**Introducing Bar Graphs**

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| This lesson provides students with opportunities to become introduced to creating bar graphs after collecting their own data. |

**NC Mathematics Standards:**

**Measurement and Data: Represent and interpret data.**

**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.

4. Model with mathematics.

6. Attend to precision.

**Student Outcomes:**

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

**Math Language:**

* Bar graph, data, question, picture graph, scale

**Materials:**

* Paper, pencil, activity sheets, number cards

**Advance Preparation**:

* Gather materials

**Launch:**

1. Totaling Tallies and Introducing Tasks (10-15 minutes)

Display the Totaling Tallies picture for the class to see. Ask questions such as:

* *What do you notice in the chart?*
* *What do you wonder about the chart?*
* *What type of data do you think is on the chart?*
* *What questions could we ask about the data on the chart?*

Say, “The chart shows data about students’ favorite topics to read about.” Display the next chart which has the labels. Have students work together to respond to the questions. After discussing the questions, say, “Work with your table to come up with 3 questions about the data in the table.”Have groups share their questions and discuss strategies for answering them. Today we will look at some more ways to look at data called bar graphs.

**Explore:**

1. Introducing Bar Graphs (30 minutes)

Pair students up and have them look at the Introducing Bar Graphs activity sheet. Have students work in pairs analyzing the graphs on the sheet.

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| **Observation** | **Questions to Ask** |
| Students have a difficult time determining the value of each bar graph. | * “What do the numbers on the side of the graph tell you? * “On the favorite sport graph the baseball bar is in between two numbers. What two numbers is it between? How can that help you determine the value of baseball?” |
| Students struggle with addition and subtraction computation. | * “What strategies can we use to (add or subtract) to find the answer?” |
| Students have a difficult time coming up with a question that they want to ask and answer. | * “What types of questions can we ask based on the data?” * “What would a question sound like if we wanted to find a total of two categories?” * “What would a question sound like if we wanted to compare the number of votes for two categories?” |

**Discuss:**

1. Discussing Data on Bar Graphs (15 minutes)

Bring students together on the carpet (they need their activity sheets).

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| **Sample Questions** | **Possible Responses or Talk Frames** |
| What did you notice when you looked at the favorite food graph? | * “I noticed that \_\_\_\_ was the most popular food.” * “I noticed that \_\_\_\_ was the least popular food.” |
| How did you find the number of people who voted? | * “I found the value of each bar and then added them together.” * “I wrote the values of each bar down and used a number line to add them together.” * “I wrote the values of each bar down and then used expanded form to add them together.” |
| How did you find the difference between the most favorite and least favorite? | * “I found the value of the highest bar and lowest bar and subtracted.” * “I found the value of the lowest bar and added on to see how far it was from the highest bar?” |
| What question did you ask? | * Questions will vary. * Encourage students to ask combination questions- “How many voted for \_\_\_ or \_\_\_\_” as well as comparison questions, “How many more/fewer voted for \_\_\_ compared to \_\_\_.” |

Conclude the discussion by saying, *Think about what we did today. Can you help me finish the sentence “Mathematicians are people who \_\_\_\_\_\_\_\_\_\_\_\_.”*

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Observe students and ask questions as they are collecting data. Look for students who may need more support. Note the strategies students use to answer the questions and ask questions to push their thinking about the mathematics.

**Formal Evaluation:**

* Students’ work from the Explore activity could be used as a formal evaluation.
* If you would also like to give an exit ticket you can ask a follow up comparison questions from one of the graphs on the activity sheet.

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

**Interventions:**

* See the prompts in Explore on ways to guide students.
* Consider giving students data with values less than 10 as well as only 3 categories of data.

**Extensions:**

* Students can explore different scales for their graphs besides the number 2.

**Possible Misconceptions/Suggestions:**

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| **Possible Errors**  **and Misconceptions** | **Suggestions** |
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| Students struggle with addition and subtraction computation. | * “What strategies can we use to (add or subtract) to find the answer?” |
| Students have a difficult time coming up with a question that they want to ask and answer. | * “What types of questions can we ask based on the data?” * “What would a question sound like if we wanted to find a total of two categories?” * “What would a question sound like if we wanted to compare the number of votes for two categories?” |

**Special Notes:**

* The Totaling Tallies activity could be done at different times during the year.

**Solutions:**

* Totaling Tallies:
  + 71 people voted
  + The difference was 23.
* Introducing Bar Graphs:
  + Favorite lunch: 30 people voted, the difference was 6
  + Favorite sport: 53 people voted, the difference was 13

**Totaling Tallies without Labels**

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What do you notice?

What do you wonder about?

What do you think the data is about?

**Totaling Tallies**

What topics do people like to read about?

|  |  |
| --- | --- |
| Animals |  |
| Friendship |  |
| Sports |  |
| Adventure |  |

What do you notice?

How many people voted?

What is the difference between the most popular subject of books compared to the least popular?

**Introducing Bar Graphs**

Look at the graphs below and respond to the questions:

**Favorite Lunch**

How many people voted?

What was the difference between the most popular and least popular food?

Write another question about the data and answer it.

**Favorite Sport**

How many people voted?

What was the difference between the most popular and least popular food?

Write another question about the data and answer it.