**Comparing Fractions**

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| In this lesson, students solve problems involving fractions and use various models to compare fractions. Students focus on the importance of using the same whole when comparing. |

**NC Mathematics Standard:**

**Number and Operations- Fractions**

**NC.4.NF.2** Compare two fractions with different numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions by:

* Reasoning about their size and using area and length models.
* Using benchmark fractions 0, ½, and a whole.
* Comparing common numerator or common denominators.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

**Student Outcomes:**

* I can compare fractions using a variety of strategies including benchmark fractions, common numerators, or common denominators.
* I can justify fraction comparisons by using various methods including visual models, number lines, and reasoning.

**Math Language:**

* compare
* fraction
* equivalent
* denominator
* numerator

**Materials:**

* fraction tiles
* grid paper
* student handout (1 per student)
* presentation slides

**Activity 1**

**Launch:**

1. Introduce the Problem (5 minutes)

Read the task with students.

 *On March 17, the teachers will celebrate St. Patrick’s Day with a party after school. The teachers will dress in green, play games, and eat green refreshments. The refreshments will include veggies, cupcakes, cookies, and green punch.*

 *Ms. Hasty is responsible for bringing the punch to the party. The punch recipe calls for ¾ of a Liter of ginger ale soda and 2 gallons of green Kool-Aid. At Walmart, Ms. Hasty found six different brands of ginger ale on sale. Which brand of ginger ale should Ms. Hasty buy to have enough ginger ale for the punch recipe?*

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| --- | --- |
| **Brand** | **Size of Container** |
| Seagram’s | 2/4 of a Liter |
| Canada Dry | 6/8 of a Liter |
| Schweppes | 5/6 of a Liter |
| Vernors | 11/12 of a Liter |
| Zevia | 7/12 of a Liter |
| Shasta | 3/7 of a Liter |

**Explore:**

1. Solving the Problem (15 – 30 minutes)

Tell students that today they are going to solve this problem in partners. Assign partners and hand out materials. Give students time to work with their partners to solve the problem. As students work, observe students to see how they are solving the problem. Encourage students to share their strategies with one another and describe how they are solving the problem.

As students work, observe:

* How are students interpreting and understanding the problem?
* How are students organizing and representing their thinking?
* How do students make sense of the fractions?
* How do students determine the containers that would match or exceed ¾ of a Liter of soda?
* What strategies do students use in order to solve the problem? (visual models including pictures or number lines, common denominators, common numerators, benchmark numbers, close to 1 strategy)
* How do students compare the fractions? Do they consider the same whole?

*Note: As students are solving the task, they will notice that there is more than one brand that would give them enough ginger ale. Several brands will leave Ms. Hasty with extra amounts of ginger ale. Only one brand, Canada Dry will give Ms. Hasty the exact amount that she needs.*

Purposefully select students to present to the class. Look for students who modeled the problem in different ways that demonstrate reasoning and understanding. Look for students who can explain solutions or generate great discussion for others to build on and move toward a deeper understanding of fraction comparisons. Also, look for examples of students who can prove their reasoning with visual models or drawings. Consider in which order strategies should be shared in order to move everyone’s thinking forward.

**Discuss:**

1. Sharing Strategies (15-20 minutes)

Bring the group back together and have the selected students share their strategies for solving the first problem.

Possible points to address:

* Discuss how students are making sense of the numbers.
* Discuss various modeling strategies (particularly those strategies that focus on the size of the whole).
* Discuss different strategies related to comparing fractions.
* Compare different strategies, discussing similarities between the strategies.

As students share, draw attention to the strategies used, referring to and summarizing today’s learning targets.

Activity 2:

**Launch:**

* + - 1. Introduce the second task to students. (5 minutes)

*At the party, Ms. Hasty and Ms. Marley each ate ½ of a cookie. Ms. Hasty said they both ate the same amount, but Ms. Marley disagreed. She thought they ate different amounts. Could they both be correct? Explain your thinking in words, pictures, and numbers.*

**Explore & Discuss:** (15-30 minutes)

* + - 1. Give students time to work with their partner to solve the problem. Observe to see if students are reasoning about the whole and the size of the cookies. Select a few strategies to share with the group.
			2. Call students to share in the selected order. As students share, ask questions to promote discussion of the mathematics.

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| Sample Questions | Possible Responses or Sentence Frames |
| * According to this model, which teacher is correct?
 | * “According to the model, \_\_\_\_\_ is correct because the model shows \_\_\_\_\_\_.”
 |
| * How does this model relate to what (student’s name) said?
 | * “The model relates to what \_\_\_\_\_\_\_ said because \_\_\_\_\_\_\_\_\_.”
 |
| * Could both teachers be correct? Why?
 | * “Both teachers could be correct. Both ate the fraction ½. However, they could have eaten ½ of different sized cookies, which would make their shares different sizes, even though they have the same name.”
 |

* + - 1. Revisit the learning targets. To summarize today’s lesson, ask students to write in their math journals to answer these questions: What strategies help you compare fractions? What is important to remember when comparing fractions?

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Observe students while working on activity 2 and review students’ journal reflections.

**Formal Evaluation/Exit Ticket:**

* Students complete the Comparing Fractions Exit Ticket.

**Meeting the Needs of the Range of Learners:**

**Interventions:**

* Some students may need manipulative support such as fraction tiles to help with comparisons.

**Extensions:**

* Give students a similar scenario with the Kool-Aid needed for the recipe.

Example: Each Kool-Aid packet makes ⅔ of a gallon. Will Ms. Hasty have enough if she purchases 2 packets of Kool-Aid?

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| * Students may compare only the numerators when comparing the fractions.
* Students may use two area models to shade fractions for comparison. However, they may not make the wholes, or parts within, the same size.
 | * Give students concrete models to see that the number of parts in the whole is important.
* Show students a small and large drink cup. If I drink half each would I have drunk the same amount? Use this and other scenarios to emphasize the importance of the having the same size whole.
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**Possible Solutions:**

**Activity 1:** Students could select any of these three brands for Ms. Hasty to purchase.

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| Canada Dry | 6/8 of a Liter |
| Schweppes | 5/6 of a Liter |
| Vernors | 11/12 of a Liter |

**Activity 2:**

Ms. Hasty and Ms. Marley could both be correct. If the whole cookie was the same size and each ate ½, then both would have eaten the same amount. However, they could have eaten different amounts if the cookies were different sizes. Eating half of a small cookie would be less than eating ½ of a large cookie.

**St. Patrick’s Day Party: Part 1**

On March 17, the teachers will celebrate St. Patrick’s Day with a party after school. The teachers will dress in green, play games, and eat green refreshments. The refreshments will include veggies, cupcakes, cookies, and green punch.

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**St. Patrick’s Day Party: Part 2**

At the party, Ms. Hasty and Ms. Marley each ate ½ of a cookie. Ms. Hasty said they both ate the same amount, but Ms. Marley disagreed. She thought they ate different amounts. Could they both be correct? Explain your thinking in words, pictures, and numbers.

**Comparing Fractions**

**Exit Ticket**

Compare the following fractions using pictures, words, or numbers.

$\frac{5}{6}$ $\frac{2}{8}$ $\frac{7}{12}$ $\frac{4}{10}$

Which fraction is greatest? \_\_\_\_\_\_\_\_\_

Which fraction is least?\_\_\_\_\_\_\_\_\_

What strategies did you use to compare the fractions?