

Lesson Plans
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All reference material comes from Math Trailblazers (M.T.)
Grade 5 Data

Day 1: Students will investigate the relationship between the area of spots relative to the number of drops of water using paper towels.

Key Content: Measuring the area of irregular shapes
Collecting and organizing data

Key Vocabulary: area
Manipulated variable
Responding Variable

Materials: Student Guide Pages 135-140 (Math Trailblazers)
Centimeter graph paper
Eyedropper (1 per group)
Ruler
Container of water
3-4 sheets of paper towel per group (same brand)
scissors

Before this Unit: Students were introduced to terms manipulated and responding variables.

Developing the Lab: Read the Students Guide (MT) as a class to set the stage for this activity. Identify with the students the two main variables in the lab. The number (N) of drops is the manipulated variable. The area (A) of spots created is the responding variable since they find the values for area by doing the experiment. Use Questions 1-4 in the Student Guide (MT) to check their understanding of experiment as described. Question #1 asks how to measure area of the spots. One way is to outline the spots with a pencil after the water has stopped spreading. When the spots are dry enough, students should cut them out and trace them on centimeter grid paper (Master Copies MT). Once the areas are traced on the grid paper, they should be labeled with the number of drops used to make the spot. Students should be familiar with a technique for finding an area by counting the square centimeters. Students identify the manipulated and responding variables in Question #2. Question #3. To look at the relationship of these to variables, other variables need to be kept the same (type of paper towel, type of liquid, the same size eyedroppers, and procedure for making the drops). Question #4 asks why it is a good idea to make more than one trial. (we might make a mistake) Examples of mistakes: counting area wrong, or not keeping all the fixed variables the same. After discussing, students are ready for the experiment using Questions 5-9 on the Spreading Out Lab in the students guide (MT) They begin by drawing a picture of their experimental setup labeling the main variables. This will give you the opportunity to see if students have a clear understanding of the methods and variables and are ready to go on. Students must choose values for the number of drops. (You might want to pick these for them so they don't get carried away!) Don't use 3 or 5.

Day 2: Students will be Collecting and Organizing Data

Key Content: Remind Students of the procedure for collecting data

Students decide on the Number of spots to use, number of trials, how to check if their data is reasonable, and how to organize data. Students collect data and record it in data table. Students use mean or median to represent data.

Collecting Data/ Doing Experiment: Question #6 asks students to make decisions concerning the collecting and recording the data. 6A and 6B ask them to decide how many trials they will make and how they will organize their data. You can provide more structure by handing out a blank sheet from Three-trial Data table (MT generic copies). Remind students that they should make their spots so each is clearly defined and spots don't run together. Students will count the square centimeters to measure each spot and record in their data table. Students should then find their medians or means (average). Observe students working and recording data. If they find data that doesn't seem reasonable, encourage them to find the reason for the big differences.

Day 3: Students will be able to graph their data.

Key content: Students plot their data on point graphs. Students use a ruler to draw a best-fit line.

Graphing the Data: Ask students to graph the data. You might want to go over the types of graphs they have discussed and decide which is the appropriate type of graph based on the information/variables used. Page 138 Student Guide (MT) discusses the point graph and the bar graph. Read aloud with class to determine the appropriate graph to use in this experiment. Students should demonstrate understanding that using a point graph is better than a bar graph for this data. Discuss reasons why. Each student constructs a graph on their centimeter graph paper. Observe students labeling variables (N) Number of drops on the horizontal axis and (A) area on the vertical axis. Have them add a point (0 drops, 0 square cm) to the graph since no drops will produce a spot with no area. Plot all the data (ex. 1 drop, 5cm) (3drops, 19cm) etc.. Once all four points have been graphed, using a ruler or a piece of spaghetti noodle, have students draw a best-fit line.

Day 4: Students Explore the Data

Key Content: Students make predictions based on their data and check their predictions using the lab set-up.

Explore the Data: Using the graph paper and data tables students use these to help answer questions 10-12 Page 140 Student Guide (MT). #10. Use the graph to predict the area of a spot made with three drops of water. Show your work on the graph and make a prediction. Mark a spot using three drops of water. Find the area. Repeat with five drops. Ask questions to see if the understand their graph. How many drops will it take to make a 40 square cm. spot. Explain. Find another way to solve this problem... Use Question #13 to assess students' abilities to solve an open-ended problem and communicate solution strategies. Students will discuss their responses to the questions. Assign a compare and contrast written assessment comparing the different brands of paper towels. Have different groups plot their points and lines on one graph on an overhead labeling their best fit line with the brand name. Students look at the various best fit lines and determine the better/worse type of paper towel used in the classroom.

Day 5-7. Students will collect , graph and analyze data on the length of time soap bubbles live. They compare graph of the “age at death” of bubbles and the age of “death of animals”.

Key Content: Collecting and graphing data
Using patterns in tables and graphs to make generalizations about data.
Using percents.

