Using Ratio Tables to Solve Problems

Objective Use a ratio table and ratio reasoning to convert between units of measure.

Students know that a ratio is a comparison of two quantities that are somehow related. Ratios appear in many contexts, from speed (5 miles in 3 minutes) to recipes (3 cups of flour for every cup of water) to costs (5 dollars for 4 avocados) to measurements (1,000 meters to one kilometer). In this activity, students build on ratio knowledge to solve problems.

Some students may follow a process for solving problems involving ratios without understanding why the process works. By taking a given ratio and using ratio tables to "build" the information they need to find, students are able to reason quantitatively, apply their reasoning to solve meaningful problems, and explain their solutions. These skills will be useful later as students solve problems involving such concepts as identifying proportional relationships and solving multi-step percent problems.

Step by Step 10–15 minutes

1 Create a new linear unit.

- Have the student make up a name for an imaginary unit of linear measure (e.g., blips).
- Explain that he will use the imaginary unit to examine relationships among units.

2 Create a conversion ratio.

- Help the student make up a conversion ratio from the new unit of measure to a standard unit of measure.
- Tell him to imagine that 5 blips is equal to 2 inches.

3 Complete a ratio table.

- Demonstrate how to format the table to show equivalent units. Fill in the row for blips as shown below.
- Ask: *Since 5 blips is equivalent to 2 inches, how many inches is 10 blips? How are 5 and 10 related?* (Since 10 is 5 doubled, you need to double 2.)
- Help the student fill in more pairs of values. Be sure to include a unit rate.

Blips	5	10	20	2.5
Inches	2	4	8	1

4 Model using the table.

- Model how to convert from one unit to the other using the numbers in the table.
- As you point to the table, say: *Since 12 inches is 3 groups of 4 inches, 12 inches is also equal to 3 groups of 10 blips, or 30 blips. What other ways could you use this table to find how many blips equal 12 inches?*

5 Practice converting units.

- Give the student several other measurements to convert from one unit to the other.
- Ask: *How many inches are equal to 50 blips? How many blips are equal to 3 inches? 5 inches?*
- Say: *Explain how to use your table so that another student could make these conversions, too.*

Check for Understanding

Present the following problem to the student: Hannah can fold 8 paper airplanes in 6 minutes. How many paper airplanes can Hannah fold in 15 minutes? Encourage the student to make a table to help solve the problem. (20 paper airplanes)

For the student who struggles, use the chart below to help pinpoint where extra help may be needed.

If you observe…	the student may…	Then try…
the student has difficulty making basic entries in the table, such as doubling the given ratio	not understand the relationship between equivalent ratios.	asking the student leading questions, such as, "What if you double the number of minutes to get 12 minutes? What happens to the number of planes?"
the student has difficulty finding a unit rate for the table	not understand that the given ratio can also be divided.	drawing a model of the problem and asking how many of the airplane units are equal to one minute, and vice versa.
the student has difficulty constructing the number needed from the numbers that are in the table	have difficulty with basic computational fluency.	having the student first identify the relationship among the given numbers in the table, for example, determining if they are multiples or factors of one another.