LESSON 11

How Can I Find Out?

Collecting and Using Data

Objectives . . . Students will be able to:

- *Use various models to collect and represent data.*
- *Formulate and solve problems that involve collecting and analyzing data.*

NCTM Standards and NAEP Strand

Concepts learned and applied in Lesson 11 correlate to NCTM Standards 1, 2, 3, 4, and 11; and NAEP Strand 4 (Data Analysis, Statistics, and Probability).

Materials List

- paper and pencils
- string and poster board (for making a Venn Diagram)
- post-it notes
- pizza wheels
- balance scales
- counting chips
- multi-links

Each Student

- A copy of BLMs 11-A and 11-B for the "You Try It at Home" activities.

To Prepare Your Students

Introduce today's video topic and ask questions designed to ascertain if the students are familiar with the Student Prerequisites and Key Words and Terms. Present some simple examples of the type of problem to be explored—e.g., When people vote, what methods are used to gather the data? How can we tally data that we have collected? Why would we need to collect data and record it? . . .

Video Overview

In the opening sequence, we watch as a young boy measures his height; three kids play cards and keep score; a girl is counting hands in her class to see what type of books they like. Collecting and using data are everyday skills we must all have!

Student Prerequisites

- Ability to collect and record data.
- Recognize similar and dissimilar data.

Key Words and Terms

data	*record*
tally	*graph*
collect	*chart*

Video Lessons

The New Bike

A young boy's bike is worn out and his parents agree to buy him a new one . . . *if* he can find the best buy! How will the boy find out where he can get the best price on a new bike?

YOUR CLASS MAY WANT TO TALK ABOUT THIS NOW

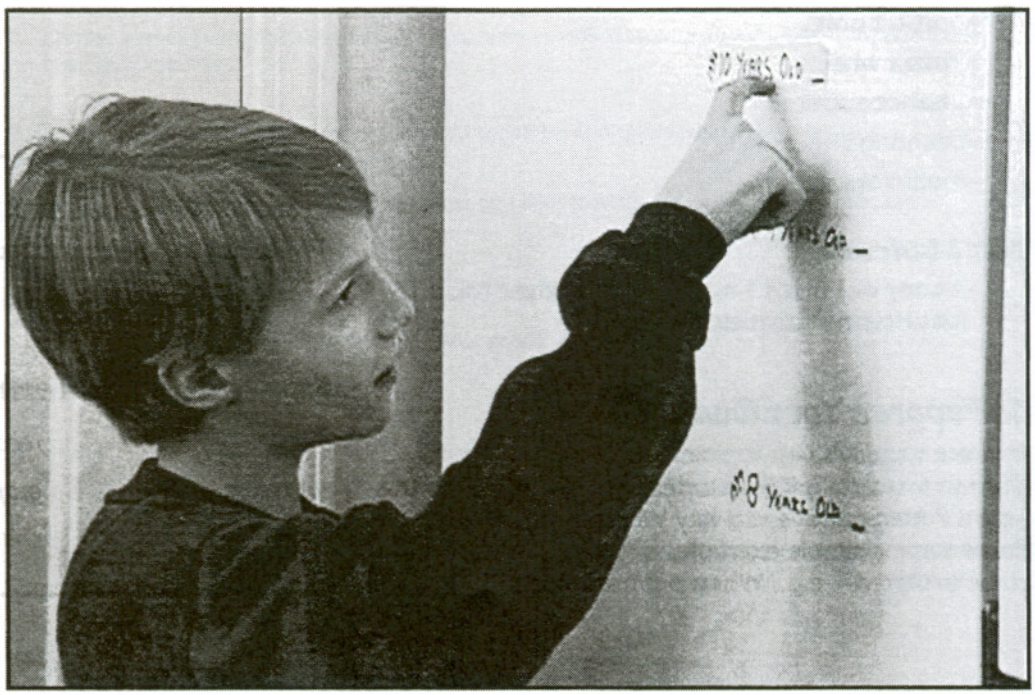
Use the following questions to help your class respond to this question.

1. Why does the boy need to find the best price?
2. What are some of the ways he can find out what the best price is?

Play

Class Party

Judy Fadness of Locust Lane Elementary poses this problem to her students: They have agreed to have a class party, but now they need to find out what to bring. She asks them to set up stations around the classroom so that they can collect data on what kind of drink and cookies they want to have at the party, where to hold the party, what kind of games to play, etc., but they cannot use pencil and paper! In essence, it will be a class survey on all the different elements. She shows them the tools they may use to collect the data: balance scales, counters of various kinds, string and a board for making a Venn Diagram (students could vote by placing markers inside the various choices, indicated with cards), post-it notes for making bar-graphs, etc.



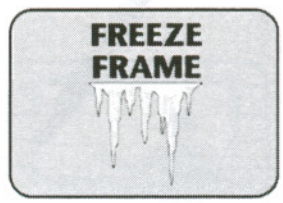
YOUR CLASS MAY WANT TO TRY THIS NOW

Break up your class into small groups and ask each to take one aspect of the problem: type of cookie, game, beverage, etc. Then ask them to devise an interesting way to collect and represent the data. When they have their stations set up, let the entire class move through each station, voting on their choices.

After they have worked out the problem, but before they present their solutions, play the video showing how other kids solved the problem.

Play

Watch the ways the children on the video solve the problem. The video then asks:



WERE THESE SOLUTIONS LIKE YOURS?

Note: Question is on-screen but there is no stop sign. Teachers should pause at this point and ask each group to present its solution. Encourage your class to think about all the solutions and remind them that there are many possible solutions.

