Lesson Plan: The Data Detective and the Case of the Candy Clues

Materials Needed:

- One fun-size or standard bag of multi-colored candies (like M&M's, Skittles, or gummy bears)
- A plain white piece of paper or a notebook
- Colored pencils, crayons, or markers that match the candy colors
- A standard pencil
- A ruler (optional, but helpful for neatness)
- A calculator (optional)
- Access to a computer with spreadsheet software like Google Sheets or Microsoft Excel (for the extension activity)

Lesson Information

- **Subject:** Data Science, Math, Critical Thinking
- **Student:** Lorien (Age 12)
- **Time Allotment:** 60 minutes

1. Learning Objectives

By the end of this lesson, Lorien will be able to:

- Formulate a question that can be answered with data.
- Collect and organize a small dataset by sorting and tallying.
- Represent the collected data accurately by creating a bar graph.
- Analyze the data to draw at least two valid conclusions or inferences.

2. The Mission: The Hook (5 minutes)

"Welcome, Data Detective Lorien! We have a special case today. A mystery source has left behind a single, crucial piece of evidence: this bag of candy. Our mission, should you choose to accept it, is to analyze this evidence. We can't solve the whole mystery today, but we can practice our skills by answering one key question: **What is the most common color in this bag, and what story does the data tell us?** Let's open the evidence bag and begin our investigation."

3. The Investigation: Guided Activity (25 minutes)

Step 1: Data Collection and Sorting

1. Carefully empty the bag of candy onto a clean surface. This is your entire dataset!
2. First, count the total number of candies. Write this number at the top of your paper. This is your "Total Sample Size."
3. Next, sort the candies into groups based on their color. Create a neat pile for each color.

Step 2: Organizing the Data (Creating a Tally Chart)

1. On your paper, create a simple chart with two columns: "Color" and "Tally."

2. List each candy color in the first column.
3. For each color group, count the candies and represent that number using tally marks in the second column. (Remember: four vertical lines and the fifth crosses them out for easy counting!)
4. Once you've tallied every color, add a third column called "Frequency (Number)" and write the total number for each tally.

Example Tally Chart:

Color	Tally	Frequency (Number)
Red	IIII	4
Blue	IIII II	7

Step 3: Data Visualization (Creating a Bar Graph)

1. Turn your paper to a new page. Use a ruler to draw an L-shape for your graph axes.
2. The horizontal line at the bottom is the **x-axis**. Label it "Candy Color." Space out the names of each color along this line.
3. The vertical line on the side is the **y-axis**. Label it "Number of Candies." Mark numbers on this axis, starting from 0 at the bottom and going up. Make sure you go high enough to include your most frequent color! (e.g., 0, 1, 2, 3...)
4. Now, draw a bar above each color name. The height of the bar should match the number of candies you counted for that color. Use your colored pencils to make each bar match the candy color for a professional-looking chart!
5. Finally, give your graph a title, like "Frequency of Candy Colors in the Evidence Bag."

4. Cracking the Case: Analysis and Interpretation (15 minutes)

Great work, Detective! Your data is now visualized. A good detective doesn't just look at the evidence; they understand what it means. Answer the following questions in your notebook based on your graph:

- **Question 1:** Which color is the **mode** (the most frequently occurring value) in our dataset? Which color appeared the least?
- **Question 2:** If you were to close your eyes and pick just one candy from the original pile, which color would you be most likely to grab? Why? (This is about probability!)
- **Question 3 (Detective's Inference):** Write two "Case Notes" or interesting conclusions you can make just by looking at your graph. For example: "There are twice as many blue candies as red candies," or "Green and yellow candies appear in almost equal amounts."

5. Closing the Case: Assessment and Real-World Connection (10 minutes)

Let's review your findings! We will look at:

- The accuracy of your Tally Chart.
- The neatness and correctness of your Bar Graph (Did you include labels and a title?).
- The logic behind your answers to the analysis questions and your "Case Notes."

Real-World Connection: "You just performed the basic steps of a data scientist! Companies do this to figure out which products are most popular. Scientists do this to track animal populations. Video game designers do this to see which levels are the most difficult for players. They all collect data, organize it, visualize it, and then draw conclusions to make important decisions. Your detective work today is exactly how they get started!"

6. Advanced Operations: Extension Activity (Optional)

If time permits and you're ready for a bigger challenge, Detective:

- **Go Digital:** Open a spreadsheet program (Google Sheets or Excel). Enter your data with "Color" in the first column and "Frequency" in the second. Select your data and use the "Insert Chart" function to create a digital bar graph or a pie chart. How does a pie chart show the data differently?
- **Calculate Percentages:** For each color, calculate what percentage it represents out of the total number of candies. The formula is: `(Number of one color / Total number of all candies) * 100`. For example, if you have 4 red candies and 20 total candies, that's (4 / 20) * 100 = 20%.