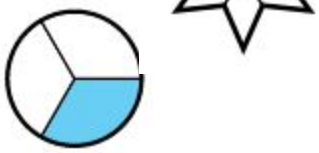
Exploring Equivalence with Rational Numbers: Part 1

Fractions less than or equal to 1



<table>
<tr><th colspan="3">TARGET GROUP(S): 4th Grade, 5th and 6th Grade Support</th></tr>
<tr><td rowspan="5">PRE-PLANNING</td><td colspan="2">PRIOR KNOWLEDGE</td></tr>
<tr><td colspan="2">This activity should <u>precede</u> the activity “Exploring Equivalence with Rational Numbers: Part 2 Extending to improper fractions” as it focuses on fractions less than 1 whereas Part 2 adds fractions greater than 1.

Students should understand that...
● Fractions can be represented through a variety of different representations including circle and rectangle models.
● There are quantities that are less than 1 and can be represented by a fraction whose numerator is less than the denominator.
● There are quantities that are greater than 1 which can be represented by improper fractions and/or mixed numbers.
● The numerator and denominator have specific meanings and are represented in models as the number of shaded pieces and the total number of pieces respectively.
● Equivalent fractions are fractions that represent the same amount and can have different numerators and denominators.

NOTE: If students do not have a solid understanding of the concepts above, you might consider beginning with some activities using the “Intro to Fractions” sim. (https://phet.colorado.edu/en/simulation/fractions-intro)</td></tr>
<tr><td colspan="2">LEARNING GOALS</td></tr>
<tr><td colspan="2">● Use ideas of fraction equivalence and ordering to: (CCSS: 4.NF)
i. Explain equivalence of fractions using drawings and models.
ii. Use the principle of fraction equivalence to recognize and generate equivalent fractions. (CCSS: 4.NF.1)
● Develop strategies for determining which representations of fractions are equivalent.</td></tr>
<tr><td>Common Core Standards</td><td>Common Core Practices</td></tr>
<tr><td>Different models and representations can be used to compare fractional parts.
a. Use ideas of fraction equivalence and ordering to: (CCSS: 4.NF)
i. Explain equivalence of fractions using drawings and models.
ii. Use the principle of fraction equivalence to recognize and generate equivalent fractions. (CCSS: 4.NF.1)</td><td>1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively (e.g. can go back and forth between visual models and formal fraction notation)
5. Use appropriate tools strategically
7. Look for and make use of structure</td></tr>
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<tr><td></td><td colspan="2">MATERIALS</td></tr>
<tr><td></td><td colspan="2">

PhET Fraction Matcher simulation: https://phet.colorado.edu/en/simulation/fraction-matcher
Computers/tablets for each student or pairs of students.
“Exploring Equivalence with Rational Numbers: Part 1 Fractions less than or equal to 1” Activity Sheet for each student.

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<tr><td rowspan="6">LESSON CYCLE</td><td colspan="2">WARM-UP</td></tr>
<tr><td colspan="2">Activate prior knowledge by having students journal about the following questions and then leading a whole class discussion in which they share their ideas.
1. What does it mean for two different fractions to be equivalent?
2. Write one example of equivalent fractions. For a challenge, write as many examples of equivalent fractions as you can.</td></tr>
<tr><td colspan="2">INTRODUCTION</td></tr>
<tr><td>Teacher will…</td><td>Students will…</td></tr>
<tr><td>

Distribute activity sheets
Point out that students will only be working in Levels 1 and 2 during this activity.
Give students time to explore Level 1 and write down their answers to Question #1.
Lead a whole class discussion about what students figured out about a) how to use the sim and b) strategies for knowing that fractions are equivalent. If students don’t seem to have solid strategies for knowing when fractions are equivalent, you may want to pause and spend some time reinforcing the basic prior understandings.

</td><td>Explore Level 1 of the Fractions screen.

Write down their answers to Question #1 on the activity sheet and discuss with a partner.

