

Science and Technology Fundamental Concepts and Principles

Science and technology have been practiced by people for centuries, and they are always evolving to meet people's needs. The unit of study presented here consists of lessons arranged in a certain order so that students can readily build upon prior knowledge. The lessons incorporate similar vocabulary, objectives, and recommended resources.

The lessons are designed for a 90 minute class period unless otherwise noted. Activities can be adapted to meet the specific needs of individual programs. For shorter class periods, one should consider using one or more of the extension activities listed with the lessons.

Vocabulary

invention - something originated by experiment; new device

inventor - a person who invents creates a new process or invention

technology - tools and techniques for solving specific technical problems

Objectives

Students will

- Identify a simple problem, propose a solution, implement that solution, evaluate the product or design, and communicate the problem, design, and solution.
- Demonstrate an understanding that science is one way of answering questions about their world.
- Develop an understanding that tools and techniques have been created or invented to solve problems.
- Recognize that tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise see, measure, and do.
- Identify women and men who have engaged in a variety of scientific and technological work.
- Identify objects that have been designed and made by people to solve human problems and enhance the quality of life.
- Be able to categorize objects as natural or designed.

Materials

Materials will vary according to the design activity chosen.

Activities

Note: May take more than one class period due to the nature of creating a design.

Build upon students' multiple opportunities to examine technology and its evolution. Challenge them to build some designs of their own. Choose one or more of the following activities to engage the students in technological design. Instruct students to use Activity Sheet C included in the Grade 4 manual as a basis for their planning and design.

A. Ask the students to build the tallest structure they can using only 10 straws and 10 pieces of masking tape. The bridge must be able to stand on its own without depending on additional sources of support, such as books, pencils or someone's hand.

B. Refer to the web site

<http://www.chemistry.org/portal/resources/?id=c373e9f68307e9988f6a4fd8fe800100>. Direct the students to build a bridge that will connect two students' desks. Use the accompanying sheets to show students different types of bridges. Consider bringing in pictures of different bridges from magazines or the Internet. The Internet site discusses the design of a bridge.

C. Challenge the students to build a device that could shield their eyes from the sun. The final design can be an adaptation of an existing device.

D. Have the students create a door opener for various settings, such as a room, a building, or a garage. Use the web site

<http://pbskids.org/zoom/activities/sci/dooropener.html>. A copy of this activity from the website is included in this unit plan.

E. Encourage the students to create a new type of surfboard that prevents surfers from being attacked by sharks. Refer to the web site

http://www.pbs.org/wgbh/nova/teachers/activities/2316_sharkatt.html. Copies of the lesson and activity sheet from the website are included in this unit plan.

F. Engage the students in creating a kite and experimenting with ways to improve its flying ability. Consult the web site

<http://pbskids.org/fetch/parentsteachers/activities/act-crazyaboutkites.html>. A copy of the lesson from the website is included in this unit plan.

G. Challenge the students to create a boat that will float. Use the web site

<http://pbskids.org/fetch/parentsteachers/activities/act-floatmyboat.html>
A copy of the lesson plan from the website is included in this unit plan.

H. Work with the students to build a skyscraper of 6 oz. or 7 oz. cups glued together. The structure must stand up without external supports. Wave a magazine in front of it

to test its stability. Ask students to think about what they could do to make their structure stronger, for example adding sand or coins to the bottom cup. Ask them to test their idea and see if it does make their structure stronger.

I. Challenge the students to design a machine that can turn the crank on a manual pencil sharpener.

A copy of this activity from Newton's Apple Show Number 1403 is included in this unit plan.

J. Ask students to use drinking straws, plastic or Ziploc bags, string, tape and/or glue to construct a design that will prevent a raw egg from breaking when dropped from a desk. Make additional materials available to the students as they need them for their design ideas.

Assessment

Observe and record students' participation in and contributions to class discussions. Additional assessment will be determined by the objectives and activities selected.

Extension Activities

A) Visit the web site

<http://www.pbs.org/teachers/sciencetech/inventory/scientificinquiry-35.htm>.

Two of the activities listed on this site have been used in this activity. However, there are many more activities available for whole class instructional purposes or for students' independent use. Additionally, the website provides a variety of activities in a range of levels of difficulty.

B) Review the Invent America program. Information about the program is included in the unit plan. There is also an opportunity for members to join the annual national INVENT AMERICA student invention contest.

Recommended Resources

Albert Einstein: Genius of the Twentieth Century by Patricia Lakin

Brainstorm!: The Stories of Twenty American Kid Inventors by Tom Tucker

Fannie in the Kitchen by Deborah Hopkinson

First-Start Biography Series Scholastic Inc. This series includes stories about many inventors including young Thomas Edison, and young Orville and Wilbur Wright.

Girls Think of Everything: Stories of Ingenious Inventions by Women by Catherine Thimmesh

Imaginative Invention: The Who, What, Where, When and Why of Roller Skates, Potato Chips, Marbles, and Pie (and More!) by Charise Mericle Harper

Henry Ford by Jeffrey Zuehlke. This is part of the History Maker Bios series. Other titles include biographies of John Deere, W.K. Kellogg, and Levi Strauss.

Milo's Great Invention by Andrew Clements (Steck-Vaughn Co. publisher)

Mistakes That Worked by Charlotte Foltz Jones

Rookie Biographies. This series is written at an early readability level. Biographies of Alexander Graham Bell, Benjamin Franklin, and Henry Ford are part of this series. Small Inventions That Make A Big Difference by Books For World Explorers National Geographic Society

The Picture History of Great Inventors by Gillian Clements

The Sky's The Limit: Stories of Discovery by Women and Girls by Catherine Thimmesh

The Usborne Book of Scientists from Archimedes to Einstein by Struan Reid and Patricia Fara

The Usborne Book of Inventors from DaVinci to Biro by Struan Reid and Patricia Fara

Turn on the Light, Thomas Edison by Peter and Connie Roop. This is part of the Before I Made History series.

What's Happening? A Book of Explanations by Patricia Relf

What Makes the Light Bright, Mr. Edison? by Melvin and Gilda Berger