

Fraction Matcher Scaffolding Lesson

Pre-Planning

Learning Goals

Students will be able to...

- Describe what the =, <, and > symbols represent in relation to equivalent fractions and inequalities.
- Compare and contrast horizontal and vertical number lines and represent fractions on a number line diagram to show understanding of their values in relation to one another.
- Understand how to demonstrate the word equivalent as it describes fractions.
- Apply and extend previous understandings of multiplication and division to recognize and generate equivalent fractions.

Standards

(from <http://www.corestandards.org/Math/>)

Develop understanding of fractions as numbers.

CCSS.MATH.CONTENT.3.NF.A.1

Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.

CCSS.MATH.CONTENT.3.NF.A.2

Understand a fraction as a number on the number line; represent fractions on a number line diagram.

CCSS.MATH.CONTENT.3.NF.A.3.A

Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

CCSS.MATH.CONTENT.3.NF.A.3.B

Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$. Explain why the fractions are equivalent, e.g., by using a visual fraction model.

CCSS.MATH.CONTENT.3.NF.A.3.C

Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram.*

CCSS.MATH.CONTENT.6.NS.C.6.C

Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Curriculum Alignment

Prior Knowledge

Students have completed the PhET Fraction Intro Lesson prior to this lesson. Student will have experience with Fractions (Grades 3-5). Most of the students will have seen fraction representations numerically in the form of a/b and as shapes in a previous math class but have not fully consolidated fraction number sense or vocabulary into their math abilities. Some of the students will have an understanding of fractions between 0 and 1 but less understanding of improper fractions and mixed numbers. *Students will come with varying levels of understanding of the relevant math vocabulary and symbols/pictures used in the sim; therefore, this lesson is developed as a scaffolding lesson, especially useful for English Language Learners/Emerging Bilinguals and students with learning or language support needs.*

Materials

Prior Lesson:

https://bayes.colorado.edu/dev/html/fractions-intro/1.0.0-dev.10/fractions-intro_en.html

PhET Fraction Matcher Sim:

https://phet.colorado.edu/sims/html/fraction-matcher/latest/fraction-matcher_en.html

Lesson Flow

Warm-Up

Estimated Time: 5-10 minutes

- Open Play using Fraction Matcher PhET simulation. Everyone will begin on level 1 and then differentiate afterwards (self-paced).
 - Set expectations: Students are to move the pictorial representations (fractions) onto the pans and record any observations and questions on the study notes section of the activity sheet. Suggest that they pay attention to the number line and any symbols ($=$, $<$, and $>$).

Guided Exploration and Discussion

Activity Sheet Question 1

Estimated Time: 5-10 minutes

- Complete the Student Notes at the top of the activity sheet, question 1: I notice/I wonder.
- Student partner talk: "Share what you noticed and wondered with a partner."

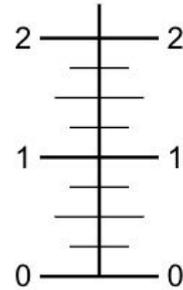
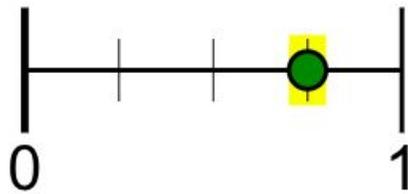
- Teacher facilitated share-out of partner observations and wonderings.
- Possible probing/pushing questions to facilitate exploration and understanding of vocabulary:
 - *What did you notice or wonder?*
 - *What can you do with the flat pans in the Fraction Matcher Sim?*
 - *When you found two fractions matching on the pans (equivalent), how did you know? How did you figure out which ones are equivalent?*
 - *Did you see number line in this sim? What did you notice about it?*
 - *Are there any math symbols that you know or that you do not recognize?*
 - *What do the colored bars on the number line mean? How do you interpret the lines between the numbers 0, 1 and 2 on the number line?*

