Cluster 1: Building a Math Community through Real Data

Duration: 1-2 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 strikethroughs and recommendations in the Important Considerations section for more information.

Represent and Interpret Data
NC.4.MD.4
Represent and interpret data using whole numbers.

- Collect data by asking a question that yields numerical data.
- Make a representation of data and interpret data in a frequency table, scaled bar graph, and/or line plot.
- Determine whether a survey question will yield categorical or numerical data.

Supporting Standards:
NC.4.NBT.4
Add and subtract multi-digit whole numbers ~~up to and including 100,000~~ using the standard algorithm with place value understanding.

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 building an effective math environment. Representing and interpreting data will be the content used to begin the development of a classroom culture where students respect and value each individual's contribution to the classroom.

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
- Considering various 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**

During this cluster:

- Students will generate data by formulating a question(s) (Example: Favorite summer vacation, number of siblings, weight of backpack, how many minutes you are on a device in a week, favorite flavor of ice cream, etc.).
- Students will determine whether a survey question will yield **categorical data** (favorite summer vacation, favorite flavor of ice cream) or **numerical data** (number of siblings, weight of backpack, hours on device).
- Students will design a plan to collect and represent the data (ex: using frequency tables, scaled bar graphs, and/or line plots).
- Students will analyze and interpret their data.
- Students will apply computation skills when asking and answering questions about the data.

Important Considerations

- For success, significant time should be spent setting up the classroom.
  This includes:
  - Developing classroom norms for communication (ex: non-verbal signals, listening and speaking expectations, talk moves for math discussions).
  - Developing math routines (ex: number of the day, number talks, number strings, and other appropriate math routines).
  - Setting various expectations for the structure of the math block (ex: expectations for whole class instruction, cooperative learning, independent learning, etc.).
- Math discourse needs explicit modeling and practice. This includes students:
  - Sharing their thinking
  - Actively listening to the ideas of others
  - Connecting to others' ideas
  - Asking questions to clarify understanding
- In Grade 2, students solve simple put-together, take-apart, and compare problems in a data context using information presented in a picture and bar graph. In Grade 3, students solve one and two step 'how many more and how many less problems' using the information from graphs.
- In third grade, students add and subtract numbers up to and including 1,000. The numbers in this unit should be limited to numbers students have worked with as new content related to addition and subtraction will be the focus of Cluster 3.
- In NC.4.MD.4, the line plot is a new representation of data.
- Integrate the data standard throughout the year and across content areas when possible. Students should use relevant real-world data to make conjectures about activities related to the world around them. Take advantage of opportunities to incorporate data standards with Science and Social Studies.
- Both additive (ex. How many more fish does class A have than class B) and multiplicative (ex. Class A had three times as many fish as class B, vanilla ice cream had two times more votes than chocolate ice cream) comparisons can be made and asked based on the data. Students use the language of times as much or times as many to lay a foundation for the focus on multiplicative comparison in Cluster 2.