

**Standards:**

6.RP.A **Understand ratio concepts and use ratio reasoning to solve problems.**

7.RP.A **Analyze proportional relationships and use them to solve real-world and mathematical problems.**

(With extensions) **8.EE.B.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph.

(With extensions)**HSF.IF.C.7.D (+)** Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

**Math Practice Standards:**

**CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.**

**CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.**

**CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.****CCSS.MATH.PRACTICE.MP4 Model with mathematics.**

Thinking Strategy Foci:

#### Questioning

#### Creating a Mental Model

Proportional Reasoning

Proportional reasoning is such an important yet complicated area of study for students. See the web below for an illustration of the interconnected concepts of proportional reasoning. This lesson helps students practice proportional reasoning to make decisions. It should be taught after students have had some experience with proportional reasoning.

**Hook: (3 minutes)**

Display the “Which table for pizza?” prompt on the board. Read the prompt aloud.

**Follow-Up**

The next day, allow students to solve the “Which table for pizza?” problem and share their thinking.

**Debrief: (10 minutes)**

Lead a group discussion about the techniques and strategies that were used. Point out when students Created Mental Models to help solve and communicate. Remind students that they will use this reasoning tomorrow to solve the “Which table for pizza?” problem.

Ask students to answer on an index card:

* How did asking questions help you to solve these problems?
* How did creating a mental model hep you to solve these problems?

**Work Time: (30 minutes)**

Give students 5 minutes to think INDIVIDUALLY about the problems listed on the problem page. Help struggling students to ask questions.

2 Rules: NO LONG DIVISION and NO CROSS-MULTIPLYING!

Number students (the technique will vary depending on the number of students) so that 2-3 students are assigned to work on a specific problem. (Note: Since there are only 5 problems, you could have 2 or 3 groups of the 5 problems…i.e. A1, A2, A3, A4, A5, B1, B2, B3, B4, B5 for rotations later.)

Ask them to put up solutions to their problem, SHOWING THEIR PROPORTIONAL REASONING. Then, have them rotate to the next poster and add something to the poster (a technique for reasoning, a picture, equation, graph, etc.) or ask a question on the poster.

**Mini-Lesson: (10 minutes)**

Explain to students that the work they do today will help them to be able to answer that question with confidence.

Model a think-aloud focusing on Questioning with the prompt. Model types of questions that expert math thinkers ask, such as “I wonder which table would allow me to eat more pizza? I wonder how I could figure out how much pizza I’ll get at each place? Should I think in terms of fractions, or slices? What do I need to find out to help me decide?”

Remind students of tools/methods they’ve used in the past to reason proportionally.