

# Standard 7—Interdisciplinary Problem Solving

Intermediate

## 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 at the local level and plan and carry out a remedial course of action.**
- **make informed consumer decisions by seeking answers to appropriate questions about products, services, and systems; determining the cost/benefit and risk/benefit tradeoffs; and applying this knowledge to a potential purchase.**
- **design solutions to real-world problems of general social interest related to home, school, or community using scientific experimentation to inform the solution and applying mathematical concepts and reasoning to assist in developing a solution.**
- **describe and explain phenomena by designing and conducting investigations involving systematic observations, accurate measurements, and the identification and control of variables; by inquiring into relevant mathematical ideas; and by using mathematical and technological tools and procedures to assist in the investigation.**

*This is evident, for example, when students:*

- ▲ improve a habitat for birds at a park or on school property.
- ▲ choose a telescope for home use based on diameter of the telescope, magnification, quality of optics and equatorial mount, cost, and ease of use.
- ▲ design and construct a working model of an air filtration device that filters out particles above a particular size.
- ▲ simulate population change using a simple model (e.g., different colors of paper clips to represent different species of birds). Timed removals of clips from plastic cups represents the action of predators and varying the percentage of the return of clips to cups represent differences in reproductive rates. Students apply mathematical modeling techniques to graph population growth changes and make interpretations related to resource depletion.

## 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 auto safety in an interdisciplinary science/technology/society project:*

- ▲ use an electronic data base to obtain information on the causes of auto accidents and use e-mail to collect information from government agencies and auto safety organizations. Students gather, analyze, and chart information on the number and causes of auto accidents in their county and look for trends.
- ▲ design and construct a model vehicle with a restraint system to hold a raw egg as the passenger and evaluate the effectiveness of the restraint system by rolling the vehicle down a ramp and into a barrier; the vehicle is designed with crush zones to absorb the impact. Students analyze forces and compute acceleration using  $F=ma$  calculations. They present their results, including a videotaped segment, to a driver education class.

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

