Formative Assessment Lesson Plan - Grade 4 Mathematics Example

The formative assessment planning examples starting on page 4 outline questions teachers might consider as they develop tasks within a math lesson integrating the principles of formative assessment and support grade-level instruction for all students. Additionally, the template provides space for:

- Standards alignment
- Key concepts
- Connection to previous learning
- Connection to future learning
- Learning goals
- Success criteria

There are multiple examples outlined below, but educators may only need one piece of information for each to ground the formative assessment task in the grade level content.

NOTE: *These tasks would be embedded within a 60-minute Lesson on the Benchmarks listed below.*

STANDARDS ALIGNMENT

2007, current, Minnesota Math Standard & Benchmark(s) (NOTE: *The highlighted phrases and underlining indicate emphasis of the formative assessment tasks within the standard statements*.)

- **Standard: 4.1.2** Represent and compare fractions and decimals in real-world and mathematical situations; use place value to understand how decimals represent quantities.
- **Benchmark: 4.1.2.1** Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.

2022, future, Minnesota Math Standard & Benchmark(s)

- **Standard: 4.3.4 Number Relationships:** Describe/interpret and use quantities, relationships between and representations of quantities and number systems. Describe and relate operations. Use strategies and procedures accurately, efficiently and flexibly. Assess the reasonableness of the results.
- **Benchmark: 4.3.5.12** Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{n \times a}{n \times b}$ by using visual models, with attention on how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (MP3)

Common Core State Standards for Mathematics (**CCSS-M**) NOTE: *CCSS statements are the same grain size as MN benchmarks.*

- **Standard: 4.NF.A.1** Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

Key Concepts

Resources for using the K–12 Mathematics Standards Progression document to connect to prior and future concepts:

- Video – Representing fractions with models to identify and explain equivalencies
  The purpose of this lesson is for students to generate equivalent fractions using a representation that makes sense to them.
- Video – The Progression of Fractions in Minnesota Math Standards (including visual representations)

Connection to Previous Learning

In grade 3, students learned to recognize and generate simple equivalent fractions. In earlier lessons, they reasoned about the size of fractions and identified some equivalent fractions. Throughout those experiences, they used fraction strips, tape diagrams, number lines, and benchmark fractions to support their reasoning. The Progression of Fractions in Minnesota Math Standards video shows these connections.

Early Childhood Indicators of Progress (ECIPS):

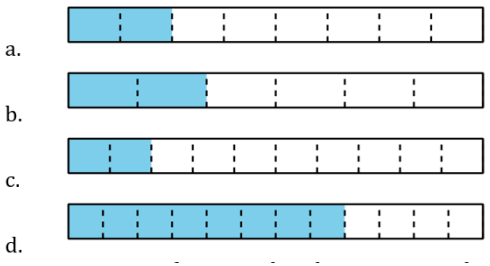
- 2–3 year old: (M7.4) Imitates using an object to measure another object.
- 4–5 year old: (M7.9) Compares and orders more than two items in some way. (M7.10) Uses comparison vocabulary (longer/shorter, taller/shorter, farthest/closest).
- Kindergarten: (K.3.2.1) Use words to compare objects according to length, size, weight and position. (K.3.2.2) Order two or three objects using measurable attributes, such as length and weight.
- 1st: 1.3.2.1: Measure the length of an object in terms of multiple copies of another object.
- 2nd: (Measuring – Benchmark 2.3.2.2): Demonstrate an understanding of the relationship between length and the numbers on a ruler by using a ruler to measure lengths to the nearest centimeter or inch.
- 3rd: (Unit Fractions – Benchmarks 3.1.3.1 & 3.1.3.2): (3.1.3.1) Read and write fractions with words and symbols. Recognize that fractions can be used to represent parts of a whole, parts of a set, points on a number line, or distances on a number line. (3.1.3.2) Understand that the size of a fractional part is relative to the size of the whole.

