## Fractions

## Foundational Understanding of Fractions

The 5th grade HLC progression focuses on operating with fractions. Prior to operating with fractions, students should have opportunities to compare and order fractions, reason about the relative size of fractions and develop understanding about equivalent fractions.

## (see 5th grade HLC progression on the subsequent pages)

## Equipartitioning <br> Equipartitioning is directly related to multiplication factors. <br> Example 1: Folding paper to make eighths, first fold the whole in half. Then fold each of those pieces in half. Then fold each of those in half to have eight equal parts. This connects to $8=2 \times 2 \times 2$ as we break apart the whole in half, in half again, and again once more. <br> 

Example 2: In making twelfths, first fold the whole in half. Then fold each of those pieces in half. Then fold each of those in thirds to have twelve equal parts. This connects to $12=2 \times 2 \times 3$ as we break apart the whole in half, in half again, and then in thirds.


Visual Representations
Students need to interact with multiple visual representations of fractions.

Tape Diagram / Number Line


Set Model


Linear Model


Number Line


## Equivalence using Visual

 RepresentationsStudents need to explore equivalence
through use of many different models.

$\frac{1}{4}=\frac{3}{12}$

## Comparing and Ordering

There are a variety of reasoning strategies to compare/order fractions. Below are a few common strategies.

## Common Numerator


$\frac{3}{6}>\frac{3}{12}$

$\frac{1}{6}$ is larger
than $\frac{1}{12}$
Comparison to $0,1 / 2,1$... ( < or > $1 / 2$ )


Distance from a benchmark

$$
\begin{aligned}
& 0 \quad \frac{1}{5} \\
& \frac{2}{5} \\
& \frac{3}{5}
\end{aligned} \frac{4}{5} \quad 1 \quad \frac{4}{5}>\frac{3}{4}
$$

## Grade Five HLC

Add, subtract, multiply and divide with fractions (in context and in equations) using visual representations

## September

Grade Five Learning Progressions
June
Students must use models to build understanding along this trajectory and interact with a variety of contexts of adding, subtracting, multiplying and dividing fractions. **NO algorithms before conceptual understanding is SOLID. Introducing algorithms too early interrupts and/or has a negative impact on understanding**

## Adding \& Subtracting Fractions

Students move from adding/subtracting with same denominators to adding/subtracting with different denominators.

| Compose and decompose using unit fraction knowledge | Add unit fractions using the area model. Partition models into the same number of equal parts | Use area models in relation to a benchmark number | Add fractions using double number lines |
| :---: | :---: | :---: | :---: |
| Students compose $\frac{7}{8}$ by adding $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}$ <br> has the same value as $\frac{4}{8}+\frac{3}{8}$ <br> Linear Model <br> Jumps on a Number Line | $\frac{1}{2}+\frac{1}{3}$ has the same value as $\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$ | " $\frac{7}{8}$ is $\frac{1}{8}$ away from 7 whole." $\frac{7}{8}+\frac{1}{2}=\frac{7}{8}+\frac{4}{8}=1 \frac{3}{8}$ |  |

## Multiplying Fractions

Students will interact with a whole number times unit fractions, then a whole number times a fraction less than 1 , then move to unit fractions times unit fractions and finally to all other fraction multiplication types. Students will recognize and discover the patterns that lead to the standard algorithm.

$\because \because \cdot$

## Dividing Fractions

In Fth grade, fraction division focuses only on problems with a whole number and a unit fraction (unit fractions by whole numbers, whole numbers by unit fractions). Students will be exposed to all problem types; partitive, quotitive, multiplicative change, measurement conversion and rectangular area.


## Multiplicative Change modeled with Rectangular Area

" 1 is $1 / 4$ of the total. Find the total."
" 1 gallon fills $1 / 4$ of the gas tank. How many gallons does the whole tank hold?"


Use visual representations to divide a whole number by a unit fraction

$$
2 \div \frac{1}{3}
$$

## Quotitive

"How many groups of $1 / 3$ are there in 2?" "How many $1 / 3$ foot bracelets can I make out of 2 feet of ribbon?"


## Multiplicative Change

" 2 is $1 / 3$ of the total. Find the total." " 2 feet of rope is $1 / 3$ of the total length. How long is the rope?


Use visual representations to divide a unit fraction by a whole number

$$
\frac{1}{2} \div 3
$$

## Partitive

"There is $1 / 2$ of a pan of brownies to be shared equally between 3 people. Each person will get $1 / 6$ of a pan of brownies."


## Measurement Conversion

"I have $1 / 2$ foot of ribbon. How many yards of ribbon do I have?"


