Eureka Acceleration Tool: Grade 4
Module 5, Topic C

To become mathematically proficient, students **must** access on-grade-level content. This document aims to help teachers who use the Eureka curriculum to ensure readiness for students before and during on-grade-level work, creating opportunities for timely support directly connected to the new learning.

About this Topic

Focus Standards:
4.NF.A.2: Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. 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, e.g., by using a visual fraction model. (Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100.)

Topic Overview per the Eureka Curriculum

In Topic C, students use benchmarks and common units to compare fractions with different numerators and different denominators. The use of benchmarks is the focus of Lessons 12 and 13 and is modeled using a number line. Students use the relationship between the numerator and denominator of a fraction to compare to a known benchmark (e.g., 0, $\frac{1}{2}$, or 1) and then use that information to compare the given fractions. For example, when comparing $\frac{4}{7}$ and $\frac{2}{5}$, students reason that 4 sevenths is more than 1 half, while 2 fifths is less than 1 half. They then conclude that 4 sevenths is greater than 2 fifths.

In Lesson 14, students reason that they can also use like numerators based on what they know about the size of the fractional units. They begin at a simple level by reasoning, for example, that 3 fifths is less than 3 fourths because fifths are smaller than fourths. They then see, too, that it is easy to make like numerators at times to compare, e.g., $\frac{2}{5} < \frac{4}{9}$ because $\frac{2}{5} = \frac{4}{10}$, and $\frac{4}{10} < \frac{4}{9}$ because $\frac{1}{10} < \frac{1}{9}$. Using their experience with fractions in Grade 3, they know the larger the denominator of a unit fraction, the smaller the size of the fractional unit.

Like numerators are modeled using tape diagrams directly above each other, where one fractional unit is partitioned into smaller unit fractions. The lesson then moves to comparing fractions with related denominators, such as $\frac{2}{3}$ and $\frac{5}{6}$, wherein one denominator is a factor of the other, using both tape diagrams and the number line. In Lesson 15, students compare fractions by using an area model to express two fractions, wherein one denominator is not a factor of the other, in terms of the same unit using multiplication, e.g., $\frac{2}{3} < \frac{3}{4}$ because $\frac{2}{3} = \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$ and $\frac{3}{4} = \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$ and $\frac{8}{12} < \frac{9}{12}$. The area for $\frac{2}{3}$ is partitioned vertically, and the area for $\frac{3}{4}$ is partitioned horizontally.

To find the equivalent fraction and create the same size units, the areas are decomposed horizontally and vertically, respectively. Now the unit fractions are the same in each model or equation, and students can easily compare. The topic culminates with students comparing pairs of fractions and, by doing so, deciding which strategy is either necessary or efficient: reasoning using benchmarks and what they know about units, drawing a model (such as a number line, a tape diagram, or an area model), or the general method of finding like denominators through multiplication.

Eureka Acceleration Tool: Grade 4
Module 5, Topic C

Overview

Eureka Acceleration Tools include:

1. a diagnostic assessment to help teachers determine the misunderstandings or gaps in mathematical knowledge related to a specific Topic in the Eureka curriculum
2. guidance for teachers to analyze student work on the diagnostic assessment
3. suggested materials for targeted remedial instruction

Note: The use of this guidance is not intended to delay students' engagement with on-grade-level learning. On-grade-level learning should be the focus of instructional time and be treated as an opportunity for students to "finish" learning previous skills and deepen conceptual understanding.

Diagnostic Assessment

The diagnostic assessment is designed to be administered to targeted students prior to beginning instruction on the given Topic. When appropriate, it is broken into parts (Part A, Part B, and so on); each part addresses a different prerequisite standard and contains three problems. If a student correctly answers at least 2 out of the 3 problems, it can be assumed that he/she is ready to engage with the new content of the Topic with little to no support needed prior to engaging with the Topic. The diagnostic assessment is designed in this way so that teachers can determine the "entry point" to remedial instruction and/or opportunities for unfinished learning within the context of the new learning. The entry points and opportunities for unfinished learning will vary between students.

Guidance for Acceleration

The Acceleration Guidance is designed for teacher use. It is also broken into parts (Part A, Part B, and so on) and correlates to the parts on the diagnostic assessment. Each part contains the following:

1. **The focus standard**: The focus standards are strategically chosen to address prerequisite skills and are purposefully arranged in the order that students typically master the skills and knowledge.
2. **Why this is important for current grade level work**: This section describes how the work of the prerequisite standard relates to the standard(s) addressed in the Topic of instruction.
3. **Using the diagnostic assessment to identify gaps**: This section identifies common errors students make on the diagnostic assessment items.
4. **Acceleration Resources for Targeted Instruction**: The resources pinpoint specific Eureka lessons and parts of lessons for teachers to use to address gaps in mathematical knowledge. Using Eureka materials to address acceleration ensures alignment to the standards, consistency in approach to learning, and similarities in strategies for solving problems.

Part A: 3.NF.A.3a

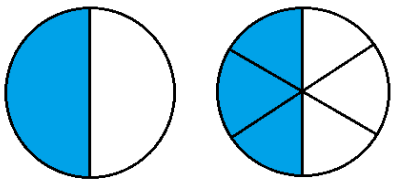
1. Is $\frac{1}{4}$ equivalent to $\frac{2}{8}$? Use visual fraction models to explain your thinking.

