## Multiplicative Reasoning

## Grade Four HLC

Multiply and divide within 1000 within context and with equations.

## September <br> Grade Four Learning Progressions

June
Students must use models to build understanding along this trajectory and interact with a variety of contexts for multiplication and division. Models will continue to support students' ability to unitize-understand a group or collection of items represents "one." (For example, one group of 5 consists of 5 individual items but is classified as one group.)

## Counting by Equal Groups (Unitizing) to Extend Multiplicative Understanding

| Skip counts the equal sized groups or uses repeated addition to tell the cumulative total of each group. | Combines equal sized groups in flexible ways to begin to explore partial products. |
| :---: | :---: |
|  |  |

## Operations: Multiplication and Division

Students must use models to build understanding along this trajectory and interact with a variety of contexts for multiplication and division. Models should support students developing understanding of the magnitude of digits in their place values. In Grades 3 and 4, place value understanding is multiplicative: $245=2(100)+4(10)+5(1)$ Students also use relational thinking when composing, decomposing and recomposing.
**Students are maintaining and using their fact strategies to solve basic facts through 100 within context and with equations.

## Multiplication - Composition and Decomposition

Students derive strategies through the use of area models, decomposition of numbers, and relational thinking with known facts.

$\because \bullet \bullet$
$\because \because \because \because$
Grade Four HLC Learning Progressions

Properties of Multiplication (These properties are investigated throughout the year with different numbers and problem situations. The sequence of how the properties appear below does not suggest the order in which to explore them. Many times the properties can be explored simultaneously with student work.)
Identity Property

Division - Composition and Decomposition (Students model both partitive and quotitive situations)

Shares equal sized portions from the total to each group using benchmark sized quantities (10,5, 2 and then 1s) from a whole within 1,000.

AND/OR
Subtracts equal sized groups of the divisor from the total.

Uses inverse relationship, and considers the missing factor problem for multiplication to solve a division problem.

May use partial products and foundational facts to build up to the total.

Uses partial quotients, removes larger-sized products using the divisor as a factor, multiples of benchmark numbers, and multiplication facts.


$$
\begin{aligned}
& 1,440 \div 32= \\
& 32 \times \_=1,440
\end{aligned}
$$

?

|  | 20 | 20 | + 5 |
| :---: | :---: | :---: | :---: |
| 32 | 1,440 | 800 | 160 |
|  | -640 | - 640 | - 160 |
|  | 800 | 160 | 0 |
|  |  | 40 |  |

$$
\begin{array}{r}
32 \begin{array}{r}
1,440 \\
\frac{-640}{800} \\
\frac{-640}{160} \\
\frac{-160}{0}
\end{array} \\
\hline \frac{+5}{45} \times 32 \times 32 \\
20 \times 32
\end{array}
$$

Composing and Decomposing Using Base Ten Units and Place Value - 1s, 10s, 100s, 1000s (Students must use models to build understanding along this trajectory. Models should support students developing understanding of the magnitude of digits in their place values.)


Grade Four HLC Learning Progressions
Models and Strategies for Multiplication (Across Grades 3-4)


Models and Strategies for Division (Across Grades 3-4)

| Grade 3 | Grade $3+4$ | Grade 4 |
| :---: | :---: | :---: |

## Strategies



