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| **Sample of Highly Effective Lesson Plan using LES model**  **Pizza Lesson – Investigation 2.2** |
| **Focus Standards:** Understand ratio concepts and use ratio reasoning to solve problems.  [**CCSS.Math.Content.6.RP.A.1**](http://www.corestandards.org/Math/Content/6/RP/A/1/) Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example:*   * *The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.* * *For every vote candidate A received, candidate C received nearly three votes.*   [**CCSS.Math.Content.6.RP.A.2**](http://www.corestandards.org/Math/Content/6/RP/A/2/) Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.  *For example:*   * *This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar.* * *We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger.*   Analyze proportional relationships and use them to solve real-world and mathematical problems.  [**CCSS.Math.Content.7.RP.A.1**](http://www.corestandards.org/Math/Content/7/RP/A/1/) Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.  *For example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour*.  **Math Practice Standards:**  *Math Practice 4:* *Model with Mathematics.*  I can apply the mathematics I know to solve problems in everyday life.  *Math Practice 8:* *Look for and express regularity in repeated reasoning.*  I can notice if calculations are repeated, and look both for general methods and for shortcuts.  *Math Practice 6: Attend to precision.*  I can be precise when solving problems and communicate my ideas clearly.  **Learning Targets:**   * How do we compare ratios? * How do we make meaning of ratios?   **Criteria for Success:**   * I can use multiple strategies to compare proportional relationships. * I can make sense of ratios in terms of proportional relationships. |

| **Time/Purpose** | **Sharing Pizza Activity** | **Materials** |
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| **5-10 min**  Engage learners in learning goals without giving the math away  **20 – 25 min**  Student engaging in thinking and productive struggle  **15 – 20 min**  Mathematics discourse to make connections for all learners | Math Practice Standards:   * *Math Practice 4:* *Model with Mathematics.* I can apply the mathematics I know to solve problems in everyday life. * *Math Practice 8:* *Look for and express regularity in repeated reasoning.* I can notice if calculations are repeated, and look both for general methods and for shortcuts. * *Math Practice 6: Attend to precision.* I can be precise when solving problems and communicate my ideas clearly.   Learning Targets:   * How do we compare ratios? * How do we make meaning of ratios?   Criteria for Success:   * I can use multiple strategies to compare proportional relationships. * I can make sense of ratios in terms of proportional relationships.   (*Refer to learning targets poster and unpack with students. Unpack them a little more in depth on this first day to really delve into what they mean*.)  **Launch**: *It’s lunch time at MathLab™ and pizza has been ordered. The dining room/cafeteria has two kinds tables.*   * *The large table seats ten people.* * *A small table seats eight people.*   *When the pizzas arrive, four pizzas are put on each large table and three pizzas are put on each small table.*  *Which table would you sit at?*  Tell students that you will read this prompt twice (three times?) and have them take out a piece of blank paper and create a visual description of what is being read. Assumedly, there will be some sort of representation of pizzas, people, and tables. Ask students to circle the table *they* would choose to sit at. Have students “Lightning Share” out and gather data from class whether *they* would choose to sit at the large or small table. Record.  **Explore:**  *Are we really getting pizza?*  *Suppose the pizzas are shared equally by everyone at the table. Does a person sitting at a small table get the same amount as a person sitting at a large table? How do you know? Justify your reasoning with a model.*  Have students make a formal conjecture in favor of the large or small table on a piece of anchor paper and build a model to justify their thinking.  OR what if they had to build/cut pizzas out of colored paper/cardstock and manipulate to ensure that everyone gets equal shares and share their models with other tables (or the teacher room?).  OR what if they had to do ALL OF THIS?  **Follow up:** *Miss Tina thinks she can decide at which table a person gets the most pizza. She uses the following reasoning:*  *10-4= 6 and 8-3 = 5 so the large table is better.*   * *What does the 6 mean and what does the 5 mean in Miss Tina’s method of reasoning?* * *Do you agree with Miss Tina’s reasoning? Why or why not?*   *Suppose the number of pizzas changes at the large table. For example, what if we decide that 9 pizzas will be sitting at this will be on the large table. How does that change your conjecture?*  The ratio of large tables to small tables in the dining hall is **8 to 5**. There are exactly enough seats for the 240 attendees at MathLab™. How many table of each kind are there? What fraction of the participants sit at a small table? What fraction of the participants sit at the large table? How can you model this relationships on a number line? Modify so that numbers are relevant to the population/situation at that MathLabTM.  **Consider*:*** *Some students will only consider one value (pizza or people) with their reasoning as in they will sit at the large table because there is more pizza or the small table because there are fewer people. So ask:*   * *What if one table and 30 people and 5 pizzas and another had 5 people and 4 pizzas? Would you always choose the table with the most pizza?* * *What if one table had 10 people and 5 pizzas and another had 3 people and 1 pizza? Would you always choose the table with the fewest people?*   **Summary:** *Students will finalized their thinking/models on an Anchor Chart.*   * *Groups will work for about 20 minutes creating their Anchor Charts and constructing their arguments to defend their models.* * *Groups then pair up with their “Shoulder Group” and look at each other’s work (****switch*** *Anchor Charts). Encourage the students to attend to precision with their MATH LANGUAGE and descriptions and arguments.* * *Students will then critique the reasoning of the other group using the Critiquing Table Tents. Students will put their thinking on a post-it on the Anchor Chart.* * *After critiquing, students will choose one problem to put a “star” on that they think should be shared out.* * *The Shoulder Groups switch back Anchor Charts. Then, each group will share their critiques/questions, and the other group will defend their thinking.*   Have students share out with the learning targets in mind. Push to think about the math.  **Exit Ticket:**  *Provide students with something decontextualized (comparing ratios, ordering, etc.). A good example can be taken from Comparing and Scaling, p.40, “Order the following fractions from least to greatest: 8/11, 9/12, 11/14”.* | Anchor paper  Other tools such as cardstock, rulers, compasses, scissors, etc.  Blank paper  Document with these prompts/questions |