Participate in a whole class discussion about Question #1.</td></tr>
<tr><td colspan="2">GUIDED EXPLORATION</td></tr>
<tr><td>Teacher will…</td><td>Students will…</td></tr>
<tr><td>

Review question #2 through #6. Point out that before actually playing Level 2 students should answer Question #2 and then discuss their answers with their partner. Clarify any questions students may have about the questions and check that they understand the directions before letting them work independently.
Ask students to begin working.
As students work, circulate around the room to make sure they answer Question #2 and pair-share before they play Level 2.
Lead a discussion about Question #2a once most students have finished Question #2 and are ready to play or already playing Level 2. During the discussion, project the table for #2a and have students draw/describe a variety of representations for each fraction. Consider keeping this table with students’

</td><td>Open the Level 2 screen and complete question #2 before playing Level 2.

Before playing Level 2, discuss and compare answers for Question #2 with their partner.

Participate in a whole class discussion about Question #2a.

Play Level 2 and try to get 10 out of 12 points before moving ahead.

Once they achieve 10 out of 12 points on Level 2, student should go on to answer questions #3, 4, 5, and 6.</td></tr>
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<tr><td rowspan="4">LESSON CYCLE (cont)</td><td>representations for later use in the “Discussion” phase of the lesson.
● As students play Level 2, be available for questions and/or ask questions, such as:
If students are struggling...
1. Can different shapes/colors model the same fractions? (or Does the shape/color matter?)
2. How do you see the denominator in the model(s)?
3. How many pieces are shaded?
4. How do you see the numerator in the model(s)?
5. How can you know if two fractions are equivalent?
If students need extensions...
6. Was there a different equivalent representation you could have chosen for that fraction?</td><td>If students finish early, you might suggest that they try to go ahead and play higher levels. Ask them to think about what is the same and different in higher levels compared to Levels 1 and 2.</td></tr>
<tr><td colspan="2">DISCUSSION</td></tr>
<tr><td>Teacher will...</td><td>Students will...</td></tr>
<tr><td>● Prepare the class for a summary discussion of the big ideas:
o Equivalent fractions are fractions that represent the same amount and can have different numerators and denominators.
o Equivalent fractions are those fractions whose numerator and denominator are in the same ratio as that of the original fraction.
● Remind students to close their laptops or turn around so that the sim does not distract them from listening. Use an established teaching strategy such as popcorn discussion (one student answers, calls on the next student to talk), think-pair-share (pose question, allow time to think, turn and talk to partner), or group discussions (print out questions and have groups talk to each other and write down consensus to share aloud with class).
● Begin by discussing students’ answers to Question #2b,c,d (Note: you may consider recording students’ work using the table the</td><td>Participate in the whole class summary discussion</td></tr>
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LESSON CYCLE (cont)	table that was created earlier shwoing the variety of students' representations for #2a). Questions might include: 1. In question #2, were there some representations that confused you? What are they? What is confusing about them for you? 2. What relationships do you notice between the numerators and denominators of all the fractions in each column? (question #2c on activity sheet) 3. How do we know $\frac{3}{6}$ and $\frac{1}{2}$ are equivalent from their visual representations? 4. How do we know $\frac{3}{6}$ and $\frac{1}{2}$ are equivalent by just looking at their numerators and denominators? 5. How would you explain to another student why $\frac{3}{6}$ and $\frac{1}{2}$ are equivalent? 6. What are some other fractions and/or visual representations that are equivalent to $\frac{3}{6}$ and $\frac{1}{2}$ (ask several students and generate a long list to include fractions that don't appear in the sim). 7. What are some fractions that are equivalent to $\frac{2}{3}$? (make a long list). What relationships between the numerator and denominator are we using to make this list? *(start the discussion with this question if you feel students can jump write to it)* 8. How many different ways can we write $\frac{2}{3}$ using equivalent fractions? ● **Continue** the discussion by having students share their answers to #4,5,6.	
	SUMMARY	
	Teacher will… ● **Summarize** the discussion by asking more general questions such as: 1. What questions do you still have? 2. Did anyone *not* answer another question? Share out and call on someone who can answer it. 3. Who can explain how they know when fractions are equivalent? 4. What is your strategy for writing equivalent fractions? For example, if I ask you to write	*Students will…* **Participate** in the summary discussion.

LESSON CYCLE (cont)	fractions equivalent to ⅘, how would you do it.	
	EXIT TICKET	
	Teacher will… ● **Ask** students to draw at least two different fraction representations that are equivalent to each other and label each representation with the fraction it represents. ● **Alternatively,** you might choose to specify a specific fraction and ask students to draw and label two or more representations of fractions that are equivalent to the given fraction.	*Students will…* **Complete** and hand in the exit ticket.