Activity Name: Cookie Lab

Supplies:
3 different types of store-bought chocolate chip cookies, enough for each student
Sheets of paper with A, B, and C written at the top.
Scales for weighing cookies
Ruler for measuring
Calculators for math problems
“Cookie Lab” handouts

Preparation
Having supplies ready
Have students do “Qualitative Vs. Quantitative” and “Observation and Inference”
Work Sheet
Provide rulers, worksheets, calculators, and scales

Concept:
Students will determine which cookie is best quantitatively and qualitatively.

Activity:
Pass out the activity sheets
Pass out cookies
Have students follow the handout
propose a hypothesis
do qualitative and quantitative data

Conclusions:
Students learn to assess how these two types of data that assist researchers when they test a hypothesis.

Time: 1 hour to 1 ½ hour.
COOKIE LAB- USING THE SCIENTIFIC METHOD

INTRODUCTION:

Often two types of data can be collected from an experiment. Quantitative data is information that can be accurately measured and recorded. Qualitative data is information that requires judgment on the part of the researcher. In this lab you will be asked to take both quantitative and qualitative data.

I. PROBLEM

1. Which brand of cookie is the least expensive?
2. Which brand of cookie is the best tasting?
3. Which brand of cookie has the best appearances

II. FACTS

<table>
<thead>
<tr>
<th>Brand</th>
<th>Number of Cookies per Bag A B C</th>
<th>Cost</th>
</tr>
</thead>
</table>

III. FORMING HYPOTHESIS-Form a hypothesis about each of the problems given in Step I.

1. _________________________________________________________________
2. _________________________________________________________________
3. _________________________________________________________________
IV. EXPERIMENT

Part A: Each group of three students should have nine cookies (three of each brand). Place the three cookies of each brand on a labeled sheet of paper so you will not mix them up. The members of your group should take turns weighing each cookie and recording its mass on the table labeled Part A: Quantitative Data.

Part B: Take one cookie of each brand and as a group record the qualitative data for the three brands of cookies. Rate the cookies on a scale from 1 to 3, 1 being the worst and 3 being the most desirable for each quality.

V. RESULTS

Part A. Quantitative Data

<table>
<thead>
<tr>
<th>Brand</th>
<th>Mass Average Mass Mass of Bag</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1  2  3</td>
</tr>
<tr>
<td>A</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

Part B: Qualitative Data

<table>
<thead>
<tr>
<th>Brand</th>
<th>Texture</th>
<th># of chips</th>
<th>Crispiness</th>
<th>Color</th>
<th>Mass</th>
<th>Size</th>
<th>Taste</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
VI. CONCLUSION

1. Now that you know the mass and cost of each bag of cookies, 
   determine which brand was the least expensive.

2. Look back to your original hypotheses.
   
   Which hypotheses are supported by your data? ________________
   
   Which hypotheses are refuted by your data? ________________

3. Which brand of cookie is the best tasting? ________________

4. Which brand of cookie has the best appearance? ________________

5. Compare your results with other groups. Are the results alike? ________________

6. Which data, qualitative or quantitative, is most consistent with the rest of the 
   class?
   ___________________________________________________________________

7. Which type of data would you expect to be most accurate? Why? ________________
   ___________________________________________________________________
   ___________________________________________________________________
COOKIE LAB – Key for Teachers

This lab will very from group to groups. After lab is complete have class come back together as a group and develop the data collected for the best conclusion. Grades should be based on thorough collection of data and the conclusions reached by individual groups.
Write the letter of the term or phrase that correctly completes the statement.

_B_ 1. The recorded measurements taken during an experiment are:
   (a) conclusions (b) data (c) variables (d) controls.

_D_ 2. A statement that explains an observations is called the
   (a) experiment (b) observation (c) variable (d) hypothesis

_B_ 3. Changes that occur during an experiment are compared with an
   unchanged group called the:
   (a) variable (b) control (c) hypothesis (d) conclusion

_B_ 4. Testing the hypothesis is called:
   (a) a conclusion (b) an experiment (c) a theory (d) a law

_D_ 5. At the end of an experiment, a scientist forms a(n):
   (a) problem (b) hypothesis (c) observation (d) conclusion

Each sentence below describes a step of the scientific method. Match each sentence with a step of the scientific method listed below.

_A_ 6. Grant wondered if dyes could be taken out of leaves, flowers, and stems of
   plants.

_C_ 7. Tiffney soaked six different kinds of seeds in water for 24 hours. Then she
   planted the seeds in soil at a depth of 1 cm. She used the same amount of
   water, light, and heat for each kind of seed.

_A_ 8. Ty read about growing plants in water. He wanted to know how plants could
   grow without soil

_B_ 9. Angela said, "If I grow five seedlings in red light, I think the plants will grow
   faster than the five plants grown in white light."

_D_ 10. Doug fed different diets to three groups of guinea pigs. His experiment showed
    that guinea pigs need vitamin C and protein in their diets.
Multiple Choice: Write the letter of the phrase or term that correctly finishes the statement.

_ A __ 11. The petrified trees at Florissant Fossil Beds are thought to be:
(a) sequoias (b) firs (c) beech (d) ponderosa pines

_ D __ 12. The trees are thought to have become petrified as a result of:
(a) hot lava from volcanoes (b) old river deposits (c) Pikes Peak sediments (d) volcanic mudflows

_ C __ 13. Dinosaur fossils are not found at Florissant Fossil Beds because:
(a) the climate was too cold (b) they were not in the area (c) they were already extinct (d) they did not get preserved

_ C __ 14. Only the bases of the trees are petrified because:
(a) the tops had already rotted away (b) fire burned the tops off (c) that was the only part that got surrounded (d) the bases were stronger than the rest of the tree

_ D __ 15. By studying the petrified trees, scientists have determined that:
(a) the climate was much different at one time than it is today (b) the rain was much greater than today (c) the trees were up to 500 years old based on tree ring studies (d) all of the above