



# Consumer Investigations: What Is the “Best” Chip?

**T**he “Investigations” department recognizes the importance of students’ exploring mathematics in a real-world context. This investigation helps students learn to identify multiple approaches for solving problems. Students will seek answers to the types of questions often posed by consumer agencies and people who work in sales and marketing.

A mathematical investigation is defined as a collection of worthwhile problem-solving tasks that are amenable to mathematical treatment. The collection as a whole—

- has multidimensional content;
- is open ended, permitting several acceptable solutions;
- is an exploration requiring a full period or several classes to complete;
- is centered on a theme or event; and
- is often embedded in a focus question.

In addition, a mathematical investigation involves a number of processes, which include—

- researching outside sources to gather information;

- collecting data by conducting surveys, observing, or measuring;
- collaborating, with each team member taking on specific jobs; and
- using multiple strategies to reach solutions and conclusions.

This investigation allows students to become consumer researchers, similar to those who work for consumer agencies. On the first day of the investigation, the class will brainstorm criteria to use for product testing of potato chips, tortilla chips, banana chips, and other snack chips. In small groups, the students will investigate chips and develop criteria to support their choice of the “best” chip. On the second day of the investigation, the student groups will gather data to investigate each type of chip. On the third day, the groups will present their results to the class, using visual displays. This exploration illustrates how students can investigate questions that can be addressed with data and how they can “collect, organize, and display relevant data to answer them” (NCTM 2000, p. 176).

## Objectives

As a class, the students will develop a list of criteria for determining the “best” snack chip. Groups of students will—

- gather data found on labels of different kinds of snack chips;
- organize the data into charts or graphs;
- distinguish between qualitative criteria (qualities such as taste and crispiness) and quantitative criteria (measurable amounts);
- decide on the criteria used to determine the best chip; and

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*Edited by Rosamond Welchman, welchman@brooklyn.cuny.edu, 407 6th Avenue, #3, Brooklyn, NY 11215. This section is designed for teachers who wish to give students new insights into familiar topics in grades K–6. This material can be reproduced by classroom teachers for use in their own classes without requesting permission from the National Council of Teachers of Mathematics. Readers are encouraged to send manuscripts appropriate for this section to the editor.*

- give whole-class presentations explaining their choices.

## Materials

Each student will need one 3 × 5 index card. Each group of four to six students will need paper and pencils, three small bags of chips, and a calculator. Small bags of chips are preferable. If large bags are used, put the chips into small plastic bags; label each bag; and provide the nutrition information, weight of the bag, and cost of each type of chip on a separate piece of paper.

## Day 1: Preparing for the Investigation

1. Display the bags of chips to be used for the investigation, for instance, potato chips, tortilla chips, or banana chips. This investigation does not involve the brands of chips, but teachers might design an extension to compare brands of one type of chip.

2. Hand out an index card to each student, and ask students to write down which chip they think is the best and why.

3. Divide the students into groups of four to six, and ask them to read their responses to their groups.

4. Ask a representative from each group to report on the group's discussion. On chart paper or the board, record the criteria that the students used to determine the best chip. This discussion should help students recognize the difference between qualitative and quantitative responses, and they should sort the responses into those two categories. For example, some students might use qualitative criteria, such as flavor for banana chips, crispiness for potato chips, and similar attributes. Others might use quantitative data, such as cost, calories, total fat, and so on.

5. Discuss with the class the criteria that they used to determine the best chip, distinguishing between qualitative and quantitative criteria. Have students select the quantitative criteria, such as calories, total fat, sodium content, protein, cost per ounce, number of chips per ounce, and so on, that they can use to determine the best chip. Discuss how to compare different chips when the servings are not the same size.

6. Help the students design a rubric that they can use during the investigation for each quantitative criterion. The class discussion should generate a description of each level of the rubric by determining when a high or low value would be better for each of the criteria and why. The class chart might resemble the following:

Criteria	Low Value	Medium Value	High Value
Calories per serving	Less than ___ calories	Between ___ and ___ calories	More than ___ calories

## Day 2: Structuring the Investigation

1. Tell the students that they are preparing reports on the best snack chips for a consumer magazine. Their reports should include accurate information, use visual aids to show the information, be well organized, and have a conclusion or recommendation.

2. Use the data about calories to model product testing. Discuss ways to present the data, such as through tables, charts, or graphs.

3. Distribute calculators and bags of chips or copies of the nutrition facts, weight, and cost facts to each group.

4. Have the groups develop criteria for high,

Criteria	Low Value	Medium Value	High Value
Calories	Less than ___ calories per serving	Between ___ and ___ calories per serving	More than ___ calories per serving
Total fat	Less than ___ percent per serving	Between ___ and ___ percent per serving	More than ___ percent per serving
Sodium	Less than ___ milligrams per serving	Between ___ and ___ milligrams per serving	More than ___ milligrams per serving
Protein	Less than ___ grams per serving	Between ___ and ___ grams per serving	More than ___ grams per serving
Cost per ounce	Less than ___ per ounce	Between ___ and ___ per ounce	More than ___ per ounce

medium, and low values for the other quantitative data. A sample template is included as **table 1**.

5. Allow time for the students to work in groups to gather the information on each type of chip from the labels. Students can organize this information using charts, tables, or bar graphs, as they did for the calorie content.

6. Using the information gathered, decide which chip is the best by discussing the criteria, for example, Which chip has the fewest calories? Would cost be a consideration if a certain type of chip contains less fat or sodium? The teacher should circulate among the groups to facilitate their work, ask groups to explain their thinking,

and clarify any misconceptions about the investigation that the students might have.

## Day 3: Concluding the Investigation

The groups give presentations to the class, using the charts, tables, or graphs that they developed to determine the best chip. The students should evaluate the presentations given by their classmates. They should make sure that the calculations are correct, that the visual aids are readable, and that the presentations support the criteria for the best chip. The class may also discuss the idea that *best* means different things to different people according to what they value most.

## Extending the Investigation

1. Students can discuss ways to compare qualitative criteria, such as taste, and develop and test a rubric related to taste.

2. Students can conduct a survey to determine which chip the teachers and other students in the school think is best. The class can then compare the results of the survey with the results of the classroom investigation.

3. Students can conduct a similar investigation to compare specific brands of one type of potato chip or tortilla chip, using qualitative or quantitative criteria.

4. Students can graph calorie content, total fat, and so on, for each type of chip, using a spreadsheet as part of their presentations.

5. Students can do research from consumer guides or on the Internet to evaluate other foods that they like.

6. Students can use the information that they have gathered to write an advertisement for the best product.

## Concluding Comments

This investigation engages students in an approach to problem solving that includes aspects of market research. Students learn the difference between qualitative and quantitative values. Through cooperative learning and communication, students support their conclusions with quantitative data and begin to understand how to evaluate qualitative data.

## Reference

National Council of Teachers of Mathematics (NCTM). *Principles and Standards for School Mathematics*. Reston, Va.: NCTM, 2000. ▲

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