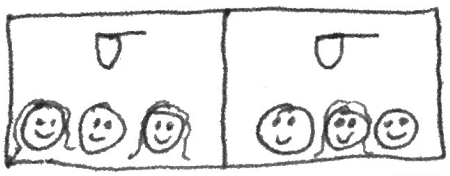
Common Approaches:
1) Drawing 2) Calculation of unit rate
3) Moving down the table 4) Moving across the table

a. How many people will 10 cups of rice serve? 10 cups of rice will serve 30 people

b. How many cups of rice are needed to serve 45 people? 15 cups of rice are needed to serve 45 people

cups of rice	number of people
2	6
3	9
10	30
15	45

•3



NAME Q: Have you ever eaten a spring roll? DATE PERIOD

2. A recipe says that 6 spring rolls will serve 3 people. Complete the table.

number of spring rolls	number of people
6	3
30	15
40	20
56	28

•1/2 •2

Unit rate:
1) 1/2 a person is satisfied by one spring roll.
2) 1 person is satisfied by 2 spring rolls.

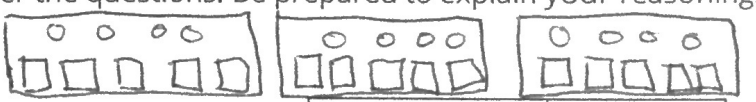
Introduce term: "proportional relationships" → Whenever we have a situation like this where two quantities are always in the same ratio, we say there is a proportional relationship between quantities.

*2.3: Making Bread Dough

A bakery uses 8 tablespoons of honey for every 10 cups of flour to make bread dough. Some days they bake bigger batches and some days they bake smaller batches, but they always use the same ratio of honey to flour. Complete the table as you answer the questions. Be prepared to explain your reasoning.

(Spoons)

1. How many cups of flour do they use with 20 tablespoons of honey?
25 cups of flour are used with 20 tablespoons of honey.
2. How many cups of flour do they use with 13 tablespoons of honey? 16 1/4 cups of flour are used with 13 tablespoons of honey.
3. How many tablespoons of honey do they use with 20 cups of flour? 16 tablespoons of honey are used with 20 cups of flour.



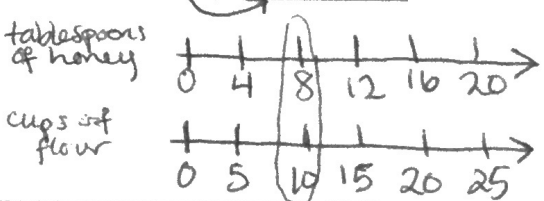
honey (tbsp)	flour (c)
8	10
20	25
prime number 13 ★ unit rate required	16 1/4
16	20

•1.25

Q: What does the 1.25 tell us?

Unit rate: 4/5, 8/10; 5/4; 10/8; 1.25

4. What is the **proportional relationship** represented by this table?
- The relationship between the number of tablespoons of honey and the number of cups of flour is proportional.
- vice versa
- The table represents a proportional relationship between H & F.



2.4: Quarters and Dimes

4 quarters are equal in value to 10 dimes.

1. How many dimes equal the value of 6 quarters?
2. How many dimes equal the value of 14 quarters?
3. What value belongs next to the 1 in the table? What does it mean in this context?

number of quarters	number of dimes
1	2.5
4	10
6	15
14	35

Unit 2, Lesson 3: More about Constant of Proportionality

Let's solve more problems involving proportional relationships using tables.

3.1: Equal Measures

Use the numbers and units from the list to find as many equivalent measurements as you can. For example, you might write "30 minutes is $\frac{1}{2}$ hour."

2 mins quiet think 1 min partner

You can use the numbers and units more than once.

24 in = 2 ft 1 cm = 0.01 m

1	24 in = 2 ft	$\frac{1}{2}$	$\frac{1}{2}$ hour = 30 min	0.3	centimeter
12	12 in = 1 ft	40	1 hr is 60 min	24	meter
0.4	6 in = $\frac{1}{2}$ ft	0.01	$\frac{1}{5}$ hr is 12 min	$\frac{1}{5}$	hour
60	40 in = $3\frac{1}{3}$ ft	$3\frac{1}{3}$	0.4 hr is $\frac{24}{60}$ min	6	feet
50		30		2	minute
					inch

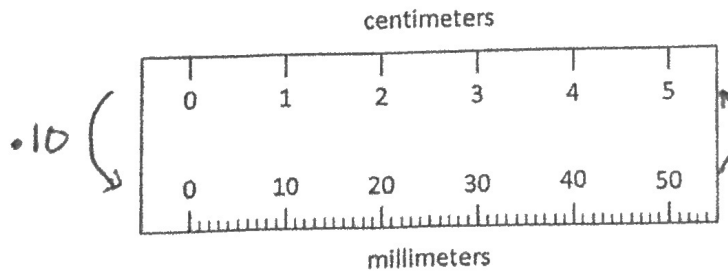
30 cm = 0.3 m
40 cm = 0.4 m
$\frac{1}{2}$ m = 50 cm

Q: What numbers did you use the most? Why?

