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**productivity in the
classroom**

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It's in the (Chocolate) Chips

Subjects: Science, Math
Grade Level: Intermediate, Middle School
Required Software: Microsoft® Excel 97, Microsoft® Word 97, Microsoft® PowerPoint® 97

▶ Teaching Guide
▶ Student Activity

Teaching Guide

Summary
 Students will investigate which brand of chocolate chip cookies contains the most chocolate; they analyze and compare data using Microsoft Word and Microsoft Excel, and then use Microsoft PowerPoint to communicate their findings.

Objectives
 To provide students with hands-on practice in the scientific process: establishing hypotheses, investigating, recording data, comparing, and writing conclusions, to help students make the connection between the study of math and science and their real-life concerns (such as making consumer choices), and to build students' communications skills.

Prerequisite Skills
 Understanding of the concept of mass and the use of metric weights and basic familiarity with Microsoft Office tools, including Word, Excel and PowerPoint.

Hands On Materials Needed

- Chocolate chip cookies from two different brands, five cookies per team
- Paper towels
- Food scale or other scale to weigh in grams

Time Alloted
 Two class periods

How to Begin
 Ask students which brand of chocolate chip cookies they consider best and why. Consider different criteria for determining the best cookie: Is it taste? Size? Amount of chocolate? Explain that today the class will investigate two brands (A and B) of chocolate chip cookies to determine which contains the most chocolate. Half the class will experiment with Brand A and the other half with Brand B.

Before you organize the class into teams, tell students they will be conducting their experiment using the Office tools. They will use Word to write their hypothesis and results; Excel to analyze their data; and PowerPoint to present their findings in a slide show and on the Web.

Student Activity

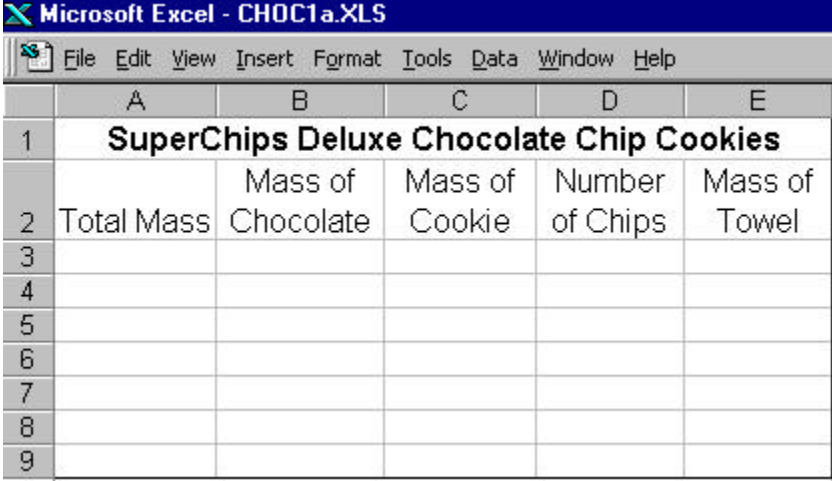
Description

What's your favorite brand of chocolate chip cookies? Is it the one with the most chocolate per bite? In this activity, you will uncover the chocolate quotient in several popular cookie brands.

STEP 1 *Preparing Your Spreadsheet*

SOFTWARE: Microsoft Excel

WHAT TO DO: You'll be using a spreadsheet to track and analyze your chocolate chip data. Here's how to set it up:



Microsoft Excel - CHOC1a.XLS					
File Edit View Insert Format Tools Data Window Help					
	A	B	C	D	E
1	SuperChips Deluxe Chocolate Chip Cookies				
2	Total Mass	Mass of Chocolate	Mass of Cookie	Number of Chips	Mass of Towel
3					
4					
5					
6					
7					
8					
9					

1. Open Excel and create a new worksheet, and save it under a unique file name.
2. In cell A1, type the name of the brand you're investigating.
3. In cells A2 through E2, type these column headings, respectively: Total Mass, Mass of Chocolate, Mass of Cookie, Number of Chips, and Mass of Towel.
4. Highlight A2:E2. On the Format menu, click Cells, choose Alignment, then check Wrap Text. Save again.

STEP 2 *Making Your Hypothesis*

SOFTWARE: Microsoft Word

WHAT TO DO: Scientists begin their investigations with an educated guess called a "hypothesis," which they then test against real data. Here's how to create your own hypothesis:

1. Open Word, create a new document, and save it as *Hypothesis*.
2. Choose an average cookie from your set and estimate how much of it is chocolate.
3. Record your estimate as a hypothesis: "Our team hypothesizes that

Brand X cookies contain an average XX proportion of chocolate per cookie." Express your estimate as a fraction, a percentage, or a ratio.

4. Add notes about how you reached your estimate. To include a sketch, pull down the View menu, click Toolbars, choose Drawing, and use the oval AutoShape. Save your file.

STEP 3 *Collecting Data*

SOFTWARE: Microsoft Excel

WHAT TO DO: Decide on a minimum number of people to be surveyed. Set up tables in public places, such as at a mall, inside or outside a grocery store, or at a movie theater. Please note: You must have the permission of your parents and the survey site owner before administering their survey. Be sure respondents fill out the entire survey and thank them for taking the time to do so. Now, for each respondent, average the numerical values of their responses to the survey statements and write this "score" in the Key Code Average box on the survey form.

STEP 4 *Analyzing the Results*

SOFTWARE: Microsoft Excel

WHAT TO DO: Now roll up your sleeves and get ready for lab work. Here's what to do:

1. Choose one cookie, weigh it to find its mass, and enter this figure into spreadsheet cell A3.
2. Weigh a sheet of paper towel, and enter this mass in E3. Since this figure will be the same for every cookie, select E3, click on the "fill handle" in the corner of the cell, and pull down to cover as many cells as you have cookies. When you release, the figure will fill each cell.
3. On a towel, pick out the chocolate chips from the cookie.
4. Place the chips on another towel and weigh them. In cell B3, create a formula, $=X-E3$. Replace X with the weight of the chocolate you just found, press Enter, and the true Mass of Chocolate will appear.
5. Now let Excel calculate the Mass of Cookie based on the other figures you've entered. Go to cell C3 and type $=A3-B3$. Press Enter. Copy the formula by clicking on the fill handle on the corner of the cell and dragging down through C7. When data is entered for each cookie, Mass of Cookie will automatically be calculated.
6. Count the chips and enter this number in cell D3.
7. Repeat steps 1-6 for all five cookies. Save all your piles of chips and crumbs, labeling the towels to keep each cookie's data separate.
8. Weigh each pile of crumbs and see if this mass matches what you've calculated in column C. How do you explain any differences you see?

STEP 5 *Crunching Your Data*

SOFTWARE: Microsoft Excel, Microsoft Word

WHAT TO DO: Here's how to make sense of your data.

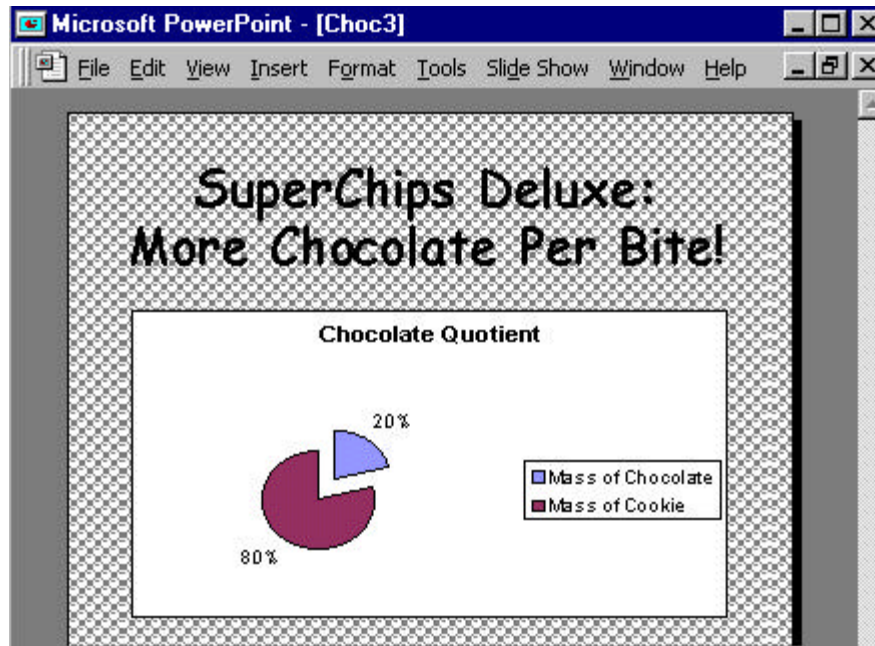
Microsoft Excel - Choc2.xls					
File Edit View Insert Format Tools Data Window Help					
	A	B	C	D	E
1	SuperChips Deluxe Chocolate Chip Cookies				
2	Total Mass	Mass of Chocolate	Mass of Cookie	Number of Chips	Mass of Towel
3	50	10	40	23	5
4	49	8	41	19	5
5	52	11	41	20	5
6	50	12	38	21	5
7	48	10	38	19	5
8	49.8	10.2	39.6	20.4	5
9					

1. Calculate the average of each of your cookie columns. To do this, click cell A8 and type in this formula: =Average(A3:A7). Press Enter. Click on the fill handle and drag through cell E8.
2. Make a pie chart that shows Mass of Chocolate and Mass of Cookie as percentages of the Total Mass. To do this,
 - Highlight cells B8:C8.
 - Hold down the CTRL key, and highlight B2:C2.
 - On the Insert menu, click Chart, choose Pie Chart, and select a type.
 - Click Next two times to go to Step 3 of the Chart Wizard.
 - Click the Titles tab, and type Chocolate Quotient.
 - Click Data Labels tab and choose Show Percent. Click Finish.
3. Select the whole chart and Copy it. Then open your Hypothesis Word document and Paste the chart there. Compare results to your estimate.

STEP 6 *Comparing and Communicating*

SOFTWARE: Microsoft PowerPoint

WHAT TO DO: You're about to decide once and for all which cookie brand has the highest chocolate quotient - and then tell the world! Here's how:



1. Compare your results with those of the other teams analyzing the same brand. If results differ significantly, reweigh and recalculate.
2. Put together a PowerPoint presentation summarizing your results. Import spreadsheet data and graphs, or create new ones as needed. For extra dazzle, try the PowerPoint Animation option.
3. Make your presentation to the other half of the class; they'll do the same. Which cookie brand rules?
4. Combine your results into a whole-class PowerPoint presentation that you can deliver to other classes or the entire school.
5. Save your team and class PowerPoint presentations as HTML documents to post on your school or classroom Web page.

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