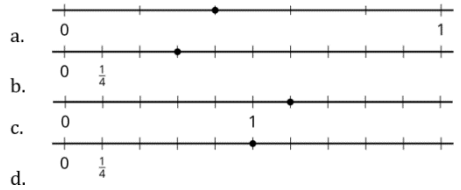
Connection to Future Learning

Based on The Progression of Fractions in Minnesota Math Standards video, the following connections were identified:

- **4th:** Benchmark 4.1.2.1 Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.
- **5th:** Benchmark 5.1.2.3 Order fractions and decimals, including mixed numbers and improper fractions, and locate on a number line.
- **6th:** Benchmark 6.1.3.2 Use the meanings of fractions, multiplication, division and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions.
- **7th:** Benchmark 7.1.1.5 Recognize and generate equivalent representations of positive and negative rational numbers, including equivalent fractions.
- **8th:** Benchmark 8.2.4.6 Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve such equations and inequalities and graph the solutions on a number line.
- **9th–11th:** Benchmark 9.2.2.6 Sketch the graphs of common non-linear functions such as $f(x) = \sqrt{x}$, $f(x) = |x|$, $f(x) = \frac{1}{x}$, $f(x) = x^3$ and translations of these functions, such as $f(x) = \sqrt{x-2} + 4$. Know how to use graphing technology to graph these functions.

Learning Goals *What will students learn by the end of the lesson? TIP: Use the Benchmark Achievement Level Descriptors.*	**Success Criteria** *What will students be able to do when they meet the learning goal? TIP: Use the Benchmark Achievement Level Descriptors.*	**Eliciting Evidence During Learning** *What learning tasks will students engage with to elicit evidence of learning? How will learning tasks be structured to show student learning as it develops during the lesson?*
Teacher Facing • Generate equivalent fractions using a representation that makes sense to students. **Student Facing** • Let's find some equivalent fractions.	**Does Not Meet** • Identifies fraction strips representing the same fractions **Partially Meets** • Identifies fraction circles representing the same fraction **Meets** • Uses fraction models (such as fraction strips, fraction circles, other manipulatives, and written descriptions) to determine equivalent fractions • Uses fully labeled number lines to plot equivalent fractions **Exceeds** • Interprets fraction models to identify multiple equivalent fractions • Determines equivalent representation of fractions plotted on a number line with minimal labeling	Source: © CC BY 2021 Illustrative Mathematics® The purpose of this warm-up is to elicit students' prior understanding of equivalence and strategies for comparing fractions. To determine equivalence, students may rely on familiarity with benchmark fractions, use fraction strips, or think about the relative sizes of the fractional parts. They may also use their knowledge about fractions with the same numerator or denominator. In any case, students have opportunities to look for and make use of structure (MP7). **Display one prompt at a time. Listen to and record student thinking.** **Warm-up: True or False: Equivalence** Decide if each statement is true or false. Be prepared to explain your reasoning. • $\frac{4}{8} = \frac{7}{8}$ • $\frac{3}{4} = \frac{6}{8}$ • $\frac{2}{6} = \frac{2}{8}$ • $\frac{6}{3} = \frac{4}{2}$ **Formative Assessment/Teacher-Led Synthesis** • If no students refer to a visual representation (a tape diagram or number line) to explain an equation such as $\frac{3}{4} = \frac{6}{8}$, ask how one of these representations could help with their explanation. • "For the pair of fractions that you know are not equal, can you tell which fraction is greater? How?" *****

Learning Goals *What will students learn by the end of the lesson? TIP: Use the Benchmark Achievement Level Descriptors*	**Success Criteria** *What will students be able to do when they meet the learning goal? TIP: Use the Benchmark Achievement Level Descriptors*	**Eliciting Evidence During Learning** *What learning tasks will students engage with to elicit evidence of learning? How will learning tasks be structured to show student learning as it develops during the lesson?*
		The purpose of this activity is to elicit strategies for finding equivalent fractions when the fractions are represented by tape diagrams or points on the number line. Students may reason in various ways, but here are two likely approaches: • partition given fractional parts into smaller equal-size parts and count the new parts (for instance, partitioning each 1 fourth into 3 parts and then counting the twelfths). • bundle given fractional parts into larger equal-size groups and count the new groups (for instance, bundling every 2 tenths to make 5 fifths in 1 whole and then counting the fifths). During this and upcoming activity syntheses, help students recognize regularity in their moves to find equivalent fractions. In future lessons, students will connect more explicitly how diagrams of equivalent fractions relate to a numerical process for generating them. They will relate the subdividing or grouping of fractional parts to the idea of using multiples and factors to find equivalent fractions. **Task: Two or More Fractions** 1. Each entire diagram represents 1 whole. Write two or more fractions that the shaded part of each diagram represents. Be prepared to explain your reasoning. 

