MA.4.FR.1.4

Overarching Standard: ***MA.4.FR.1 Develop an understanding of the relationship between different fractions and the relationship between fractions and decimals.***

Benchmark of Focus

MA.4.FR.1.4: Plot, order and compare fractions, including mixed numbers and fractions greater than one, with different numerators and different denominators.

Example : $1\frac{2}{3} > 1\frac{1}{4}$ because $\frac{2}{3}$ is greater than $\frac{1}{2}$ and $\frac{1}{2}$ is greater than $\frac{1}{4}$.

Benchmark Clarifications

Clarification 1: When comparing fractions, instruction includes using an appropriately scaled number line and using reasoning about their size.

Clarification 2: Instruction includes using benchmark quantities, such as $0, \frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ and $1,$ to compare fractions.

Clarification 3: Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100.

Clarification 4: Within this benchmark, the expectation is to use symbols (<, > or =).

Related Benchmark/Horizontal Alignment

- MA.4.M.1.1
- MA.4.DP.1.1/1.2

Vertical Alignment

Previous Benchmarks	Next Benchmarks
MA.3.FR.2.1	MA.5.NSO.1.4

Purpose and Instructional Strategies

The purpose of this benchmark is to understand the relative size of fractions. Students will plot fractions on the appropriate scaled number line, compare fractions using relational symbols, and order fractions from greatest to least or least to greatest. Work builds on conceptual understanding of the size of fractions from Grade 3 (MA.3.FR.2.1) where students learned to compare fractions with common numerators or common denominators.

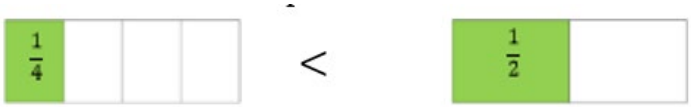
- Instruction may include helping students extend understanding by generating equivalent fractions with common numerators or common denominators to compare and order fractions.
- Instruction may include number lines, which will make a connection to using inch rulers to measure to the nearest $\frac{1}{16}$ of one inch.
- Instruction may include using benchmark fractions and estimates to reason about the size of fractions when comparing them. Students can compare $\frac{3}{5}$ to $\frac{1}{2}$ by recognizing that 3 (in the numerator) is more than half of 5 (the denominator) so they can reason that $\frac{3}{5} > \frac{1}{2}$.

Common Misconceptions or Errors

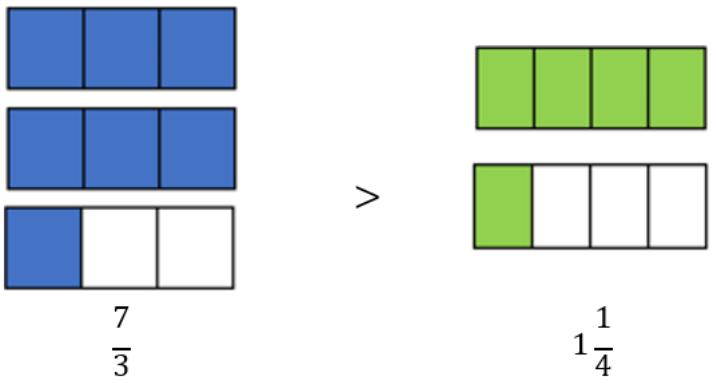
- The student may mistake the fraction with the larger numerator and denominator as the larger fraction. The student may not pay attention to the relationship between numerator and denominator when estimating.
- The student incorrectly judges that a mixed number like $1\frac{3}{4}$ is always greater than an improper fraction like $\frac{17}{4}$ because of the whole number in front.

Strategies to Support Tiered Instruction

- Instruction includes models that represent different numerators and denominators.
    - For example, students think about the fraction by reasoning about the size of the parts related to the numerator or denominator. Students compare $\frac{1}{4}$ to $\frac{1}{2}$ by recognizing that 1 (in the numerator) is less than half of 4 (the denominator) so they can reason that $\frac{1}{4} < \frac{1}{2}$.
        - This can also be shown with a model so that students can see the difference in sizes of pieces when related to the whole.



- Instruction includes models and examples where fractions greater than one whole are represented in a mixed number and as an improper fraction.
    - For example, students might think that $\frac{7}{3}$ is greater than $1\frac{1}{4}$ because of the whole number being represented. Instruction includes models to represent fractions that build conceptual understanding of fractions greater than 1.