Play

Selling Cookies

Four kids are sorting cookies to sell to make money for a class field trip. How can they find the best place in town to set up a cookie stand?

YOUR CLASS MAY WANT TO TALK ABOUT THIS NOW

Use the following questions to help your class respond to this question.

1. What would you do first to get an answer to this question?
2. What information will we need to collect in order to find the best spot in town to sell cookies?
3. Where is the best place to sell cookies in our school building in the afternoon? Does the time of day matter? What are your reasons?

Play

As the video continues, we see the Cookie Kids doing research on where best to place their stand. They then use the data to find the best location.

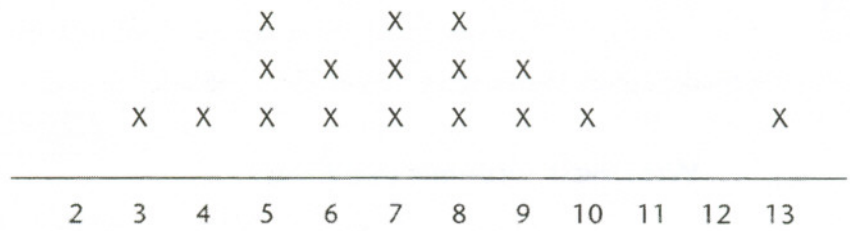
In the final segment, two kids are sharing two pizzas—one pepperoni and one cheese. A narrator asks, "What kind of pizza do most kids your age like? How could you gather the data?" The video suggests . . .

YOU TRY IT!

Extended Activities

These activities are designed to extend the mathematics learning introduced in this lesson.

1. Have students write their full first and last names. Record the number of letters in the first name on a post-it note. Record the number of letters in the last name on a different color post-it note. Record the total number of letters in the name on a post-it note of a third color. Make a line plot on the blackboard or a poster board with the post-it notes (see illustration). Determine the range of each category. Which has the most and least letters? What are the outliers?



   Which letters are used most often? Next, you may wish to make a bar graph using the *letters* in their names.

2. Survey your classmates to find some of their favorite things. Choose a category such as breakfast cereal. Ask each student what his or her favorite cereal is. Record their responses and create a chart or graph that shows the class data.

Cross-curricular Activity

Either bring in or ask your class to provide several different types of flower seeds and a bag of topsoil. Have each group plant 2-3 of the same seeds in dixie cups and label them. Make a chart or graph of how many days it took for each kind of flower to sprout. (The flowers can then be grown on the windowsill or the students can take them home to plant!)

Writing Activity

Collect data regarding the types of products advertised in different kinds of television programs, such as sporting events, news shows, cartoons, soap operas, and talk shows. What patterns do you see? Write a paragraph describing the patterns you noticed and why you think these products are advertised during these programs.

You Try It At Home

Two handout masters, numbered 11-A and 11-B, are provided in a booklet accompanying the Teacher's Guide; reproduce as many of these as you need. Reduced examples are also provided at the end of this lesson. These activities are designed to extend and reinforce concepts taught in the lesson, and to enable parents or other caregivers to become more involved with students' mathematics learning.

Assessment and Criteria for Scoring

These criteria provide a framework for scoring various aspects of the activity and should be shared with students at the beginning of the activity. It is hoped that you will feel free to alter them to meet your needs and/or create your own.

Advanced Response: Students actively used the tool chosen to collect and display the data. The group suggested an appropriate number of choices for their part of the party—game, cupcake type, drink, cookie type, where and when (may include only two possible choices for place and time, morning and afternoon). Their presentation was well organized, complete, and logical.

Proficient Response: Students actively used the tool chosen to collect and display the data, and suggested an appropriate number of choices for their part of the party. Their presentation was complete.

Partially Proficient Response: Students used the tool to some extent, but didn't appropriately collect or display the data.

Minimal Response: Students didn't use the tool in their data collection or display, although they may have spent time exploring its use or playing with it.

References and Resources

National Council of Teachers of Mathematics (1989) Curriculum and Evaluation Standards for School Mathematics. Reston, VA: The Council.
Standard 1 : Mathematics as Problem Solving.
Standard 2 : Mathematics as Communication.
Standard 3 : Mathematics as Reasoning.
Standard 4 : Mathematical Connections.
Standard 11 : Statistics and Probability.
NAEP Strand 4 (Data Analysis, Statistics, and Probability).

Suggested Children's Literature

Alison Lester, *Rosie Sips Spiders*
Kate Spoon, *Ruth's Bake Shop*
Margarette S. Reid, *The Button Box*
Russell Hoban, *Bread and Jam for Frances*

You Try It At Home 1 and 2

Getting to Work or School

Ask an adult at home or other care-giver to help you with this project. Take a survey of your family, friends, neighbors, and relatives. Ask them how they get to work or school. Record the data on the sheet below.

Walk **Car: Alone** **Car: Pool** **Bicycle** **Train** **Bus** **Other**

1. Create a graph in the space below to display your data.

2. Which is the method most often used?

3. How many methods of travel did you find?

4. What in your data surprised you? Why?

How Much Can a Can Cost?

Ask an adult at home or other care-giver to help you with this project. Discover and compare the cost of a can of soda.

1. Find the cost of a can of soda at various places, such as a supermarket, vending machine, convenience store, cafeteria, restaurant, etc. Choose at least five places to survey. Remember to always compare the same kind of soda.

2. Make a chart to display your findings.

3. Where can you buy the cheapest can of soda?

4. Where can you find the most expensive can of soda?