Materials: Comparing Lives of Animals and Soap Bubbles Lab Pages (Student Guide MT) p.280
Centimeter graph paper for each student
One jar of bubble solution with wand
One stopwatch per group
One calculator per student

Day 5: Launching the Investigation/Experimenting with Soap Bubbles

To begin the investigation, read and discuss the description of the lives of different kinds of animals. (page 280 student guide MT) Ask students to match 3 descriptions of the life spans of three kind of animals with three different graphs showing percent of animals that die at a certain age. Be sure students can identify each graph. Graph A match robins because all ages are likely to die an equal percent. Graph B shows life span of a human because majority of human live longer. Graph C represents oysters since the bars are to the left telling us they die at a young age. The shape of these graphs will be compared to the shape of the graph showing the percent of bubbles that burst after any given number of seconds.

Try out a few bubbles and ask students what the variables are in this experiment. 2 main variables are the time at which the bubble pops and the percent of bubbles that pop after a given number of seconds. Students may also say that there are other variables involved: bubble solution, air temperature, size of bubble, etc.

Develop a Plan: Develop a plan for collecting reliable data on life span of soap bubbles.

When does a bubbles life begin and end? (When will you start and stop the timer?)
To find out how long a bubble will live they should catch it with the wand. The moment the bubble Lands on the wand is the beginning and the moment it pops is the end.

What variables are fixed? The solution and the way the wand is held (up or down), along with room Conditions.

Which bubble is part of sample? Try to avoid “Double Bubbles”. Bubbles should be the same size.

How many bubbles will you sample? Each group do 20-25 to provide enough data.

How many students in a group? 3 ..blower and catch bubble, timer, record data

Day 6: Drawing a Picture and Collecting Data

Direct students to draw a picture which shows the procedures and identifies the variables. Once each Group has a clear idea of the procedures they should proceed the investigation. Students will need to organize their data. (Each student can make a data table on page 283 student guide MT). Use time intervals for the first column. 1-9 second, 10-19 second, etc..Timing of the bubbles are Recorded to nearest hundredth of a second. Collect your data and fill in your data table.

Day 7: Graphing/Analyzing the Data

Have students make a graph of the data with the time (seconds) on the horizontal axis and the percent of bubbles on the vertical axis. Students should complete their graph independently as possible. Ask students to analyze the shapes of their graphs.(Assessment) most of the bars on the graph, when do bubbles burst, which graph is it similar to (Human)

Day 8-10: Project/Assessment: Which Chocolate Chip Cookie is a better buy?

Key Content: Students will collect and organize data.
Represent data using graphs
Compare different representations of the same data
Propose and justify conclusions based on data

Materials: 3 bags of chocolate chip cookies (different kinds one being a store brand)
One cookie of each kind for each student
Napkins
Prepared data sheet
Pencil
Ruler
Graph Paper

Day 8: Developing a Plan/Collecting Data

Propose the question of how could you find what makes something a “good buy”. Brainstorm ideas on the board. Introduce the chocolate chip cookie. Again, brainstorm on what makes a chocolate chip cookie a good buy. Have a prepared data sheet ready with Brand, Size of cookie, # of chocolate chips, size of chocolate chips, grams of fat, price per cookie, and taste.

Hand out a napkin to each student for their cookies. Have cookies in a bag that doesn't give the name brand away to the students. Hand out cookie number one out to students. Have them trace the cookie on a sheet of paper and measure the diameter of the cookie in cm. record their data. Next, have them count all the chocolate chip cookies in the cookies. Record. After that, have them draw the size of the chip and measure the diameter and record. Have them eat their cookie (use a second one if they destroy it finding Choc. Chips) have them rate their cookie on a scale of 1-4 with 4 being the best. Record. You will have

to supply the information of the grams of fat and price per cookie for them to fill in their data chart. Repeat steps for cookies Brand 2 and 3.

Day 9: Organizing Data/Graphing the Results of Data

Have students organize their collection of data. List sizes of each brand of cookie, # of chips, and chip Size and taste. (grams of fat and price are given) Have students find the medians of each of these categories. Using the medians of your data collections, graph your results using bar graphs. Create 2 or 3 graphs (if you want do all 6) comparing the Brands (horizontal axis) and one of the other categories (vertical axis).

Day 10: Written Assessment: Comparing Cookies

Students will interpret their graphs by writing a paragraph about which cookie is a better buy. Assessment will look at comparing the different categories of each brand using their graph or data table. After assessment are finished, reveal the name brand of the cookie.

PERFORMANCE PACKAGE TASK 1
(Title of Package)

FEEDBACK CHECKLIST FOR TASK 1

The purpose of the checklist is to provide feedback to the student about his/her work relative to the content standard. Have the standard available for reference.

Y=Yes

N=Needs Improvement

<u>Student</u>		<u>Teacher</u>
_____	A list of characteristics of what makes a cookie a good buy.	_____
_____	Data sheet is completed correctly.	_____
_____	Information on graph is labeled correctly and done neatly.	_____
_____	The conclusion is based on the evidence and refers to table or graph.	_____
_____		_____
_____		_____

Overall Comments (information about student progress, quality of the work, next steps for teacher and student, needed adjustments in the teaching and learning processes, and problems to be addressed):