2. Is $\frac{1}{3}$ equivalent to $\frac{2}{3}$? Use visual fraction models to explain your thinking.

3. Is $\frac{1}{3}$ equivalent to $\frac{2}{6}$? Use visual fraction models to explain your thinking.

Part B: 3.NF.A.3b

4. Are the two fractions represented by the models below equivalent? Explain your thinking.



5. Generate two fractions that are both equivalent to $\frac{2}{4}$. Explain your thinking and/or justify your answers with visual fraction models.

6. Use a visual fraction model to show why $\frac{4}{6}$ and $\frac{2}{3}$ are equivalent. Explain your thinking.

Part C: 3.NF.A.3d

7. For the inequality $\frac{1}{2} > \frac{1}{4}$ to be valid, what must be true?

8. Complete the sentence with >, =, or <. Explain your thinking and/or justify your choice with a visual fraction model.

   $\frac{2}{6}$ _____ $\frac{5}{6}$

9. Complete the sentence with >, =, or <. Explain your thinking and/or justify your choice with a visual fraction model.

   $\frac{2}{6}$ _____ $\frac{2}{8}$

Solutions:

1. Yes. Models will vary but must show equal wholes.
2. No. Models will vary but must show equal wholes.
3. Yes. Models will vary but must show equal wholes.
4. Yes. Both show an equal amount of the same whole shaded. (sample)
5. $\frac{1}{2}$ and $\frac{4}{8}$ (sample)
6. Models will vary but must show equal wholes.
7. The two fractions must refer to the same whole.
8. <; If models are used as evidence, they must show equal wholes.
9. >; If models are used as evidence, they must show equal wholes.

Part A Focus: 3.NF.A.3a. Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 in special cases, and compare fractions by reasoning about their size.

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

Why this is important for current grade level work: The target topic focusses solely on comparing fractions with different numerators and different denominators. One method students will use for comparison is comparing each of the given fractions to a benchmark fraction such as ½, either by reasoning about their size or their location on the number line. Another method by which students will compare two fractions is by generating fractions equivalent to the given fractions with either a common numerator or a common denominator. In either method, it is imperative that students understand what it means for two fractions to be equivalent. This understanding will help students recognize equal fractions as well as understand why generating new fractions is an acceptable method for comparing fractions that does not change the value of either fraction in the comparison. The most important look-fors here are the accuracy of their response and visual fraction models.	**Acceleration Resources for Targeted Instruction:** 3rd Grade, Module 5, Topic E, Lesson(s) 20 - 21 Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set focused on conceptual understanding.
Using the Diagnostic Assessment to identify gaps: **Problems 1-3:** These problems are not designed to assess students' ability to compare fractions; rather, these problems are designed to assess whether students can create visual fraction models and use them to determine if two fractions are equal. As such, look for students who draw different sized models as this is a clear indicator the student is not ready for the grade-level work.	

Part B Focus: 3.NF.A.3b. Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 in special cases, and compare fractions by reasoning about their size.

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.

Why this is important for current grade level work:
Beyond understanding fraction equivalence, students will need to be able to readily recognize equivalent fractions and, more importantly, generate equivalent fractions for the purpose of comparing two fractions with different numerators and different denominators.

Using the Diagnostic Assessment to identify gaps:

Problem 4:
Look for students to explain that both models have the same amount of an equal whole shaded. A student does not need to create a number sentence for this problem to be considered ready for the target standard.

Problem 5:
Look for students to draw same-sized models that all show one-half of the model shaded.

Problem 6:
Look for students who misread the problem and simply try to compare the two given fractions. Reiterate for such students that the problem is asking for a justification, not a comparison. It is given that the two fractions are equivalent.

Acceleration Resources for Targeted Instruction:

3rd Grade, Module 5, Topic E, Lesson(s) 22 - 23

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set focused on conceptual understanding.

Part C Focus: **3.NF.A.3d.** Explain equivalence of fractions with denominators 2, 3, 4, 6, and 8 in special cases, and compare fractions by reasoning about their size.

d) Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

<table>
<tr>
<td colspan="2">Why this is important for current grade level work:
Comparing fractions with the same numerator or the same denominator sets the foundation for comparing fractions with different numerators and different denominators, the sole focus of the target topic. Visual models also set the foundation for comparing fractions with the general method of finding equivalent fractions later.</td>
<td rowspan="2">Acceleration Resources for Targeted Instruction:

<u>3rd Grade, Module 5, Topic F, Lesson(s) 28 - 29</u>

Use the Concept Development portion of each Lesson and a sampling of problems from the Problem Set focused on conceptual understanding.</td>
</tr>
<tr>
<td colspan="2">Using the Diagnostic Assessment to identify gaps:</td>
</tr>
<tr>
<td>Problem 7:
Students must understand that for a comparison to be valid each fraction must refer to the same whole. Furthermore, it is important that students understand that the denominator does not dictate the whole, only the number of parts that comprise a whole.</td>
<td>Problems 8-9:
Look for students who only compare the numbers that differ and treat them as whole numbers. This will be more evident in Problem 9 If a student thinks 2/6 is less than 2/8 because 6 is less than 8. Encourage the use of visual fraction models and look for models that show equal wholes.</td>
</tr>
</table>