$\frac{7}{3}$ $1\frac{1}{4}$

Questions to ask students:

- **See if students can correctly subdivide a number line with a distance from 0 to 1 into equal parts, including: halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and sixteenths.**
- **Example: Ask students, "How they would represent one-fourth on a number line?"**
    - **Sample answer that indicates understanding:** ***Student correctly describes drawing or draws a number line from 0-1 and partitions the distance into four equal parts and identifies that the part starting at 0 represents one-fourth.***

- **Sample answer that indicates an incomplete understanding or a misconception:** ***Student partitions the number line by drawing four lines, resulting in 5 equal parts, or parts are not equal.***

- **How could you compare those two fractions using benchmarks?**
  - **Sample answer that indicates understanding:** ***Using the benchmark of 1/2 students should be able to explain that one fraction is less than 1/2, while the other fraction is greater than 1/2, or that one fraction is close to 1/2 while the other is closer to 1. (i.e. 1/8 is less than 5/6 because 1/8 is less than 1/2 while 5/6 is greater than 1/2.)***

- **Ask students to compare two strategies; using common denominators or benchmark numbers to compare 2/3 and 5/6.**
  - **Sample answer that indicates understanding:** ***I would use common denominators, because it is easy for me to think of 2/3 as 4/6, they are equivalent, and 5/6 is greater than 4/6. I would not use benchmarks because both numbers are greater than 1/2.***

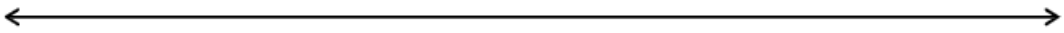
- **Could you solve that problem using a different strategy? Which strategy is most efficient?**
  - **Sample answer that indicates understanding:** ***The student is able to choose an alternate strategy and justify which strategy is most efficient.***

Instructional Tasks

Instructional Task 1

Use benchmark fractions and the number line below to compare the fractions $\frac{12}{5}$ and $2\frac{7}{8}$.

In the space below the number line, record the results of the comparison using the <, > or = symbol.



Instructional Items

Instructional Item 1

Four soccer players started a game with the exact same amount of water in their water bottles. The table shows how much water each soccer player has left at the end of the game. Who has the least amount of water remaining?

Player	Fraction of Water Left
Jackie	$\frac{2}{6}$
Laura	$\frac{1}{3}$
Terri	$\frac{4}{9}$
Amanda	$\frac{2}{10}$

a. Jackie
b. Laura
c. Terri
d. Amanda

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
MA.4.FR.1.4 Plot, order and compare fractions, including mixed numbers and fractions greater than one, with different numerators and different denominators. Example: $1\frac{2}{3} > 1\frac{1}{4}$ because $\frac{2}{3}$ is greater than $\frac{1}{2}$ and $\frac{1}{2}$ is greater than $\frac{1}{4}$. Clarification 1: When comparing fractions, instruction includes using an appropriately scaled number line and using reasoning about their size. Clarification 2: Within this benchmark, the expectation is to be able to use benchmark quantities, such as 0, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1, to compare fractions. Clarification 3: Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, 16 and 100. Clarification 4: Within this benchmark, the expectation is to use symbols (<, >, or =).	Mathematical	Items with given number lines will include only whole number marks labeled on the number lines. Number lines in the answer options may include fractional marks labeled on the number line. Items involving comparison may use relational words but must use relational symbols.

ALD 2	ALD 3	ALD 4	ALD 5
identifies equivalent fractions, including fractions greater than one, using models. plots fractions less than one with different numerators and different denominators using a number line.	compares fractions with different numerators and different denominators by reasoning about their size, including mixed numbers and fractions greater than one.	plots, orders, and compares fractions, including mixed numbers and fractions greater than one, with different numerators and denominators.	identifies an error; plots, orders, and compares fractions, including mixed numbers and fractions greater than one, with different numerators and denominators.

Additional Resources:
CPALMS Resources

Video: Fractions on a number line https://youtu.be/kGH5VvMxGyg

- YouTube: Comparing and ordering fractions by creating your own fraction strips
- YouTube: Compare and order fractions by equivalency

Resources/Tasks to Support Your Child at Home:

- Recipes are great real-life opportunities to practice exploring equivalent fractions and strategies for comparing fractions with your child. Encourage your child to find equivalent fractions for recipe ingredients. If a recipe calls for $\frac{1}{4}$ cup sugar, you can ask what the equivalent amount of the $\frac{1}{8}$ cup measuring cup of sugar would be. Your child can compare the fractional amount of ingredients required to make a recipe.
- Play Tug Team Fractions, a comparing fractions tug-o-war game: http://www.mathplayground.com/ASB_TugTeamFractions.html