Problem-Solving: Math, Episode 2
Teacher's Guide

Grade Level: K–2	**Curriculum Focus:** Math	**Lesson Duration:** 1–2 class periods

Program Description

Picture This (5:41) — See how diagrams help solve problems before buildings, bridges, and other structures have even been built.
That's Discussing (5:32) — Explore how the best way to solve a problem or difficult situation might be to discuss it with a friend or knowledgeable person.
Make Sense (5:29) — Solving a problem is only half the battle. It is also important that people are able to comprehend the solution. Learn why good explanations help young scientists win a yearly science competition.
Get it Together (5:14) — See how making lists can help you organize information and prepare for situations.

Onscreen Questions

- How are pictures useful in creating buildings?
- How does discussing a problem help you find a solution?
- Why do you think it's important to give clear answers?
- Why is a list helpful when you prepare for a trip?

Lesson Plan

Student Objectives

- Explore different ways to find solutions to problems or situations.
- Draw a picture that represents a problem-solving strategy.

Materials

- *Problem-Solving: Math, Episode 2* video
- Drawing paper
- Crayons
- Pencils and crayons

Procedures

1. Discuss problems students have had and the ways they solved them. Ask students these kinds of questions:

- Have you ever forgotten your lunch? What did you do?
- Have you ever been unable to do your homework because you didn't understand it? What did you do?
- Have you ever been in a fight with somebody? How did you work it out?

Talk about the strategies scientists, engineers, and mathematicians use when solving problems. How are their strategies similar to those of the students? A good way to introduce the topic of problem solving is to watch *Problem-Solving: Math, Episode 2*.

2. After watching the program, discuss the strategies featured. When does diagramming or drawing pictures come in handy? When do students or their parents make lists to help them solve problems? How does discussing a problem or situation help solve it? Why is it important to think clearly and be organized when solving a problem?
3. Brainstorm some school-based problems with the class, such as trash on the playground, noise in the hallways, limited handicapped access in some areas, too few bathrooms or dirty bathrooms, incorporating healthier foods in the cafeteria, the need for more computers). Choosing one, discuss with students how they might go about solving it. What are some possible solutions to this problem? How would you test the solutions? Who would you talk with to discuss possible solutions? Would a diagram or drawing help you solve this problem? Do you need math to solve this problem? What would you say to make people understand your solution?
4. Ask volunteers to share some small problems they have encountered and as a class, discuss some of the ways to go about solving them. Once you are confident that students understand problem-solving techniques and the importance of delivering a clear explanation of problems and solutions, tell them that they are going to draw pictures of a problem and how they solved it.
5. Demonstrate drawing a line down the center of a piece of paper. Draw an example of a problem on one side of the paper, such as a forgotten lunch or difficulty building a model airplane. On the other side of the divided paper, draw a solution to the problem, perhaps asking a friend to share their lunch, or a child drawing a diagram of the model airplane.
6. Make sure students understand what you are asking them to do. Then distribute the drawing paper and allow time to draw pictures. More advanced students can write a sentence or two describing their problem and solution.
7. Once students have completed their drawings, have volunteers share them with the class. Talk about the different problems and solutions.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students were highly engaged in class discussions; demonstrated a clear understanding of different problem-solving strategies; and drew colorful, unique pictures that clearly identified a problem and a solution.
- **2 points:** Students participated in class discussions; demonstrated a general understanding of different problem-solving strategies; and drew somewhat colorful and unique pictures that mostly identified a problem and a possible solution.
- **1 point:** Students participated minimally in class discussions; were unable to demonstrate a basic understanding of different problem-solving strategies; and drew incomplete or inaccurate pictures that did not clearly identify a problem or drew a solution that did not fit the problem.

Vocabulary

diagram

Definition: A plan, sketch, drawing, or outline designed to demonstrate or explain how something works or to clarify the relationship between the parts of a whole

Context: Diagrams can be used to plan new structures and to find out how a damaged building looked originally.

explanation

Definition: The act or process of defining something or making it understood to others

Context: A good explanation of a solution can help us understand and solve similar problems.

problem

Definition: A question to be considered, solved, or answered

Context: Making a list is a way of organizing information to solve a problem.

strategy

Definition: To determine the dimensions, quantity, or capacity of something

Context: Discussing a problem is a good strategy to make sure a science team understands what each individual needs to solve the problem.

Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit http://www.mcrel.org/compendium/browse.asp

This lesson plan addresses the following national standards:

- Life Skills—Thinking and Reasoning: Understands and applies basic principles of logic and reasoning; Applies basic trouble-shooting and problem-solving techniques
- Mathematics—Uses a variety of strategies in the problem-solving process

National Council of Teachers of Mathematics
The National Council of Teachers of Mathematics (NCTM) has developed national standards to provide guidelines for teaching mathematics. To view the standards online, go to http://standards.nctm.org/.

This lesson plan addresses the following math standards:

- Problem Solving: Solve problems that arise in mathematics and other contexts; Apply and adapt a variety of appropriate strategies to solve problems

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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- http://school.discovery.com/teachingtools/teachingtools.html

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DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:

Play Video—This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index—Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief descriptions and total running times are noted for each part. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

***Curriculum Units*—**These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

***Standards Link*—**Selecting this option displays a single screen that lists the national academic standards the video addresses.

***Teacher Resources*—**This screen gives the technical support number and Web site address.

Video Index

Curriculum Units