Classroom Routines:
- Incorporating classroom routines focused on mathematical content can be an effective way to address standards throughout the year (ex. number talks, subitizing, telling time, estimation activities; Same or different?; Which one doesn't belong?)

Cluster 1: Understanding Equal Groups

Duration: 3-4 weeks

Content Standards:
This list includes standards that will be addressed in this cluster, but not necessarily mastered, since all standards are benchmarks for the end of the year. *Please note that strikethroughs represent parts of standards that are addressed in a different cluster.* Additionally, *please note the recommendations in the Important Considerations section of this cluster.*

NC.3.OA.1
For products of whole numbers with two factors up to and including 10:
- Interpret the factors as representing the number of equal groups and the number of objects in each group.
- Illustrate and explain strategies including arrays, repeated addition, decomposing a factor, and applying the commutative and associative properties.

NC.3.OA.3
 Represent, interpret, and solve one-step problems involving multiplication and division.
- Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem.
- Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction ~~and/or equations with a symbol for the unknown number to represent the problem~~.

Supporting Standards:
NC.3.OA.2
For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient:
- Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group.
- Illustrate and explain strategies including arrays, repeated addition or subtraction, and decomposing a factor.

NC.3.OA.9: Interpret patterns of multiplication on a hundreds board and/or multiplication table.

Mathematical Practices:
1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

What is the mathematics?
The focus of this cluster is 1) building an effective math environment, and 2) representing situations that involve equal groups, including simple story problems with equal groups.

Consider the following elements when preparing for an effective math environment:
1.) Develop mathematicians with positive attitudes about their ability to do mathematics by:
- *Creating opportunities to develop an appreciation for mistakes*
- *Seeing mistakes as opportunities to learn*
- *Teaching students to take responsibility for their learning*

2.) Develop mathematicians who respect others by:
- *Demonstrating acceptance, appreciation, and curiosity for different ideas and approaches*
- *Establishing procedures and norms for productive mathematical discourse*
- *Consider other solution paths*

3.) Develop mathematicians with a mindset for problem solving by:
- *Encouraging student authority and autonomy when problem solving.*
- *Emphasizing questioning, understanding, and reasoning about math, not just doing math for the correct answer.*
- *Asking follow-up questions when students are both right and wrong.*
- *Allowing students to engage in productive struggle and moving them along by questioning, not telling.*

The second focus of this cluster builds on second-grade work when students worked with equal groups to build a foundation for multiplication (skip counting with 2, 5, and 10 and repeated addition). During this cluster, students are formally introduced to the meaning of multiplication and the symbolic notation for multiplication. The emphasis is on context and story problems (not merely equations); therefore, 3.OA.1 and 3.OA.2 are addressed through story problems.

Students will:
- *Develop conceptual understanding of multiplication by solving story problems that involve equal groups (a number of groups with an equal number of items in each group).*
- *Use arrays and repeated addition to model the story problems.*
- *Write a multiplication equation to represent story problems.*
- *Develop conceptual understanding of division by solving story problems that involve the number of groups unknown or the size of the groups unknown (formal symbolic division notation will not be introduced until Cluster 4).*
- *Understand the relationship between multiplication and division through story problems (but formal symbolic notation will not be introduced until Cluster 4).*
- *Be fluent with multiplication facts with 2, 5, and 10 as a factor.*
- *Share their thinking by communicating their reasoning and sharing their solutions.*

Important Considerations:
- This is one of two clusters in 3rd grade that addresses multiplication. Story problems are the emphasis in this cluster to build the "groups of" meaning of multiplication.

- Multiplication and division are the major work of the grade-level standards. By starting the year with developing understanding of the "equal groups" interpretation of multiplication, this foundation can be used throughout the year in other units of instruction as well as during possible daily routines (examples of routines are provided at the front of this document).
- Beginning the year with "equal groups" also provides students who may need more work with addition and subtraction more time with single and double-digit numbers before they return to the addition and subtraction of three-digit numbers in Clusters 2 and 3.
- Students should represent problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, or using objects. Students will need many opportunities to develop mathematical representations of story problems. After students work with concrete representations of equal-groups story problems, students can be introduced to the symbolic notation of multiplication and write multiplication equations to match situations.
- This cluster is connected to skip counting by 2s, 5s, and 10s from second grade. This connection can be made by asking students to look for real items that occur in groups of 2s, 5s, or 10s (e.g., wheels on a bike, fingers on a hand). Through experiences finding and counting groups of 2s, 5s, and 10s and connections to skip counting from 2nd grade, many students will be fluent with for 2s, 5s, and 10s at the end of this cluster.
- In this cluster, students are not expected to master other multiplication facts. They will use arrays, models, and repeated addition or repeated subtraction to develop an understanding of multiplication.
- Symbolic division equations are not introduced in this cluster, but the students will understand the concept by fair sharing and the relationship between multiplication and division. These experiences lay the foundation for Cluster 4.