Q: If you could include 2 more numbers of units to the selection, what would they be, and why?

3.2: Centimeters and Millimeters

There is a proportional relationship between any length measured in centimeters and the same length measured in millimeters.



Dividing by a number is the same as multiplying by its reciprocal.

There are two ways of thinking about this proportional relationship.

cm → mm •10 or mm → cm •1/10

1. If you know the length of something in centimeters, you can calculate its length in millimeters.

a. Complete the table.

b. What is the constant of proportionality?

The constant of proportionality is 10.

•10

length (cm)	length (mm)
9	90
12.5	125
50	500
88.49	884.9

2. If you know the length of something in millimeters, you can calculate its length in centimeters.

a. Complete the table.

b. What is the constant of proportionality?

The constant is 1/10 or 0.1.

•1/10

length (mm)	length (cm)
70	7
245	24.5
4	0.4
699.1	69.91

3. How are these two constants of proportionality related to each other?

10 and 1/10 are reciprocals

4. Complete each sentence:

a. To convert from centimeters to millimeters, you can multiply by 10.

b. To convert from millimeters to centimeters, you can divide by 10 or multiply by 1/10 or 0.1.

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Lesson 2 Summary

If the ratios between two corresponding quantities are always equivalent, the relationship between the quantities is called a **proportional relationship**.

This table shows different amounts of milk and chocolate syrup. The ingredients in each row, when mixed together, would make a different total amount of chocolate milk, but these mixtures would all taste the same.

tablespoons of chocolate syrup	cups of milk
4	1
6	$1\frac{1}{2}$
8	2
$\frac{1}{2}$	$\frac{1}{8}$
12	3
1	$\frac{1}{4}$

Notice that each row in the table shows a ratio of tablespoons of chocolate syrup to cups of milk that is equivalent to 4 : 1.

About the relationship between these quantities, we could say:

- The relationship between amount of chocolate syrup and amount of milk is proportional.
- The relationship between the amount of chocolate syrup and the amount of milk is a proportional relationship.
- The table represents a proportional relationship between the amount of chocolate syrup and amount of milk.
- The amount of milk is proportional to the amount of chocolate syrup.

We could multiply any value in the chocolate syrup column by $\frac{1}{4}$ to get the value in the milk column. We might call $\frac{1}{4}$ a *unit rate*, because $\frac{1}{4}$ cups of milk are needed for 1 tablespoon of chocolate syrup. We also say that $\frac{1}{4}$ is the **constant of proportionality** for this relationship. It tells us how many cups of milk we would need to mix with 1 tablespoon of chocolate syrup.

Lesson 2 Glossary Terms

- proportional relationship
- constant of proportionality

- If there is a positive constant, k, so that the quantities x and y are related by the equation $y = kx$, then we say that y and x are in a proportional relationship, and that y is proportional to x.
- The constant, k, is called the constant of proportionality.

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Lesson 3 Summary

When something is traveling at a constant speed, there is a proportional relationship between the time it takes and the distance traveled. The table shows the distance traveled and elapsed time for a bug crawling on a sidewalk.

distance traveled (cm)	elapsed time (sec)
$\frac{3}{2}$	1
1	$\frac{2}{3}$
3	2
10	$\frac{20}{3}$

$\cdot\frac{2}{3}$

We can multiply any number in the first column by $\frac{2}{3}$ to get the corresponding number in the second column. We can say that the elapsed time is proportional to the distance traveled, and the constant of proportionality is $\frac{2}{3}$. This means that the bug's *pace* is $\frac{2}{3}$ seconds per centimeter.

This table represents the same situation, except the columns are switched.

elapsed time (sec)	distance traveled (cm)
1	$\frac{3}{2}$
$\frac{2}{3}$	1
2	3
$\frac{20}{3}$	10

$\cdot\frac{3}{2}$

We can multiply any number in the first column by $\frac{3}{2}$ to get the corresponding number in the second column. We can say that the distanced traveled is proportional to the elapsed time, and the constant of proportionality is $\frac{3}{2}$. This means that the bug's *speed* is $\frac{3}{2}$ centimeters per second.

Notice that $\frac{3}{2}$ is the reciprocal of $\frac{2}{3}$. When two quantities are in a proportional relationship, there are two constants of proportionality, and they are always reciprocals of each other. When we represent a proportional relationship with a table, we say the quantity in the second column is proportional to the quantity in the first column, and the corresponding constant of proportionality is the number we multiply values in the first column to get the values in the second.