EXPLORATIONS

Activity 11

Why Aren't There More Reds in My Bag?

Students will use small bags of M&M's® to make predictions, gather data, and display color distribution results in a circle graph.

Concept

- Statistics

Skills

- Finding ratios
- Creating circle graphs
- Sampling data
- Understanding sample size
- Calculator skills: [TEXT], [LIST], category lists, [STAT]

Materials

- Student Activity sheets (page 58)
- TI-73 calculators
- Small bags of Plain M&M's® (47.9g or 21g)
- Transparency of circle graph showing actual distribution of colors (page 60)
- Manila paper

Activity

Warning: M&M's®, even the plain ones, contain peanut oil. Before doing this activity, check to see if anyone in your class has a peanut allergy. If they do, you may want to use another candy similar to M&M's®.

Distribute the bags of M&M's® to each student with instructions not to open or eat them.

Ask questions about the bags of M&M's®:

- *How many M&M's® do you think are in each bag?*
- *How many colors do you think are in each bag?*
- *How many of each color? Record your predictions on the Student Activity sheet.*
- *Do you think that each bag has the same colors? Same quantity of M&M's®? Same quantity of each color? Why or why not?*

Have students open the bags and sort the M&M's® by color, again with instructions not to eat.

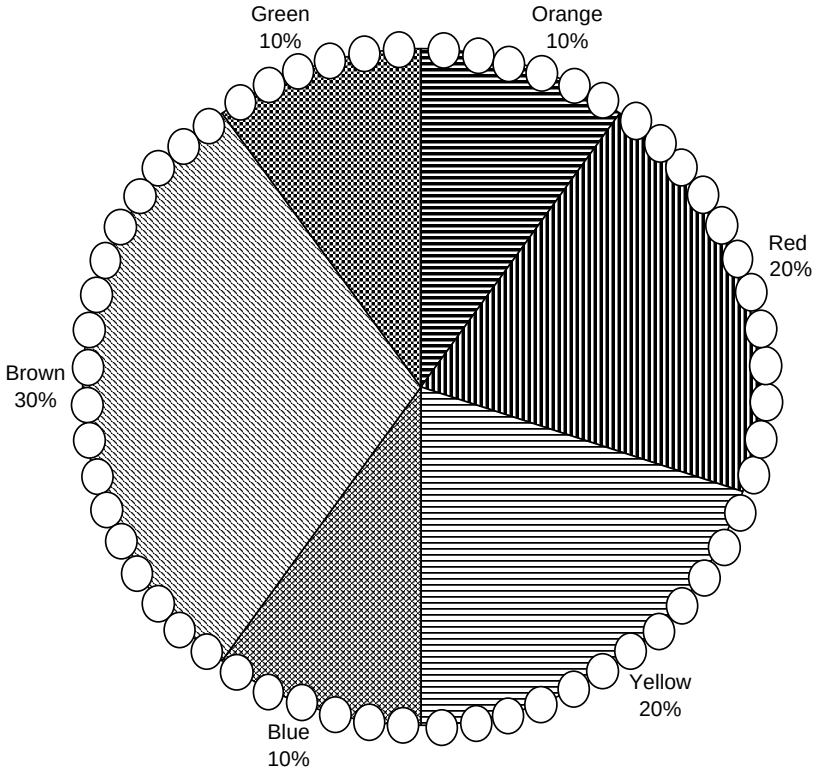
Tell each student to record the number of each color on the Student Activity sheet. Then have them record each color as a ratio, decimal, and percent of the total number of M&M's® in their bag. Discuss the concept of ratio and percent if needed.

Have each student compare the number of M&M's® in his or her bag to those of another student.

Ask students these questions:

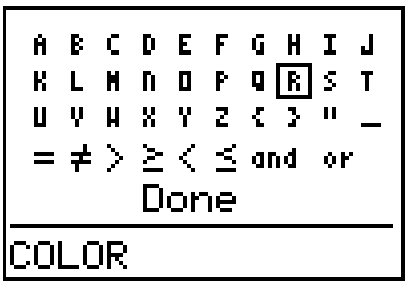
- *Do you and your partner have the same number of each color of M&Ms ®?*
- *Does your partner have the same total number of M&M's ®?*
- *Are all colors represented in both bags?*

Have students arrange the colors of M&M's® in a circle on manila paper, with like colors together and the sides of the M&M's® touching. Trace around the circle. Estimate the center and mark it. Draw a line from the center to the point where the color changes on the circle. Label each section with the color, the ratio to total M&M's®, and percent.

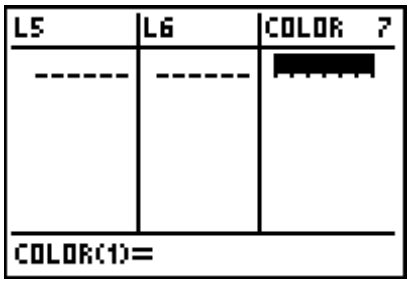


Create a list on the TI-73 called **COLOR**.

