

Standard 7—Interdisciplinary Problem Solving

Elementary

Connections

1. The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.

Students:

- analyze science/technology/society problems and issues that affect their home, school, or community, and carry out a remedial course of action.
- make informed consumer decisions by applying knowledge about the attributes of particular products and making cost/benefit tradeoffs to arrive at an optimal choice.
- design solutions to problems involving a familiar and real context, investigate related science concepts to inform the solution, and use mathematics to model, quantify, measure, and compute.
- observe phenomena and evaluate them scientifically and mathematically by conducting a fair test of the effect of variables and using mathematical knowledge and technological tools to collect, analyze, and present data and conclusions.

This is evident, for example, when students:

- ▲ develop and implement a plan to reduce water or energy consumption in their home.
- ▲ choose paper towels based on tests of absorption quality, strength, and cost per sheet.
- ▲ design a wheeled vehicle, sketch and develop plans, test different wheel and axle designs to reduce friction, chart results, and produce a working model with correct measurements.
- ▲ collect leaves of similar size from different varieties of trees, and compare the ratios of length to width in order to determine whether the ratios are the same for all species.

Strategies

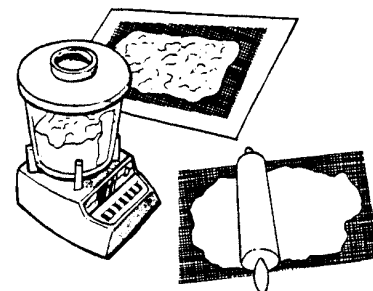
2. Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.

Students participate in an extended, culminating mathematics, science, and technology project. The project would require students to:

- work effectively
- gather and process information
- generate and analyze ideas
- observe common themes
- realize ideas
- present results

This is evident, for example, when students, addressing the issue of solid waste at the school in an interdisciplinary science/technology/society project:

- ▲ use the newspaper index to find out about how solid waste is handled in their community, and interview the custodial staff to collect data about how much solid waste is generated in the school, and they make and use tables and graphs to look for patterns of change. Students work together to reach consensus on the need for recycling and on choosing a material to recycle—in this case, paper.
- ▲ investigate the types of paper that could be recycled, measure the amount (weight, volume) of this type of paper in their school during a one-week period, and calculate the cost. Students investigate the processes involved in changing used paper into a useable product and how and why those changes work as they do.
- ▲ using simple mixers, wire screens, and lint, leaves, rags, etc., students recycle used paper into useable sheets and evaluate the quality of the product. They present their results using charts, graphs, illustrations, and photographs to the principal and custodial staff.



Key ideas are identified by numbers (1).
Performance indicators are identified by bullets (•).
Sample tasks are identified by triangles (▲).

Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Skills and Strategies for Interdisciplinary Problem Solving

Working Effectively: Contributing to the work of a brainstorming group, laboratory partnership, cooperative learning group, or project team; planning procedures; identify and managing responsibilities of team members; and staying on task, whether working alone or as part of a group.

Gathering and Processing Information: Accessing information from printed media, electronic data bases, and community resources and using the information to develop a definition of the problem and to research possible solutions.

Generating and Analyzing Ideas: Developing ideas for proposed solutions, investigating ideas, collecting data, and showing relationships and patterns in the data.

Common Themes: Observing examples of common unifying themes, applying them to the problem, and using them to better understand the dimensions of the problem.

Realizing Ideas: Constructing components or models, arriving at a solution, and evaluating the result.

Presenting Results: Using a variety of media to present the solution and to communicate the results.

Sample Problem/Activity

How much of Earth's water is readily available for human consumption?

Student Worksheet

Category	Percentage of Total Water in the World	Freshwater/Salt Water
freshwater lakes	0.0090	freshwater
saltwater lakes	0.0080	salt water
rivers	0.0001	
groundwater	0.6250	
sea ice and glaciers	2.1500	
atmospheric water vapor	0.0010	
oceans	97.2000	

1. As you conduct your library research, complete the chart above by filling in the Freshwater/Salt Water column with either the term "freshwater" or the term "salt water."
2. Represent the information in the first two columns by constructing either a two- or three-dimensional model.

Comments: