Lesson Title	Data Collection and Graphing
Length of Lesson	One (50 minute) class period
Created By	Bo Cherry
Subject	General Science
Grade Level	7th grade
State Standards	7th: 1 c,d (Inquiry)
DOK Level	DOK 3
DOK Application	Construct, Compare, Make Observations
National Standards	5-8: A (Inquiry)
Graduate Research Element	Data collection and data analysis is a fundamental part of any scientific research. In hydrology, we deal with large data sets and several different methods of data analysis.

Student Learning Goal:
MS 7th Grade:
(Inquiry) 1 (c) Collect and display data using simple tools and resources to compare information; (d) Organize data in tables and graphs and analyze data to construct explanations and draw conclusions.

National Science Education Standards of Content 5-8:
(Inquiry - A) Abilities necessary to do scientific inquiry: Use appropriate tools and techniques to gather, analyze, and interpret data; Design and conduct a scientific investigation.

Materials Needed (supplies, hand-outs, resources)
3-4 Large bags of Skittles, Small Zip-Lock bags, Colored Pencils, Graph Paper, Computer with Excel, Projector, Excel File (INSPIRE_Excel_Cherry_08_30_11).

Lesson Performance Task/Assessment:
This lesson will begin with a short (~10-15 minute) lecture which will introduce students to various types of graphs. Explanations of how each graph can be used and how they are interpreted will accompany each graph. Students will then separate into groups of 2 or 3, depending on class size. Each group will be given a zip-lock bag full of Skittles. Students will be warned that the Skittles have been handled several times, so they should not eat them. Also, any other inappropriate behavior will not be permitted (i.e. throwing Skittles). Each group will be asked to separate the Skittles according to color. One student should record the number of each color in a two-column table. Next, students will generate a bar graph on their graph paper, using the colored pencils to color the bars

according to the color of Skittle. After generating their graph, the students will report their findings to the instructor who will put the data into a table in Excel. This Excel file will automatically generate a bar graph and a pie graph to show students how powerful Excel can be. With the remaining time, the instructor will discuss the importance of using Excel or other graphing software when dealing with extremely large data sets. Examples of hyrdographs will be shown in Excel and discussed as a class.

Lesson Relevance to Performance Task and Students:
Knowledge of various types of graphs and how they can be used to display different types of data is important to future scientists to ensure effective communication of scientific data. Also, understanding how to create these graphs and tables is an important skill for any student. Lastly, becoming familiar with how computing programs such as Excel and how these programs can handle large amounts of data is important if students choose to continue studying science.

Anticipatory Set/Capture Interest:
By using Skittles for data collection, students will be immediately engaged and there will be no need for an anticipatory set. Also, separating the class into groups and handing out the Skittles will capture the students' attention to get them excited about the activity.

Guided Practice:
The lesson will begin with a discussion of different kinds of graphs and how they are used to display data. Examples will be shown and an example graph will be generated to show students how to create a bar graph.

Independent Practice:
Students will have plenty of time to practice generating graphs and collecting data on their own. Students will be given the freedom to collect data in a manner that they think is best, as long as it is appropriate for the activity. By working in small groups, students will be given jobs to do so that all students are participating. These jobs include: sorter, data recorder, and counter. All students must work on creating the graph.

Remediation and/or Enrichment:
Remediation- Individual IEP;
Enrichment - Have students work with Excel to create tables and generate graphs.

Check(s) for Understanding:
The instructor should lead discussion and use formative feedback from those discussions in order to check for understanding. Also, the instructor should constantly check students' papers to ensure that they are keeping up with the data. The instructor should also be asking questions such as "what goes on the x-axis and y-axis?". The instructor should

also check to make sure students understand what type of graph is best for a given data set. Finally, students will turn in their final graphs for a grade, which will also be a way for the instructor to check for understanding.

Closure:
Question 1: Why is it important to collect as much data as possible? Why could we not just collect data from one group and have accurate measurements?

Question 2: For this exercise, which graph depicts the data in a more effective manner, the bar graph or the pie graph?

Possible Alternate Subject Integrations:
Chemistry, Physical Science, Mathematics

Teacher Notes:
To implement this lesson within the 50 minute period, students must have had some previous instruction on various types and different parts of graphs. This could be the second day of a two-day lesson on graphing.