**What Do You Like?**

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| This lesson focuses on developing a mathematical community at the beginning of the school year. Students collect data and make a scaled bar graph, which they worked with in third grade.  |

**NC Mathematics Standards:**

**Measurement and 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.

 **Review Standards**

**NC.3.MD.3** Represent and interpret scaled picture and bar graphs:

* Collect data by asking a question that yields data in up to four categories.
* Make a representation of data and interpret data in a frequency table, scaled picture graph, and/or scaled bar graph with axes provided.
* Solve one and two-step “how many more” and “how many less” problems using information from these graphs.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

6. Attend to precision.

**Student Outcomes:**

* I can pose questions and collect data from my classmates.
* I can communicate with others about my data.
* I can create a graph to represent data.

**Math Language:**

* data
* question
* graph, bar graph
* scale

**Materials:**

* graphs to display (At the Fair, At the Fair – with Labels)
* data collection materials such as post-its, notecards, clipboards, etc.
* graph paper and colored pencils/crayons (optional)
* notecards (1 per student)
* Optional: anchor chart, poster of Math Practice #3 (<http://www.debbiewaggoner.com/math-practice-standards.html>)

**Advance Preparation:**

* Gather materials
* Plan how to group students into pairs

**Launch:**

1. Introduce the Context (10 minutes)

Display the graph “At the Fair” for the class to see. Ask: *What type of data is on the graph?* Ask: *What types of labels do we need on the graph?* Give students time to respond to the questions as partners and then share ideas with the whole class.

Tell the class that the graph displays people’s favorite food at the fair. The choices included: Caramel Apples, Cotton Candy, Funnel Cakes, and Turkey Legs. Display the labeled version of the graph.

Ask students questions about the data:

* Which food was the most liked?
* Which food was liked the least?
* Can you estimate how many people voted?
* It looks like twice as many people like cotton candy than caramel apples. Is that right? How could we find out?
	+ Allow students to time to discuss this in partners or small groups. Students should identify that the statement is incorrect and provide reasoning why it is incorrect.
	+ Say, “Sometimes in math it is okay to make a mistake as long as we figure out where we messed up and fix it.”
1. Introduce the Task (10 minutes)

Tell students that today they will work with a partner to create a question about favorite foods with four answer choices and then collect data to answer this question. Give students time to work with their partners to create a question about favorite foods. If students are stuck, you could suggest that they pick one of these topics and come up with their 4 choices:

* Favorite breakfast food
* Favorite dinner food
* Favorite type of cookie
* Favorite type of ice cream
* Favorite drink
* Favorite restaurant

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| **Observation** | **Questions to Ask** |
| Students have difficulty coming up with a question. | * What would you like to know about your classmates?
* If someone were going to ask you a question about yourself what would you want them to ask you?
* What types of food do you like?
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| Students have difficulty coming up with 4 possible choices. | * How can we come up with 4 choices that your classmates are likely to choose?
* What are some choices you think your classmates would choose?
* How would you answer this question?
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**Explore:**

1. Collecting the Data (15 – 20 minutes)

After determining their question, students will collect data to answer the question. They should spend time asking other students to answer their questions. The goal is for students to collect data from at least 12 classmates if possible. Allow each pair of students to determine how they will collect the data. Some students may move around the room asking their classmates to respond to the question, some students may have their classmates respond on slips of paper, and some may ask students to respond by raising their hand. It is important that the students decide how they will collect the data.

As students collect data, observe and ask questions to support them. This provides teachers with a chance to informally assess their students. Use these observations for the discussion that will follow in the next part of the lesson.

Observe:

* Who interacts well with others in the class? Who needs prompting and support?
* Who is keeping track of the data? How are students keeping track of the data?
* What difficulties or challenges are students having as they collect data?
* What data collection methods work well? What data collection methods did not work well? Why did they work or not work?
* How do students ensure they do not duplicate a response?

**Discuss:**

1. Discussion of Solutions (15 – 25 minutes)

Bring students together to discuss the experience. They need their work and data collection materials. Use the following questions to assist you with the discussion.

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| **Sample Questions** | **Possible Responses or Talk Frames** |
| * What was something interesting you learned today about your classmates?
 | * “An interesting fact that I learned was that my classmates \_\_\_\_\_\_.”
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| * What does your data tell you about the class?
 | * “I learned that my classmates’ favorite \_\_\_ is \_\_\_ and their least favorite \_\_\_ is \_\_\_\_.”
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| * How did you keep track of your data? Did you have any trouble keeping track of who had answered your question?
 | * “I had a hard time determining who I had asked until I starting writing names down on my paper.”
* “I wrote down names and their choice at the same time. That helped a lot.”
* “I liked making a list to keep track of the students I asked. It helped me not to repeat someone.”
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| * Why is it important when we collect information to be certain we ask the same person the question only once?
 | * “If someone gets more votes than other people our data won’t be right.”
* “If we want to find out the class favorite and least favorite everyone should only get one vote.”
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| * Who would like to share your question and tell us about the results?
 | * Responses will vary based on the question and data.
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Conclude the discussion by saying, *Think about what we did today. We talked to each other and communicated about our questions and our data. Why is it important to talk and communicate in mathematics?* Discuss several responses. Ask: *Can you help me finish the sentence? “Mathematicians are people who \_\_\_\_\_\_\_\_\_\_\_\_.”*  Have students record a response on notecards or add the responses to an anchor chart. Relate the responses and previous discussion to Mathematical Practice #3 – Construct viable arguments and critique the reasoning of others. Introduce the practice to students (display on the board, add to anchor chart, or present as a poster <http://www.debbiewaggoner.com/math-practice-standards.html>) and say, *This year our math class will include many discussions, arguments, and communication in order to deepen our thinking and expand our mathematics understanding.*

**Additional Activities & Extensions:**

* **Making a Graph of Our Data**

Provide graph paper to students and have them create a representation (bar graph, picture graph, frequency table) of the data they collected. When they are done, students should write 2 statements of their data. Encourage students to use a “how many more” or “how many fewer” statement such as “In the data, 4 more students preferred caramel apples compared to funnel cakes.”

* **What do you like?**

Students select another question with 4 categories as choices. Students can either pose that question to students during these activities, on another day, or during math stations. Additionally, the teacher could have students create questions and choices and then use the questions as a Daily Math Routine over the next few weeks.

**Evaluation of Student Understanding:**

**Informal Evaluation:**

Observe students and ask questions as they are collecting data. Look for students who may need more support keeping track of their data.

**Formal Evaluation:**

As an exit ticket, redisplay the “At the Fair” graph. Ask: How many fewer people prefer caramel apples than funnel cakes?, What additional information can we learn from the graph?, Can you write a sentence about the graph?

**Meeting the Needs of the Range of Learners:**

**Interventions:**

* For students who struggle coming up with a question, give them options for questions and let them select the possible choices.

**Extensions:**

* Students can pose additional questions with more than four choices. They can collect data and create a data representation to answer one of their questions.
* Students can explore different scales when creating their graphs.

**Special Notes:**

* The “At the Fair” activity can be used multiple times in this unit and throughout the year.
* These activities can either be done by everyone in the class or as part of centers/math workshop. However, it is important to conduct the closing discussion as a whole class so students can share their experiences and the information they learned.

**At the Fair**

**At the Fair (with Labels)**

Caramel Cotton Funnel Turkey
 Apples Candy Cakes Legs