The intended purpose of this document is to provide teachers with a tool to determine student understanding and suggest instructional moves that may help guide a student forward in their learning of a particular concept or standard. This guide is not an exhaustive list of strategies.

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| **Measurement and Data**  **Represent and Interpret Data** | |
| **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. | |
| **Trouble Getting Started**  **or with Graph Organization** | **Students who struggle with the purpose of their graph or a question to ask:**   * Ask students:   + What types of activities do you like yourself?   + What do you want to know about your classmates?   + If someone were going to ask you a question about yourself, what would you want them to ask you? * Give students options for possible questions to ask. Select between….   **Students who struggle coming up with categories or possible answer choices:**   * Ask students:   + 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?   **Students have difficulty determining if data is categorical or numerical:**   * Ask students:   + 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? * Have students collect graphs from newspapers, magazines, and websites and sort the samples according to types.   **Students who struggle with organizing the data into categories:**   * Provide a sorting mat with a limited number of spaces or groups. * Reduce the amount of data that the student is sorting. * Remove some of the cards from the group of responses. * Talk with students about how they are going to keep track of their data. Are they planning on using a table? A list? A whole group conversation or some student examples may help to give students ideas about how to organize their own data.   **Students who struggle creating a representation:**   * Provide blank paper or graph paper to help them plan and organize their display before creating on a large poster. * Provide a model for students to compare their work with. Ask students to consider what they need to add to their representation.   **Students who struggle with a scale:**   * When creating their own graph, 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. * Give students different size representations of the same data (i.e. scale counting by 1’s, 2’s, 5’s…). Ask them to consider what is revealed by the different perspectives. |
| **Trouble with Frequency Tables** | **Students have difficulty reading a frequency table:**   * Provide students with models of a frequency table. * Ask students:   + What data are you collecting?   + What data is this table supposed to show?   + What does frequency mean?   + What do the tally marks represent?   **Students have difficulty creating or organizing a frequency table.**   * Ask students:   + What does that data tell us?   + What should our data labels be?   + What answers might you get to your question? Where can we put that information?   + How can we represent how many of each number we have?   + How can we ensure that we have recorded all of the responses? * Provide students with graph paper to help them organize the data. * Provide students with a frequency table framework or graphic organizer. |
| **Trouble with Bar Graphs** | **Students have difficulty reading a bar graph:**   * Provide students with models of bar graphs. * Ask students:   + What data are you collecting?   + What data is this graph supposed to show?   + What do the numbers on the side mean?   + How is the axis labeled?   + Is there a scale on the bar graph?   + How does the scale affect the data on a bar graph?   **Students have difficulty creating a bar graph:**   * Provide students with models of bar graphs. Ask students:   + What do they notice about the bar graph?   + How is the information organized?   + What do these numbers on the side mean?   + 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.   S**tudents have trouble staying organized with their data:**   * Provide graph paper to help students organize the data. * Let students use color to distinguish between different categories of data on their graph. |
| **Trouble with Line Plots** | **Students have difficulty reading a line plot:**   * Provide students with models of a line plot. * Create a class/small group line plot having each student mark their own data. When you ask questions about what an X represents, students will internalize that each X was one person’s data. * Ask students:   + What data are you collecting?   + What data is this line plot supposed to show?   + What does each X on the line plot mean?   + How is the axis labeled?   **Students have difficulty creating a line plot:**   * Show students different examples of line plots. * Ask students:   + What does a line plot look like?   + What information do we put on the bottom of the line plot?   + What does each X on the line plot mean?   + How can we be sure that we have included all of the data?   + How would you determine how many X’s are needed for each value?   + What should we count by when labeling the line plot?   **Students who struggle with organizing a line plot:**   * Provide them with graph paper. Have them place one X in each box to keep the Xs organized and a consistent size. * Provide students who are unable to sequence the numbers on the line plot with a number line/line plot that has already been labeled. * Suggest students start with the smallest distance and place those on the line plot first. * Suggest marking off each piece of data after it is added to the line plot to help students organize the information. * Have students compare their data with their peers. One missing piece of data will cause the discovery answers to be incorrect when comparing with peers.   **Students are confused between the most common distance and the farthest/largest distance:**   * Have students count to make sure they have included all data on the line plot before beginning their discoveries. * Make a “human line plot” using butcher paper. After all data has been collected, have students stand on their distance so students can clearly see the most common distance jumped (where most kids are standing) compared to the farthest distance jumped. |