**Numerical, Categorical,**

**or Changes Over Time?**

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| This lesson involves determining whether data is categorical, numerical, or changes over time. |

**NC Mathematics Standard(s):**

**Measurement and Data**

**NC.5.MD.2** Represent and interpret data.

• Collect data by asking a question that yields data that changes over time.

• Make and interpret a representation of data using a line graph.

• Determine whether a survey question will yield categorical or numerical data, or data that changes over time.

**Standards for Mathematical Practice:**

4. Model with mathematics.

6. Attend to precision.

7. Look for and make use of structure.

**Student Outcomes:**

* I can determine whether a survey question will yield categorical data, numerical data, or data that changes over time.
* I can communicate with others about data.

**Math Language:**

* data
* categorical data
* numerical data
* changes over time
* bar graph
* line plot
* line graph

**Materials:**

* data cards (one set per group)
* sticky notes

**Advance Preparation**:

* Copy and cut out data cards (one set per group)
* Plan how to group students into groups of 3-4 students

**Launch:**

Introduce the Task (10 minutes)

In the past few years, you have learned to create several types of graphs. Ask students to name some of the graphs that they have made (picture graphs & bar graphs, line plots, and line graphs).

Say: When mathematicians have data that they want to organize and graph they have to think about which type of graph to use to communicate the data that they have collected. During today’s activity, you are going to pretend that you have collected data on several different topics. You are going to decide which type of graph you should use and why you are using that type of graph. Think about the data you would collect and how you might be able to represent it on a graph.

Provide each group with one set of data cards. Instruct students to sort the cards into categories. Give each group a set of sticky notes to label each set of cards based on the type of graph they would use to represent the data.

**Explore:**

1. Sorting Data Cards (10 – 15 minutes)

Provide time for students to work in groups to sort the data cards. Observe students to see how they are discussing the cards and placing them into categories based on common characteristics.

Possible questions:

* + How are you deciding which graph is best for each card?
  + How are the cards in this group alike? How are the cards in other groups different?
  + Why did you decide to put this card with this graph?
  + If you were to create another card to match this category, what might you write on the card?

**Discuss:**

1. Discussion (20 minutes)

After students have had time to sort the cards, bring the group back together. Have groups share which graph they selected for each data card. Place in holding any card that groups disagree about. Ask students to explain what is common about each of the groups. Look for students to highlight the idea that bar and picture graphs involve categorical data that represents characteristics, line plots are used for numeric or measurable data, and line graphs involve data that changes over time.

As you discuss, create a 3-column anchor chart to distinguish between the 3 types of data. Once the class has agreed on the purpose of each graph, revisit any data cards that there was disagreement about previously. Use the anchor chart and challenge students to consider how the card aligns to the purpose and characteristics of each type of graph.

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| **Observation** | **Questions to Ask** |
| Students have difficulty determining if data is categorical, numerical, or changes over time. | * How was the data collected? * What type of data did we collect? * What is the best way to represent the data? * How would a person respond to this question? What are some possible responses? |

Discuss how students sorted the data cards. Have students identify and defend which cards represent numerical data and which cards represent categorical data.

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| **Categorical Data** | **Numerical Data** | **Data that Changes Over Time** |
| B | C | A |
| E | D | F |
| J | G | H |
| N | I | K |
| O | L | M |
|  | P | R |
|  | Q |  |

Close the lesson by returning to today’s learning target: I can determine whether a survey question will yield categorical or numerical data. Have students define each type of data in their own words and provide a few examples.

**Evaluation of Student Understanding:**

**Informal Evaluation:**

* Observe students and ask questions as they sort the data cards. Use the observations to continue to plan and adapt your lessons.

**Formal Evaluation:**

* Use Tools for Teachers Assessment Task 5.MD.2 Representing Data

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

**Interventions:**

* For students who struggle determining if the data is categorical, numerical, or data that changes over time; use the questions in this lesson. Have students refer to the anchor chart that was created.

**Extensions:**

* Students can create their own questions and determine if they will yield numerical data, categorical data, or data that changes over time.

**Data Cards**

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| A  Students measure the height of a plant over 10 weeks. | B  Students are asked to name their favorite type of juice to drink. |
| C  Students record how long they can keep their eyes open without blinking in seconds. | D  Students roll a car down a ramp and record how far it travels. |
| E  Students respond to a survey where they identify whether they prefer to write with pencils, pens, markers, or type. | F  Students measure their heart rate every 10 seconds as the change from sitting to a slow walk to a fast walk or run. |
| G  Students measure the length of their shoes and record the data. | H  The office staff records the number of people in the office every 30 minutes to see how the number of people changes. |
| I  Students tell how many years they have attended the school. | J  A class collects data on which place they would like to visit for a vacation. |

|  |  |
| --- | --- |
| K  A company records the total profits every year to see if profits are increasing or decreasing. | L  Students identify the number of pets that live at their house. |
| M  A farmer keeps a running total of precipitation over a two-year period. | N  Students name the types of pets they have at their house. |
| O  Students tell whether or not they prefer PE, Music, Art, or Computer classes. | P  Students measure their arm span in centimeters (length fingertip to fingertip with arms stretched out). |
| Q  At school, every class reports the number of students enrolled in the class. | R  A student keeps a daily total of how many pages he has read over the summer. |