

Ratios and Equivalent Measurements



The interactive white board tool for this lesson can be found on our website under Resources and Teacher Tools. (www.dreambox.com/teachertools)

Students use a ratio table to record equivalent measurement ratios in the context of a recipe. This DreamBox lesson engages students in mental multiplication, division and proportional reasoning as they use scale factors and number relationships to generate equivalent ratios.

Sample Lesson

Objective: Students use a ratio table to create and record equivalent measurements by multiplying whole, decimal and fraction numbers in the context of a recipe.

Background: Prior to completing this lesson, students should be able to solve basic problems determining factors and products using a table and common ratios (such as 4 tires for every 1 car). Within this lesson, students reason abstractly and quantitatively to communicate about ratio equivalence as they solve ratio problems in the real world context of liquid equivalent measures.

- Instruction:**
- Bring up the DreamBox interactive white board lesson.
 - Begin by asking, “When looking at this table, what are your observations?”
Possible responses:
 - “They are all things used in measuring.”
 - “The volumes are all equivalent to each other. There are 8 pints in 1 gallon and 4 quarts in a gallon.”
 - “What’s a quart? Are those numbers right?”
 - “You use these measures to bake or cook. It looks like someone’s making cookies.”
 - Ask, “If we needed to change how much of each measure is shown in the table – (as in figure out what the numbers would be if we had 2 gallons or $\frac{1}{2}$ gallon instead of 1) – how could we do that?”
Possible responses:
 - “We can multiply each measure by the same number.”
 - “We can divide each measure by the same number.”
 - “We can increase/decrease the totals.” (If students say this, ask how they may do so)
 - “We can add/subtract to each amount.” (If students say this, show the student the \div , \times sign at the bottom of the table and discuss why adding/subtracting isn’t an option).



4. Ask, "If we are to multiply/divide, what would that look like in the next column? Take a moment to copy the table onto scrap paper. After you have completed the first column of your table turn to your partner and share your work." After students have shared their tables, ask a volunteer to come to the board and model his or her strategy. Multiple approaches are listed below. Students earn up to 3 stars for level of difficulty in computation. (Typically, whole numbers that are multiplied or divided earn only 1 star while decimal and fractions earn 2-3 stars).

Possible responses:

- "We can multiply each number by two which doubles each amount." (1 star)
- "We can divide each number by two which halves each amount." (1 star)
- "We can multiply each by $\frac{1}{2}$ (.5) which reduces the each amount by half.' (3 stars) Note: If the student chooses this, discuss with the class why the amount is halved and how this would look if we divided by whole numbers.
- "We can divide each by $\frac{1}{2}$ (.5) which doubles each amount. (3 stars) Note: If the student chooses this, discuss with the class why the amount is doubled and if this could look similar to multiplying by whole numbers.
- If a student has plugged incorrect numbers into the table, discuss what calculations the student used and where the errors may have occurred. Use questioning to help the student generate correct conclusions and allow him to correct his response on the board.



5. Repeat the process for the next column; however, if students did not use more complex numbers for this one, prompt them to earn more stars by using fractional and decimal numbers. If students use fractional/decimal multipliers or dividends that produce the same ratios as another column, the answer will not be accepted. Allow students to go through this process and discuss why this occurs. See example below. Continue with the lesson until the table is completed. The interactive lesson will provide one more table before concluding.