Learning Goals *What will students learn by the end of the lesson? TIP: Use the Benchmark Achievement Level Descriptors*	**Success Criteria** *What will students be able to do when they meet the learning goal? TIP: Use the Benchmark Achievement Level Descriptors*	**Eliciting Evidence During Learning** *What learning tasks will students engage with to elicit evidence of learning? How will learning tasks be structured to show student learning as it develops during the lesson?*
		2. Write two or more fractions that the point on each number line represents. Be prepared to explain your reasoning.  3. Place a new point on a tick mark on one of the last two number lines (in part c or d). Then, write two fractions that the point represents. **Formative Assessment/Teacher-Led Synthesis** • **Advance Student Thinking:** Students label number lines using tick marks alone. For example, if 4 marks are visible (including zero) each line would be labeled as fourths instead of thirds. If this happens, consider using the idea of movement from 0 to 1. Ask: "Where is 1 on the number line?" "If we are moving from 0 toward 1, what does this tick mark between 0 and 1 mean?" Ask students to review the labels on their number lines and decide if revisions are needed before continuing to work on the next activity. • **Questions for Synthesis:** Select previously identified students to share how they found multiple equivalent fractions on the two kinds of representations. Display their work, or display the diagrams in the activity for them to annotate as they explain. • "How is the process of finding equivalent fractions using diagrams like the process of using number lines?" (They both involve partitioning given parts into smaller parts, or bundling the given parts into larger parts.)

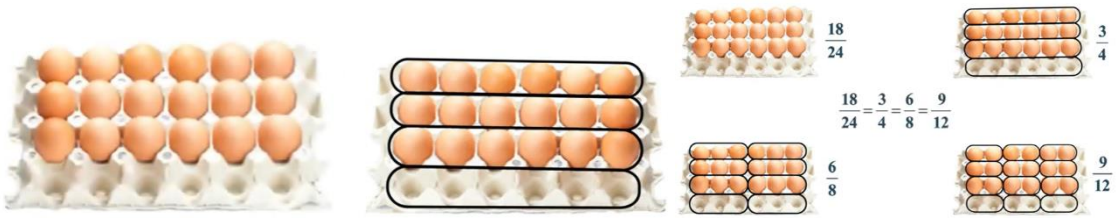
Learning Goals *What will students learn by the end of the lesson? TIP: Use the Benchmark Achievement Level Descriptors*	**Success Criteria** *What will students be able to do when they meet the learning goal? TIP: Use the Benchmark Achievement Level Descriptors*	**Eliciting Evidence During Learning** *What learning tasks will students engage with to elicit evidence of learning? How will learning tasks be structured to show student learning as it develops during the lesson?*
		• "How are they different?" (The length of a diagram usually is 1 whole or another whole number. A number line doesn't always show 1 whole, so we may have to figure out where it is first.) • If time permits: "Can you write other equivalent fractions for diagram _____?" • "How many fractions do you think you could write for that diagram?" (This prompts students to begin to realize that there are infinite equivalent fractions as the whole is partitioned into smaller parts.) ***** In this activity, students find equivalent fractions for fractions given numerically. They also work to clearly convey their thinking to a partner, which involves choosing and using words, numbers, or other representations with care. In doing so, students practice attending to precision (MP6) as they communicate about mathematics. **Task: Equivalent for Sure?** For each fraction, find two equivalent fractions. Partner A 1. $\frac{3}{2}$ 2. $\frac{10}{6}$ Partner B 1. $\frac{4}{3}$ 2. $\frac{14}{10}$

