**Favorite Activities**

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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. This lesson pairs well with the “What Do You Like?” lesson and should be used following that lesson. |

**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 create a bar graph to represent data.
* I can communicate with others about my data.

**Math Language:**

* bar graph
* data
* question
* title
* axis
* scale

**Materials:**

* graphs to display (Favorite Things, Favorite Drinks)
* data collection materials such as post-its, notecards, clipboards, etc.
* data display materials such as blank paper, graph paper, poster paper, rulers, yard/meter sticks, and markers/colored pencils/crayons
* Optional: anchor chart, poster of Math Practice #6 (<http://www.debbiewaggoner.com/math-practice-standards.html>)

**Advance Preparation**:

* Gather materials
* Plan how to group students into pairs

**Launch:**

1. Introduce the Context (15 minutes)

Display the graph “Favorite Things” for the class to see. Ask: *What do you notice about the data?*  *What do you think the question was that students answered?* 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 drinks. The choices included: Cheerwine, Coca-Cola, Lemonade, and Iced Tea. Display the labeled version of the graph.

Ask students questions about the data:

* Which drink was the most liked?
* Which drink was liked the least?
* Can you estimate how many people voted?
* It looks like more than twice as many people prefer iced tea than Coca-cola? Is that true? How can we find out?

Allow time for students to work together to come up with two more questions about the data in the bar graph. Have a few groups share their questions with the class and take responses from classmates.

1. Introduce the Task (10 minutes)

Tell students that today’s lesson will be similar to yesterday’s lesson. Students will work with a partner to pose a question and collect data to answer the question. Then they will create a bar graph to display the data. This data will help them learn more about the class.

Give students time to work with a partner to create a question that will help them learn more about their classmates. They may select the topic and the possible answer choices. (Students are not limited to 4 choices in this lesson. They may decide to use an open ended question or select possible answer choices. This will add challenge to the lesson and encourage discussion throughout the lesson.) If students have difficulty selecting a topic, you could suggest that they pick one of the following and come up with possible choices:

* Favorite sport
* Favorite board game
* Favorite afterschool activity
* Favorite place to go in the summer

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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 activities do you like do? |
| Students have difficulty coming up with possible choices. | * How can we come up with choices that your classmates are likely to choose? * What are some choices you think your classmates would choose? * How would you answer this question? |

**Explore:**

1. Collecting and Displaying the Data (30 – 40 minutes)

After determining their question, students will collect data to answer the question and then create a representation to display the data. Allow each pair of students to determine how they will collect the data. Encourage students to utilize what they learned from the last lesson to improve the ways they collect data.

As students collect data, observe and ask questions to support them. Use these observations for the discussion that will follow at the end of the lesson.

Observe:

* 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?

Provide students will materials to create a bar graph of the data they collect. This may include blank paper, graph paper, poster paper, crayons, markers, colored pencils, rulers, or yard/meter sticks. Instruct students to collaborate with their partner to create a bar graph of the collected data.

Observe students as they create the bar graphs. Carefully select aspects of the graphs that you would like to highlight during the discussion (labels, scales, organization).

Observe:

* What challenges do students have as they create the bar graph?
* How do students organize the data?
* What scale is used on the bar graph?
* Do students label each axis and add a title to the bar graph?

If students have additional time to work, encourage them to record observations about their data and data displays.

**Discuss:**

1. Discussion of Solutions (20 – 30 minutes)

Bring students together to discuss the experience and the data displays. 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 \_\_\_\_\_\_.” |
| * What does your data tell you about the class? | * “I learned that my classmates’ favorite \_\_\_ is \_\_\_ and their least favorite \_\_\_ is \_\_\_\_.” |
| * How did you keep track of your data? Did you have any trouble keeping track of who had answered your question? * What did you learn from yesterday’s lesson to help you collect data today? | * “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.” |
| * Who would like to share your bar graph and tell us about the results? | * Responses will vary based on the question and data display. |
| * What challenges did you have when creating the bar graph? | * Responses will vary. |
| * How does the scale affect the data representation? | * “I had to use a scale of 5 because my data included high numbers. I asked 30 students to respond to my question so I used a scale of 5.” * “I only asked 15 students my question. I used a scale of 2. My graph looks bigger because my scale was 2, not 5. My data was more spread out.” |

Highlight aspects of the graphs such as labels, scales, and organization. Discuss any challenges students had as they were creating the graphs.

\*Special Note: The data used in this lesson represents discrete, rather than continuous data. Therefore, the bars on the bar graph should have space between them and should not touch one another. This may be something you want to highlight in the discussion portion of the lesson.

Conclude the discussion by introducing Mathematical Practice #6 – Attend to precision. 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>). Discuss what it means to be precise in mathematics and why precision is important when collecting and displaying data.

**Additional Activities & Extensions:**

* **Making a Frequency Table and Picture Graph of Our Data**

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

* **What Should the Graph Look Like?**

Give students the “What Should the Graph Look Like?” activity sheet to complete.

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Observe students and ask questions as they are collecting and displaying data. Look for students who may need more support as they are creating the bar graph.

**Formal Evaluation:**

* The “What Should the Graph Look Like?” activity sheet can be used as a formal evaluation.

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

**Interventions:**

* For students who struggle coming up with categories, give them options for possible questions to ask.
* For students who struggle creating a graph with a scale, have them use 1 box on the graph paper for each number on the scale but only have them label parts of the scale in groups of two, five, ten, etc.

**Extensions:**

* Students can explore different scales for their graphs. How does this affect the representation of the data when the scale changes?

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| Students have difficulty creating a bar graph. | * Provide students with models of bar graphs. What do they notice about the bar graph? How can they use the model to help them create their own bar graph? * Allow students to create a bar graph with a scale of 1 before moving them to a larger scale. * Provide graph paper to help students organize the data. |

**Special Notes:**

* This lesson may take longer than one math block and could be extended over two days. Provide additional time for students to finish the bar graphs and conduct the final discussion on the second day.

**Favorite Things**

**Favorite Drinks**

Cheerwine Coca-Cola Iced Tea Lemonade

**What Should the Graph Look Like?**

For each table make a frequency table with tallies and a scaled bar graph. Then write two questions that could be answered by looking at the data.

**What is your Favorite Color? Graph**

|  |  |  |
| --- | --- | --- |
| **Color** | **Number** | **Tallies** |
| Blue | 12 |  |
| Green | 9 |  |
| Black | 26 |  |
| Yellow | 7 |  |

Question 1:

Question 2:

**What is your Favorite Animal? Graph**

|  |  |  |
| --- | --- | --- |
| **Animal** | **Number** | **Tallies** |
| Dog | 42 |  |
| Cat | 29 |  |
| Horse | 23 |  |
| Pig | 5 |  |

Question 1:

Question 2:

**What Should the Graph Look Like?**

For each table make a frequency table with tallies and a scaled bar graph. Then write 2 questions that could be answered by looking at the data.

**What is your Favorite Sport? Graph**

|  |  |  |
| --- | --- | --- |
| **Color** | **Number** | **Tallies** |
| Soccer | 32 |  |
| Basketball | 11 |  |
| Football | 13 |  |
| Baseball | 7 |  |

Question 1:

Question 2:

**What is your favorite type of book? Graph**

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| --- | --- | --- |
| **Animal** | **Number** | **Tallies** |
| Famous People | 22 |  |
| Famous Events | 19 |  |
| Nature | 23 |  |
| Animals | 35 |  |

Question 1:

Question 2: