Overall Expectation:

- demonstrate an understanding of relationships involving percent, ratio, and unit rate (Gr. 6)
- demonstrate an understanding of proportional relationships using percent, ratio, and rate (Gr. 7)

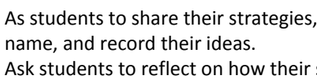
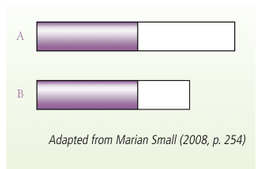
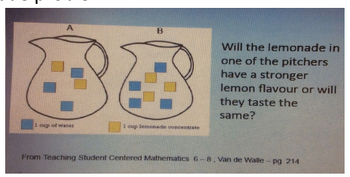
Specific Expectations:

- represent ratios found in real-life contexts, using concrete materials, drawings,and standard fractional notation (Gr. 6)
- determine and explain, through investigation using concrete materials, drawings, and calculators, the relationships among fractions, decimal numbers, and percents (Gr. 6)
- represent relationships using unit rates (Gr. 6)
- determine, through investigation, the relationships among fractions, decimals, percents, and ratios (Gr. 7)
- demonstrate an understanding of rate as a comparison, or ratio, of two measurements with different units (Gr. 7)
- solve problems involving the calculation of unit rates (Gr. 7)

Big Ideas

- Proportional thinking compares two related quantities in a multiplicative relationship.
- A number tells how many or how much.
- Classifying numbers or numerical relationships provides information about the characteristics of the numbers or the relationship.
- Number benchmarks are useful for relating numbers and estimating amounts.
- There are many algorithms for performing a given operation.

Source Marian Small

Learning Experience 1	Learning Experience 2	Learning Experience 3	Learning Experience 4	Learning Experience 5
LEARNING GOAL: We can recognize proportional thinking in problem solving. Use a **problem solving** task to activate prior knowledge.	**LEARNING GOAL:** We can apply multiplicative thinking to solve problems. **Guide** students through an investigation to explore the idea of absolute versus relative thinking.	**LEARNING GOAL**: We can use fractional benchmarks to think proportionally. **Direct** students through an investigation to establish proportional thinking with open tasks.	**LEARNING GOAL: We can use unit rate to solve proportional reasoning problems.** **Guide** students through an investigation involving unit rate and proportional reasoning.	**LEARNING GOAL: We can apply proportional thinking to produce a piece of artwork.** Students will **consolidate** their learning about proportional thinking and how it relates to various mathematical strands, concepts, or big ideas. Time must be given outside of math block to allow students to find a candy bar wrapper.
Minds On: Look at this image. Think about what you see. Turn and talk to your elbow partner about what you see.  Source: *Paying Attention to Proportional Reasoning, p.5* [Partner and Whole Group, 10 minutes] **Action:** **Which shape is more purple?**  Source: *Paying Attention to Proportional Reasoning, p. 3* Review co-constructed criteria for problem solving and working collaboratively. Ask students to meet with a partner and verify their conjectures. Have a variety of manipulatives available (E.g. rulers, fraction strips, calculators, etc.). [Think, Pair, Share, 5 minutes] Discuss students' conjectures by setting up a value line (pg. 154). Pairs of students need to select which area has more purple. Students will need to defend their position when asked,, "Which shape is more purple?" ● As students to share their strategies, note name, and record their ideas. ● Ask students to reflect on how their strategy was the same and/or different. ● Ask if any student wishes to move to the other end of the value line, signifying a change in their thinking.	**Minds On:** **If one dog grows from 5 kg to 8 kg and another dog grows from 3 kg to 6 kg, which dog grew more?** Source: *Paying Attention to Proportional Reasoning, p.5- 6* Using Think-Pair-Share, students will compare the growth of the two different dogs. Ask students to explain their thinking. Record initial responses on anchor chart of students' additive and multiplicative thinking. [Think-Pair-Share, 10 minutes] **Action:** Review learning goal and co-constructed criteria for problem solving and working collaboratively. Have students work with a partner to solve the lemonade problem.  Source: *Teaching Student Centered Mathematics 6 - 8,* Van de Walle, pg. 214. [Partners, 20 minutes] **Consolidation:** Conduct a Gallery Walk. Ask students to reflect on which pairs used similar and different strategies. Ask: ● What solutions showed additive thinking? Which solutions showed multiplicative thinking? ● What is a question you may have about another group's work? ● What strategy did you find most efficient?	**Minds On:** Have students work with a partner to solve the following. *Students should estimate how many rods they would need before beginning the task* ***If the table is 6 orange Cuisenaire rods long, how long would it be if measured using a different coloured rod?*** Adapted from *Paying Attention to Proportional Reasoning, p.9* Have pairs of students record their findings on paper, journal, whiteboard, Explain Everything, etc. Ask them to think about the relationship between the rods they have chosen? Click here for a hand out of the question above. [Partners, 10 minutes] **Action:** Review learning goal. Give pairs of students Cuisenaire rods. Allow them to manipulate them and come to some understanding of them as individual rods and their relationship to other rods. After a few minutes of "play," challenge students with the following questions: ● If the yellow rod is worth 5, what are the other rods worth? ● Now the light green rod is worth 15, what are the other rods worth? ● If the orange rod is worth 1, what is the yellow rod worth? (1/2) ● Choose a value for the purple rod. What are the other rods worth? *Source: We think from Marian Small* Debrief after each question and have students share their representations using a document camera or mirroring. [Individual, Whole Group, 15 minutes]	**Minds On:** Kellie says that if 3 apples cost her $1.50, then she should be able to buy 9 apples for $5.00. Is she correct? Discuss and display various strategies that pairs of students used to find a solution. Record specific strategies. Teacher should highlight the idea of **unit rate.** [Partner and Whole Group, 10 minutes] **Action:** Review learning goal. Have students work with a partner to solve the following problem. **The rates for Internet use offered by three companies are shown below.** ● **Company A: $6.00 for every 90 minutes of use** ● **Company B: $2.75 for every 45 minutes of use** ● **Company C: $3.00 for every 60 minutes of use** **Which company offers the lowest rate per minute?** Source: *Paying Attention to Proportional Reasoning, p.13* [Partners, 10 minutes] **Consolidation:** Facilitate a discussion using selected work. Have pairs of students show their thinking and explain their strategy. Ask: ● Convince us that your strategy led to a reasonable solution. ● Are there any strategies related? ● Which strategy is efficient and effective for you? ● What have you discovered about proportional thinking while solving this problem?" Review learning goal and add new ideas.	**Minds On:** **Review** the learning goal. Ask students to revisit their math journals and anchor charts and recall new concepts learned this week about proportional thinking. [Think, Pair, Share, 10 minutes] **Action:** Students will work individually to enlarge or decrease their candy bar wrapper on a self-created grid to show their proportional thinking. Using a standard 1 cm x 1 cm grid acetate to cover their candy bar wrapper will give students a starting point. Students will need to select appropriate sized paper to create a new proportional drawing of the wrapper. As they begin this activity, they should be thinking about why this is a proportional thinking problem. [Individual, 35 minutes. More time will be needed during art blocks to finish their product] **Consolidation:** Ask students ● "Why is the Candy Bar Problem a proportional thinking problem?" ● "How did you use proportional thinking in your drawing?" ● "What is the thing you liked best about this week in Math class?" *Adapted from Capacity Series, p. 5* ● "What was the hardest part of this week in Math class?" *Adapted from Capacity Series, p. 5* Students should reflect on these questions using Show Me or Explain Everything App, video or iMovie, or writing in Math journal. They need to use specific details in their reflections. [Individual, 15 minutes]