Learning Goals *What will students learn by the end of the lesson? TIP: Use the Benchmark Achievement Level Descriptors*	**Success Criteria** *What will students be able to do when they meet the learning goal? TIP: Use the Benchmark Achievement Level Descriptors*	**Eliciting Evidence During Learning** *What learning tasks will students engage with to elicit evidence of learning? How will learning tasks be structured to show student learning as it develops during the lesson?*
		Next, show or explain to your partner how you know that the fractions you wrote are equivalent to the original. Use any representation that you think is helpful. **Formative Assessment Task/Teacher-Led Synthesis** **FA Task: MLR7 Compare and Connect** • "Create a visual display that shows how you found two equivalent fractions for the second fraction on your list: for Partner A, 10/6, and for Partner B, 14/10." • "Include diagrams, notes, and any descriptions that might help others understand your thinking." Synthesis • "Take a few minutes to walk around and look at the work of at least 4 classmates. Make sure to look at the work by both partners, A and B." • "As you study others' work, pay attention to how the reasoning is alike and how it is different." • "What is the same about the diagrams, words, or explanations that you saw? What is different?"

Interpreting Evidence Considerations *Based on the content and students' current knowledge, what concepts and knowledge will support interpreting evidence?*	**Using Evidence During Instruction** *What will teachers (and students) do in response to evidence about students' progress? What instructional strategies might be used to support students' next steps in learning?*
Use the student response to the teacher-led synthesis questions to record and represent student thinking for the class. Use the questions to push all students to give evidence that meets or exceeds the success criteria. **Meets** • Uses fraction models (such as fraction strips, fraction circles, other manipulatives, and written descriptions) to determine equivalent fractions • Uses fully labeled number lines to plot equivalent fractions **Exceeds** • Interprets fraction models to identify multiple equivalent fractions • Determines equivalent representation of fractions plotted on a number line with minimal labeling	Use Math Language Routine #7 Compare and Connect In the Compare and Connect routine (MLR 7), **students make sense of mathematical strategies by relating and connecting other approaches to their own.** This routine can be used to support discourse around a problem that can be approached and solved using multiple strategies or representations. • Display 2 equivalent fractions side by side using tape diagrams and ask students "What is the same? What is different?" Connect their observations to strategies for knowing if fractions are equivalent. • Display 2 student representations (one number line and one tape diagram and/or circle representation) side by side. Ask students what is the same/different. Ask students to use these representations to determine if they represent equivalent representations.

Resources:

1. Open Resource Math Curriculum – Illustrative Mathematics at Kendall Hunt's Site. Grade 4, Unit 2 Lesson 7
2. MN Fraction Progression images for Benchmark 4.1.2.1



3. Benchmark Achievement Level Descriptors

Represent and compare fractions and decimals in real-world and mathematical situations; use place value to understand how decimals represent quantities. (4.1.2)

Benchmark	Does Not Meet *A typical student at this level of mathematics succeeds at few of the most fundamental mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**	Partially Meets *A typical student at this level of mathematics partially meets the mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**	Meets *A typical student at this level of mathematics meets the mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**	Exceeds *A typical student at this level of mathematics exceeds the mathematics skills of the Minnesota Academic Standards.* **Some of the skills typically demonstrated may include:**
4.1.2.1 **Represent equivalent fractions using fraction models such as parts of a set, fraction circles, fraction strips, number lines and other manipulatives. Use the models to determine equivalent fractions.**	Identifies fraction strips representing the same fractions	Identifies fraction circles representing the same fraction	Uses fraction models (such as fraction strips, fraction circles, other manipulatives, and written descriptions) to determine equivalent fractions Uses fully labeled number lines to plot equivalent fractions Released Examples: 245000, 242042, 244065	Interprets fraction models to identify multiple equivalent fractions Determines equivalent representation of fractions plotted on a number line with minimal labeling Released Examples: 43552, 43704, 244715, 245002, 245250, 245252, 245253, 245256, 245503, 245504

RESOURCES

- Illustrative Mathematics (IM) Lesson Use factors to find equivalent fractions
- Task Illustrative Mathematics – Explaining Fraction Equivalencies with Pictures
- Task Illustrative Mathematics – Fractions and Rectangles
- Grade-level Benchmark Achievement Level Descriptors – Benchmark Achievement Level Descriptor
- Fractions Progression video – The Progression of Fractions in Minnesota Math Standards
- Standards Progressions – K–12 Mathematics Standards Progression