1. Press [LIST].
2. Press [▶] to move to the right of **L6** to the first unused list.
3. To name the list **COLOR**, press [2nd] [TEXT] and use the arrow keys to spell **COLOR**, pressing [ENTER] after each letter.
4. When finished, press [▼] to move down to **Done** and press [ENTER].

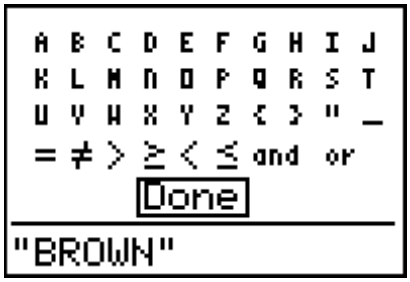


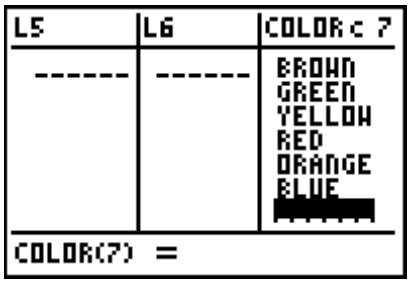
5. Press ENTER again and the list will be named.
6. Press ▼ to get **COLOR(1)=**



7. Enter the colors of the M&M's® into the list.

   Be sure to make the list a category list. To do this, enclose the first element in quotation marks (found in the text editor) when you enter it.
8. Press 2nd [TEXT] and use the arrow keys to spell **BROWN**, pressing ENTER after each letter.
9. Press ▼ to move to **Done** and press ENTER.
10. Press ENTER again and **BROWN** will be pasted on the calculator screen under **COLOR**.
11. Continue this process until you have entered all the colors.

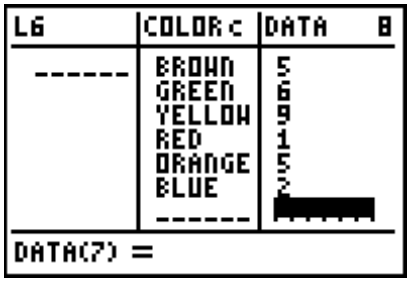




***Note**: You only have to use the quotation marks for the first color entered.*

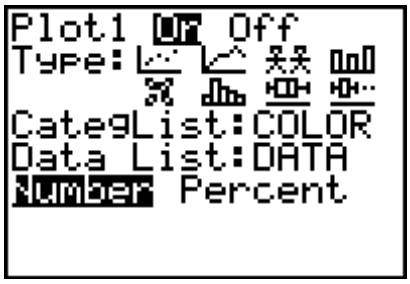
Now you are ready to enter the data.

1. Using the arrow keys, move to the top of list 8 and create a list called **DATA** using the text editor just as before.
2. When finished, press ▼ to get to the first element in the list.
3. Enter the number of each color in this list, pressing ENTER after each number.



***Tip**: This is not a categorical list, so no quotes are needed for the first element.*

Create a circle graph from the data.



***Note**: You do not need to set window values for a circle graph.*

1. On the calculator, press [2nd] [PLOT].
2. Select **1:Plot1** and press [ENTER].
3. Press [ENTER] to highlight **ON**.
4. Press [▼] and [▶] to move to the circle graph and press [ENTER] to select it.
5. For **CategList**, you want the list you named **COLOR**. To get this list, press [2nd] [STAT], use the arrows to move down to **COLOR,** and press [ENTER].
6. Follow the same procedure for the Data List, but choose the list you named **DATA**.

Before graphing, make sure all other plots are turned off.

1. Press [2nd] [PLOT].
2. If a plot other than Plot 1 is turned on, use the arrow keys to highlight that plot and press [ENTER].
3. Use the arrow keys to highlight **Off** and press [ENTER] to turn it off.
4. Press [GRAPH] to see the circle graph.
5. Press [TRACE] and use the arrow keys to explore the circle graph with students.

Have the students sketch the circle graph on the Student Activity sheet. Be sure that they label the colors and percents.

Ask the students:

- *Compare this graph with the one you created with your M&M's®. What do you notice?*

Combine data with three other classmates by adding the data together and entering it into a new list called **Group**. Create a new circle graph by pressing [2nd] [STAT] and selecting **2:PLOT 2**.

***Tip**: You cannot display two circle graphs at the same time. You must first turn off Plot 1 and then set this list up as Plot 2.*

Sketch and compare this circle graph with the circle graph for your own data. Be sure to label the circle graph.

Repeat the process by combining the whole class data into another list called class. Set this graph up as Plot 3. (Remember to turn off Plots 1 and 2.) Sketch and compare this circle graph with the two previous graphs.

Ask the students:

- *How do these three circle graphs compare?*
- *How are they different? Why?*

Wrap-Up

Compare the three circle graphs to the circle graph supplied (page 60) showing the actual distribution of colors in a package of plain M&M's®.