Activity Sheet Questions 2-5

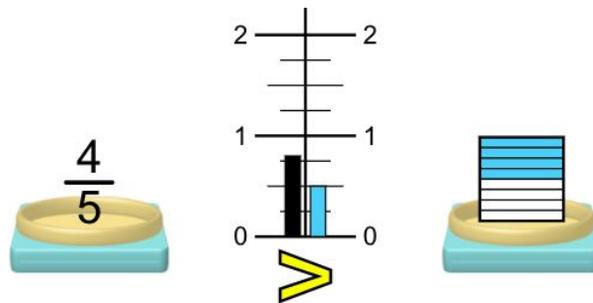
Estimated Time: 20-30 minutes



- How is this pictured item used in the sim?
- *What does = mean? How is it different than the “solution” or “answer” to a problem?*
 - *Clarify that = can mean one of many possible solutions (equal in value or amount) or an “answer.” In this sim, matching the fractions allows for one correct answer for each because there is only 1 possible solution that matches. However, there are multiple solutions for equivalent fractions. Therefore the = symbol does not always indicate only one “answer.”*
 - The yellow equals sign appears when “check” is selected and the 2 fractions are equivalent versus “the answer” or “solution” as experienced in prior grades (Grades 1-5).
- When you found > or < appear in the sim, what did that mean?
 - Describe what the yellow > (greater than) or < (less than) signs represent (and the orange “Try Again” signs) when “check” is selected and the 2 fractions are equivalent.
- Use the vocabulary of equivalent, numerator, and denominator as represented in the sim models as the number of shaded equal parts in relation to the total number of pieces respectively. (Include that larger denominators indicate smaller pieces.)
- What is similar or different with the following number lines from the Fraction Intro Sim and the Fraction Matcher Sim? (Use Same/Different diagram on the activity sheet.)



- Make sure students understand that number lines can be segmented differently by different denominators: for example, if you are looking at fifths, you will want 5 segments between the numbers (0 and 1). This does not mean five lines between the numbers, but five spaces. Many students confuse this, so time should be taken to review this. Notice in the sim that the number lines are only segmented into fourths for every fraction, so the bars go between the segments to indicate a fraction more than or less than fourths. In the example below on the right side, $\frac{4}{8}$ is shown as $\frac{2}{4}$ or $\frac{1}{2}$ on the number line. This is a great opportunity for discussion why this is so.



- Review applicable vocabulary: numerator and denominator. (Example of a tool to remembering their distinctions: **D**enominator---**D**own)
- Differentiate instruction by suggesting certain levels in the sim, if appropriate.

Additional open play

Estimated Time: 10-15 minutes

- Students will try a new level in the sim; this can be differentiated by suggesting appropriate levels as needed. As the levels increase, improper fractions are included.
- Have students pay attention to how the number line changes as they form fractions.

Follow-up Questions

Estimated Time: 5-10 minutes

- If two fractions are equivalent, what does the number line representation look like on the sim?
- If two fractions are *not* equivalent, what does the number line representation look like?
- What strategies help you match two fractions? How can you use these strategies to determine if $\frac{5}{8}$ and $\frac{10}{13}$ are equivalent?

Wrap Up

Estimated Time: 5 minutes

- What did you like about the sim activity?
- What do you wish would be different about it?
- Share with a partner a curiosity you had and explored on the sim today.

Exit Ticket

Estimated Time: 5-10 minutes

Exit ticket or performance assessment: Students will create a bookmark that provides key information learned throughout the lesson(s). This should include drawings/representations of vocabulary and fractional representations. Students will be able to use this as a study tool for later lessons/study. (See separate document.)

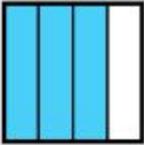
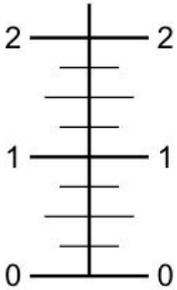
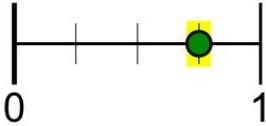
Going Forward

At differentiated levels in the sim, students will continue to practice making equivalent fractions that are less than 1 and mixed numbers/improper fractions greater than 1. They should also develop more proficiency with interpreting fraction bars on number lines and labeling fractions and mixed numbers/improper fractions on number lines.

Follow-up sim lessons:

1. [Exploring Equivalence with Rational Numbers: Part 1 Fractions less than or equal to 1](#)
2. [Exploring Equivalence with Rational Numbers: Part 2 Extending to Mixed Numbers](#)

Example for further practice with using number lines:

fraction	picture	Number line	Number line
$\frac{3}{4}$			
$\frac{5}{4}$		