Parent Newsletter

Chapter 5: Ratios and Proportions

Standards

Common Core:

7.RP.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.2: Recognize and represent proportional relationships between quantities.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Key Terms

A *ratio* is a comparison of two quantities using division.

A *rate* is a ratio of two quantities with different units.

A rate with a denominator of 1 is called a ***unit rate***.

A *complex fraction* has at least one fraction in the numerator, denominator, or both.

Slope is the rate of change between any two points on a line.

Two quantities x and y show ***direct variation*** when $y = kx$, where k is a number and $k \neq 0$.

The number k in the direct variation equation is called the ***constant of proportionality***.

Students will...

Find ratios, rates, and unit rates.

Find ratios and rates involving ratios of fractions.

Use equivalent ratios to determine whether two ratios form a proportion.

Use the Cross Products Property to determine whether two ratios form a proportion.

Use graphs to determine whether two ratios form a proportion.

Interpret graphs of proportional relationships.

Write proportions.

Solve proportions using mental math.

Solve proportions using multiplication or the Cross Products Property.

Use a point on a graph to write and solve proportions.

Find the slopes of lines.

Interpret the slopes of lines as rates.

Identify direct variation from graphs or equations.

Use direct variation models to solve problems.

Key Ideas

Proportions

- A proportion is an equation stating that two ratios are equivalent.
- Two quantities that form a proportion are proportional.

Cross Products

- In the proportion $\frac{a}{b} = \frac{c}{d}$, the products $a \cdot d$ and $b \cdot c$ are called **cross products**.

Cross Products Property

- The cross products of a proportion are equal.
- $\frac{a}{b} = \frac{c}{d}$
  $ad = bc$, where $b, d \neq 0$

Direct Variation

The graph of $y = kx$ is a line with a slope of k that passes through the origin. So, two quantities that show direct variation are in a proportional relationship.
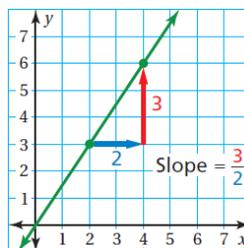
Solving Proportions

Method 1: Use mental math.

Method 2: Use the Multiplication Property of Equality.
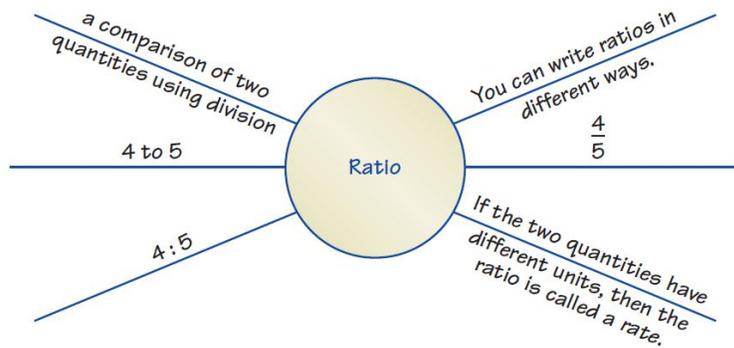
Method 3: Use the Cross Products Property.

Slope

- The slope is a measure of the *steepness* of a line.
- To find the slope of a line, find the ratio of the change in y (vertical change) to the change in x (horizontal change).

$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x}$$

$$\text{Slope} = \frac{3}{2}$$

Good to know.

Reference Tools

a comparison of two quantities using division

You can write ratios in different ways.

4 to 5

Ratio

$\dfrac{4}{5}$

4 : 5

If the two quantities have different units, then the ratio is called a rate.

An **Information Wheel** can be used to organize information about a concept. Write the concept in the middle of the "wheel." Then write information related to the concept on the "spokes" of the wheel. Related information can include, but is not limited to: vocabulary words or terms, definitions, formulas, procedures, examples, and visuals. This type of organizer serves as a good summary tool because any information related to a concept can be included.

Quick Review

- You can graph the values from a ratio table.

Time, *x* (seconds)	Height, *y* (meters)
3	2
6	4
9	6
12	8

+ 3 (between each row on left); + 2 (between each row on right)
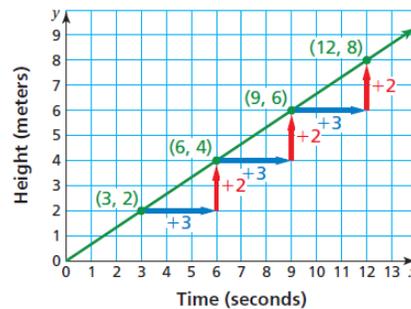
- The graph of every proportional relationship is a line through the origin.

- When two quantities *vary directly*, the ratio of one quantity to another is a *constant*.

- One way to write a proportion is to use a table.

	Last Month	This Month
Purchase	2 ringtones	3 ringtones
Total Cost	6 dollars	*x* dollars

Use columns:

$$\dfrac{2 \text{ ringtones}}{6 \text{ dollars}} = \dfrac{3 \text{ ringtones}}{x \text{ dollars}}$$

Numerators have the same units.
Denominators have the same units.

Use rows:

$$\dfrac{2 \text{ ringtones}}{3 \text{ ringtones}} = \dfrac{6 \text{ dollars}}{x \text{ dollars}}$$

The units are the same on each side of the proportion.

Essential Questions

How do rates help you describe real-life problems?

How can proportions help you decide when things are "fair"?

How can you write a proportion that solves a problem in real life?

How can you use ratio tables and cross products to solve proportions?

How can you compare two rates graphically?

How can you use a graph to show the relationship between two quantities that vary directly? How can you use an equation?

What's the Point?

The ability to write and solve ratios and proportions is very useful in real life for events like converting between measures. If you are driving in Canada, speed is measured in km/h. Ask your student what the speed limit is in miles per hour if a sign says "Speed Limit 110 km/h."

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 5: Painting a Large Room STEM Video is available online at www.bigideasmath.com.

Hmmm.