[Think, Pair, Share and Discussion, 10 -15 minutes] Consolidation**:** Ask: ● What did proportional reasoning look like today? ● What strategies did you use today to help you solve these problems? Record information on anchor chart. After class discussion, have students record their thinking in their math journal. This can be done using a book or digital app, like Explain Everything or Show Me. [Individual, 15 minutes]	Review learning goal and add new ideas or vocabulary words to anchor chart. [Whole group, 15 minutes] Exit Ticket: Parallel Task Which group had a greater significant change? Group A: A group of 3 children growing to 9 children. Group B: A group of 100 children growing to 150 children. Source: *Paying Attention to Proportional Reasoning, p.3.* OR Which group had a greater significant change? Group A: A group of 3 children growing to 9 children. Group B: A group of 5 children growing to 10 children. [Individual, 10 minutes]	**Consolidation:** Have each group of students partner with another group reflecting upon similar and different strategies and or/rods used. Ask: ● Which one-color rod combinations matched the length of the orange rod? ● How did you determine the fractional part that each of these color rods represented in relation to the whole? ● Which rods were the easiest to figure out? The hardest to figure out? Explain. ● What patterns or relationships did you discover between the rods? Adapted from *The Super Source, Cuisenaire Rods (Gr. 7-8); Yack in the Box* Review learning goal and chart new ideas. [Small Group & Whole Group, 15 minutes] **Exit Ticket:** "Where do you see problems similar to this? At home? At school? Outside?" Source: Capacity Building Series, Asking Effective Questions, p. 4. "What challenges are you still facing with proportional reasoning?" [Individual, 10 minutes]	[Whole Group, 15 minutes] **Exit Ticket:** Choose a price for four cinnamon buns. Then choose a different number of cinnamon buns and tell how much that new number of buns would cost. Justify your answer is correct. Source: *Good Questions Great Ways to Differentiate Mathematics Instruction,* Marian Small, p. 46. *Students can use a paper handout (link above), Explain Everything or another digital tool to record their thinking. Students should annotate their solution, by referring to the problem solving success criteria. [Individual, 10 minutes]	
