Algebra 1 (CCSP)

Section 1.8: Rates, Ratios, and Proportions

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objectives**: Students will be able to write and use ratios, rates, and unit rates.

Students will be able to write and solve proportions.

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| **Main Idea** | **Notes** |
| **Exploration:** | 1.8 Exploration: Rates, Ratios, and Proportions |
| **Vocabulary: Ratio and Proportion** | A **ratio** is a comparison of two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.    The ratio of a to b can be written as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, where b≠0.  Ratios of the same comparison are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  A statement that two ratios are equivalent is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Write an example of a proportion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Example 1: Using Proportions to Solve Problems** | The ratio of the number of bones in the human skull to the number of bones in the ears is 11:3.  There are 22 bones in the skull. How many bones are in the ears?  Write a proportion and solve. |
| **Vocabulary: Rates and Unit Rates**  **Example 2: Finding the Unit Rate** | A **rate** is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of two quantities with DIFFERENT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Write an example of a rate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  A **unit rate** has the second \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as one \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.    Write an example of an unit rate: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  You can convert any rate to a unit rate by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Takeru Kobayashi of Japan ate 53.5 hot dogs in 12 minutes to win a contest.  Find the unit rate in hot dogs per minute. |
| **Vocabulary: Dimensional Analysis and Conversion Factors** | **Dimensional analysis** is a process that uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to convert measurements  from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.    A **conversion factor** is a rate in which the two quantities are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but  use different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Write an example of a conversion factor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  To convert from one set of units to another, multiply by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **Example 3: Converting using Dimensional Analysis** | A large adult male human has about 12 pints of blood. Use dimensional analysis to convert this quantity to gallons.  First, convert pints to quarts. (Hint: 1 quart = 2 pints)  Second, convert quarts to gallons. (Hint: 1 gallon = 4 quarts) |
| **Example 4: Converting using Dimensional Analysis** | A cheetah can run at a rate of 60 miles per hour. What is this speed in feet per minute?  Use the conversion factors: 5280 feet/1 mile and 1 hour/60 minutes |
| **Homework:** | 1.8 Exercises  Examples: 1 – 9, 11, 12, 20 – 26, 39  Show all of your work on a separate piece of paper! |
| **Cross Products Property:** | In the proportion , the products a·d = b·c are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  In a proportion, cross products are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **Example 5: Solving Proportions** | Solve each proportion.  a)    b) |
| **Vocabulary: Scale, Scale Drawing, and Scale Model**  **Example 6: Converting Using a Scale Drawing** | A **scale** is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  **Example: 1 in : 5 mi**  A **scale drawing** or **scale model** uses a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to represent an object  as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the actual objects.  A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an example of a scale drawing.  On a road map, the distance between Pittsburgh and Philadelphia is 7.5 inches.  What is the actual distance between the cities if the map scale is 1.5 inches = 60 miles? |
| **Example 7: Converting Using a Scale Drawing** | A contractor has a blueprint for a house drawn to the scale 1 in:3 ft.  a) A wall on the blueprint is 6.5 inches. How long is the actual wall?  b) One wall of the house will be 12 ft long. How long is the wall on the blueprint? |
| **Exit Ticket:** | On a separate piece of paper, answer the following question.  (We will share these with the class and I will collect this for a classwork grade)  **Explain** two ways to solve the proportion: |
| **Homework:** | 1.8 Additional Practice Worksheet |