Cluster 8: Developing Flexibility with Number

Duration: 3 weeks

Content Standards:
This list includes standards addressed in this cluster, but not necessarily mastered, since all standards are benchmarks for the end of the year. Note strikethroughs and recommendations in the Important Considerations section for more information.

NC.1.OA.1
Represent and solve addition and subtraction word problems, within 20, with unknowns, by using objects, drawings, and equations with a symbol for the unknown number to represent the problem, when solving:
• Add to/Take from-Change Unknown
• Put together/Take Apart-Addend Unknown
• Compare-Difference Unknown
NC.1.OA.2
Represent and solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, by using objects, drawings, and equations with a symbol for the unknown number.
NC.1.OA.3
Apply the commutative and associative properties as strategies for solving addition problems.
NC.1.OA.4
Solve an unknown-addend problem, within 20, by using addition strategies and/or changing it to a subtraction problem.
NC.1.OA.6
Add and subtract, within 20, using strategies such as:
• Counting on
• Making ten
• Decomposing a number leading to a ten
• Using the relationship between addition and subtraction
• Using a number line
• Creating equivalent but simpler or known sums
NC.1.OA.9
Demonstrate fluency with addition and subtraction within 10.
NC.1.MD.5
Identify quarters, dimes, and nickels and relate their values to pennies.

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?

- This cluster culminates the mathematical work of the grade as students build on their prior understanding of the relationship between numbers, addition and subtraction situations, strategies for addition and subtraction and properties of addition to develop flexibility with

number.

- By the end of this cluster students should be fluent with their facts within 10. Students who are fluent can solve for unknowns in addition and subtraction situations accurately, efficiently, and flexibly. To develop fluency, students should also be able to appropriately choose strategies that best fit with solving a particular problem.
- Students develop fluency through reasoning strategies rather than memorization as memorizing facts in isolation is inefficient and creates inflexibility.
- Students continue to use reasoning strategies to add and subtract within 20. Some common reasoning strategies used by students are included in NC.1.OA.6 (See examples in Cluster 2).
- Students continue to use objects and drawings to solve word problems within 20. In this cluster, they label their representations with equations, using a symbol for the unknown.
- Counting coins came be used as a means through which students demonstrate flexibility in their understanding of number. Initial coin exploration should be connected with skip counting and grouping.

Important Considerations:

- Timed tests can create math anxiety. Students learn their facts best when work is rooted in reasoning strategies that help them internalize number relationships. Students should be exposed to a variety of strategies such as one more/less, doubles, near doubles, making 5s, and making tens. These same number relationships are used for addition and subtraction throughout the grades (ex. In first grade students who solves 8 + 7 with 'a make a ten strategy', can apply that same strategy in a later grade to mentally compute 68 + 7). When students spend adequate time practicing these strategies their fluency naturally increases. Teachers can assess their fluency through observations and checklists.
- In order to count coins, children must be able to think about groups of 5, 10, and 25 without seeing countable objects. A child who is only able to count objects by ones will be challenged to understand the value of coins. Coins have intentionally been saved until the end of the year because of the need for students to unitize before being able to fully access the concept. As students learn the value of coins, lessons should focus on the purchasing power of each coin and the concept of equality. (Ex: a quarter can buy the same thing as 25 pennies).
- In the past, teachers may have used coins to model early place value concepts. Since coins are non-proportional, using these models too early can hinder student's development of place value understanding. (Ex: Though it takes 10 pennies to make a dime, a dime is not 10 times larger than a penny.)