- *How are the three circle graphs the same?*
- *How are they different?*
- *Which of your charts is closest to the one showing the actual distribution?*
- *Why?*

***Note**: At this point you should discuss the idea of a small quantity of data (individual) versus a larger quantity of data (class).*

- *Why wouldn't all bags of M&M's® be the same?*
- *How do you think they chose the colors for M&M's® that they use?*
- *How did they choose how many of each color to include?*

Assessment

Have the students write about why the graphs might be different from others.

Collect the sketches of the circle graphs.

Make a circle graph with different data and give it to students with questions to answer.

Extensions

- Do the same experiment using a different candy.
- Compare the difference between the color distribution in plain M&M's® bags and peanut M&M's® bags. Is there a difference?

Name _____

Date _____

Activity 11

Why Aren't There More Reds?

Record your predictions in the table below, then open the bags and record the actual number of each color. Determine the ratio, decimal amount, and the percentage of the total number in the bag that each color represents.

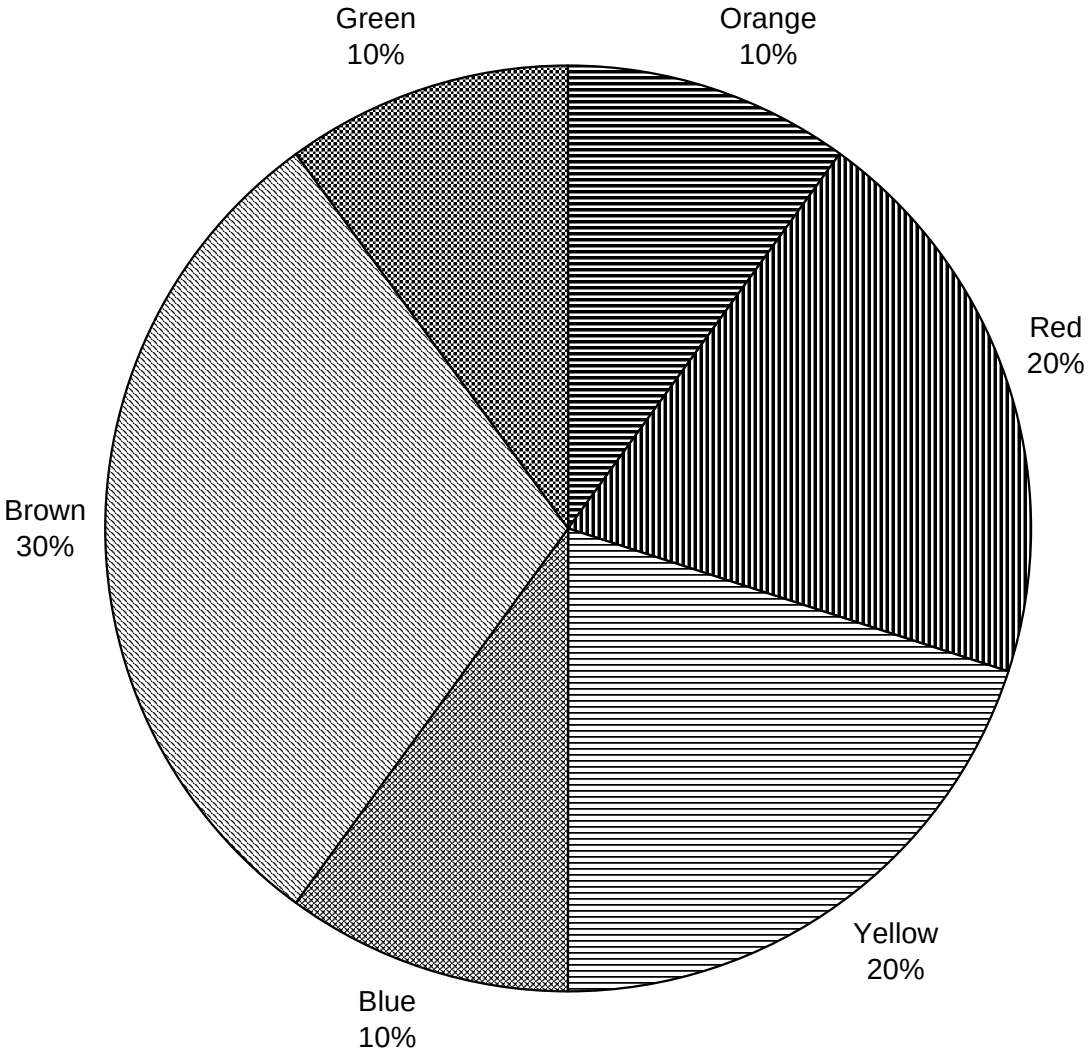
Color	Prediction	Actual	Ratio to Total	Decimal	Percent
Brown					
Green					
Yellow					
Red					
Orange					
Blue					

Circle Graph of my data

Circle Graph of my group's combined data

Circle Graph of the class data

Actual Distribution of Colors



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