AIM4S³™

UNIT PLANNING TOOL

Planning Focus: 7ᵗʰ: Ratios & Proportions   **Module(s)/Unit(s) 5**

CCSSM: CCSS.Math.Content.7.RP.A.2

Recognize and represent proportional relationships between quantities.

Mathematical Practices being emphasized:

CCSS.Math.Practice.MP4 Model with mathematics.

Essential Questions

How do rates help you describe real-life problems?
How can proportions help you decide when things are "fair" or the same value?
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?

Compendium

(planned on a separate piece of paper)

Key Concepts

Ratios
Rates
Unit Rates
Proportions
Writing Proportions
Solving Proportions
Slope
Direct Variation

Pre and Post Assessments

Pre Assessment

In the boxes below, use words, numbers and/or symbols to show what you know about the vocabulary words.

Proportions	Rates	Unit Rates

Complete the table.

x	5			
y	1			

Write a ratio with the following items:
4 red balloons
5 blue balloons

Find the unit rate.
1) 180 miles in 3 hours   2) $9.60 for 4 pounds

Show how you would determine if the following ratios form a proportion.
6 : 2 and 12 : 1

Post Assessment: Unit test

Connections (Real World Applications)

Cooking   Sports
Construction   Gaming
Money – finance   Travel
Business   Art
Engineering   Party Planning
Medical professions
Consumer Shopping
Clothing design

Language Functions/Structures

Comparing/Contrasting
This ratio is the equivalent of this ratio because _____.
Rates and unit rates are similar because _____.
Rates and unit rates are different because _____.
Proportions are unequal when_____.
Defining/Explaining
I can write a ratio by _____.
I can find the unit rate by _____.
I can find a proportion by _____.
I can solve a proportion problem by _____.

Vocabulary

* simplifying
* ratio
* complex fraction
* cross products
* direct variation
* constant of proportionality
* equivalent
* ratio table
* proportion
* cross products property
* error analysis
* rate
* unit rate
* proportional
* slope
* constant

Focus and Motivation

Literature - A Very Improbable Story by Edward Einhorn, Beanstalk: The Measure of a Giant by Ann McCallum, Cut Down To Size at High Noon by Scott Sundby, If You Hopped Like a Frog by David M. Schwartz, Is a Blue Whale the Biggest Thing There Is? by Robert E. Wells, Pythagoras and the Ratios by Julie Ellis, Ratios and Rates Reasoning by Melanie Alvarez, The Warlord's Puppeteers by Virginia Pilegard

Animations:- PROPORTION | Mathematics Animation by EarthPen https://www.youtube.com/watch?v=lClm01u8ivM
           RATIO | Mathematics Animation by EarthPen https://www.youtube.com/watch?v=77bF5vhkXgE

Songs - Proportion Song with Lyrics https://www.youtube.com/watch?v=VPaOH75O-ws
     The Ratio and Fractions Song (Stereo Hearts) Gym Class Heroes Remix https://www.teachertube.com/videos/the-ratio-and-fractions-song-stereo-hearts-gym-class-heroes-remix-351492

Activity - Statistics: Something Fishy https://nm.pbslearningmedia.org/resource/8581be38-522c-41cd-9422-87d48b0254cd/8581be38-522c-41cd-9422-87d48b0254cd/#.WL4RaDsrLIU

Ratios + Proportions

Ratio — a comparison of two or more quantities

Fruit punch has 3 cups sparkling water for every 2 cups orange juice.

$$\frac{\text{cups sp. water}}{\text{cups oj}} = \frac{3}{2} \leftarrow \text{ratio}$$

Rate — a ratio of two quantities with different units
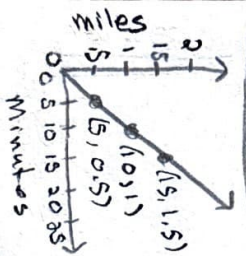
The subway car travels 2.5 miles in 5 minutes.

$$\frac{2.5 \text{ miles}}{5 \text{ minutes}} = \frac{2.5 \text{ mi.}}{5 \text{ min}} \div \frac{\div 5}{\div 5} = \frac{0.5 \text{ mi}}{1 \text{ min}}$$

rate — 2.5mi : 5min = 0.5mi : 1min

0.5 miles per minute
unit rate

Rate on Graph

Unit rate — when the unit in the denominator represents only [one] unit

(5, 1.5)
(10, 1)
(15, 0.5)
miles
Minutes
0 5 10 15 20 25

Proportion — an equation stating that two ratios are equal

First time at the movies you pay $5 for 2 boxes of popcorn. Second time at the movies you pay $7.50 for 3 boxes of popcorn. Same value?

	1st Day	2nd Day
	$5 / 2 boxes	$7.50 / 3 boxes

$$\frac{5}{2} = \frac{7.50}{3}$$

[the 2 ratios are proportional]

Cross Products Property
$$\frac{5}{2} = \frac{7.50}{3} \quad \text{or} \quad 5(3) = 7.50(2)$$
$$15 = 15$$

Work Space

Mathematical Standards + Practices

- We will use tables to create proportions to solve real-life problems.
- We will make sense of how to find the missing value that make two ratios equivalent and persevere in finding them.

Writing a Proportion

A chef increases the amount of ingredients. The new recipe has 6 cups of black beans. Write a proportion that gives the number x of tomatoes.

Black Bean Soup
1.5 cups black beans
0.5 cup salsa
2 cups water
1 tomato
2 tsp. seasoning

① Identify the ratio. 6 cups of black beans to __ tomatos

② Create a table.

	Original Recipe	New Recipe
Black Beans	1.5 cups	6 cups
Tomatoes	1 tomato	x tomatoes

③ Use table to write a proportion.
+ Use columns
+ Use rows

original / new
$$\frac{1.5 c. BB}{1 tom} = \frac{6 c. B.B}{x tom}$$

OR

original / new
$$\frac{1.5 c. BB}{6 c. B.B} = \frac{1 tom}{x tom}$$

Two ways to write a proportion