

PART 6: For Additional Help.....

For more help with this activity, look up the following terms. You'll find some of them in this book. (Check the index.) You'll find others in science books, dictionaries, or encyclopedias.

light energy	concave	fiber optics
reflection	convex	kaleidoscope
refraction	optics	periscope
prism	telescope	camera obscura
mirror	camera	
lenses	microscope	

PART 7: How Well Did You Meet the Challenge?.....

When you've finished building your device, evaluate it. Does it do what it is supposed to do? Ask yourself the following questions. Your teacher and classmates may take part in this evaluation.

1. How does your device use light?
2. Why is your device a good example of technology?
3. How might you improve the image made by your device?

PART 8: Extending Your Experience.....

This activity helps you learn about the connection between science and technology. Science and technology affect us and the world around us in many ways. Think about the following questions and discuss them in class. You'll find more about science and technology in Chapter 1, "What Is Technology?" and Chapter 2, "Technology Brings About Change."

1. How have the following devices made life easier and better?
 - microscope
 - telescope
 - periscope
2. In your opinion, which came first, science or technology? Why?

What Is Technology?

Introduction

Our people-made world is a very complex place. Each day we use many machines and systems that can be very hard to understand. How does a microwave oven cook food without a flame? How does a home heating system know when to turn on or turn off? What controls the traffic lights?

People have created these and many other familiar products to make our lives easier and more enjoyable. From alarm clocks that wake us in the morning to toothpaste that cleans our teeth before we go to bed, the products we produce using technology are countless.

After reading this chapter, you should be able to

Define technology.

Discuss how technology has become part of our everyday lives.

Describe the four families of technology.

Describe the technology-science relationship.

Words you will need

technology

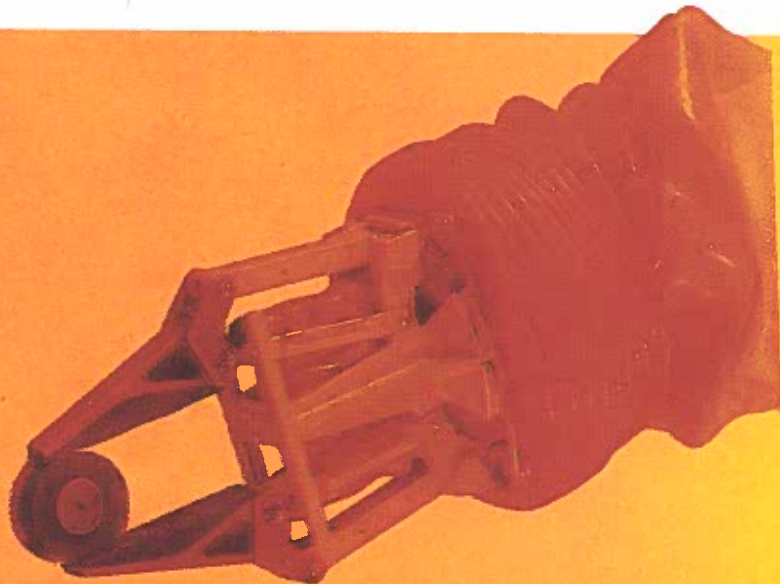
communication technology

production technology

transportation technology

biotechnology

science



Technology Is All Around Us

When people use knowledge, materials, and tools to create things that meet their wants and needs, they create technology. **Technology** is the means by which we try to improve our people-made world.

Technology is all around us. It provides the home we live in, the food we eat, and the clothes we wear. Builders use technology to construct homes and other structures. Farmers use technology to grow and harvest the food we buy at the supermarket. Fig. 1-1. Stores use technology to keep the food fresh and to calculate the prices of our purchases at the checkout counter. Fig. 1-2. Our clothes are the products of technology, too. Technology was used to make the fabric, cut the pieces, and sew the pieces into garments.

Technology is part of our everyday lives. The names of some products of technology have even become part of our everyday speech: Nintendo, Walkman, Watchman, The Pump.



Fig. 1-2. Computer and laser technology make store checkout faster and easier. A laser beam scans the bar code on the package, then sends information to a computer about the product and its price.

Fig. 1-1. Farmers use technology to help grow and harvest food products. Here a farmer is harvesting corn with a machine called a combine.



The way people live and work in the community is the result of technology. Think about some of the things you do almost every day. How do you get to school? What do you do in your spare time? How do you stay in touch with friends and family? We use technology to do all these activities. In fact, we depend on technology for our way of life.

People need technology, but technology also needs people. People with various jobs and skills keep our technological world running. Bankers, teachers, technicians, scientists, engineers, and hundreds of others help design, produce, and consume (use) the products and services of technology.

Our community is one small part of a technological world. Technology has helped bring the global community closer together. The many countries of the world are at our fingertips, only a phone call away. Satellite and broadcast technology can bring us shows and concerts live from remote parts of the world. Fig. 1-3.

Technology has made the world community so much smaller that we can have breakfast in New York and lunch in Paris, France. The *Concorde* supersonic transport makes this possible. Fig. 1-4.

From products in our homes to the services that bring our world closer, the advantages of technology make life easier and more enjoyable. Technology has worked its way into almost everything we do. We can say that technology is pervasive. *Pervasive* means “throughout.” Technology can be found throughout our people-made world.

Fig. 1-4. Technology has brought the world community closer through high-speed travel. The *Concorde* cruises at an altitude of 50-60,000 feet, traveling at 1,350 miles per hour.

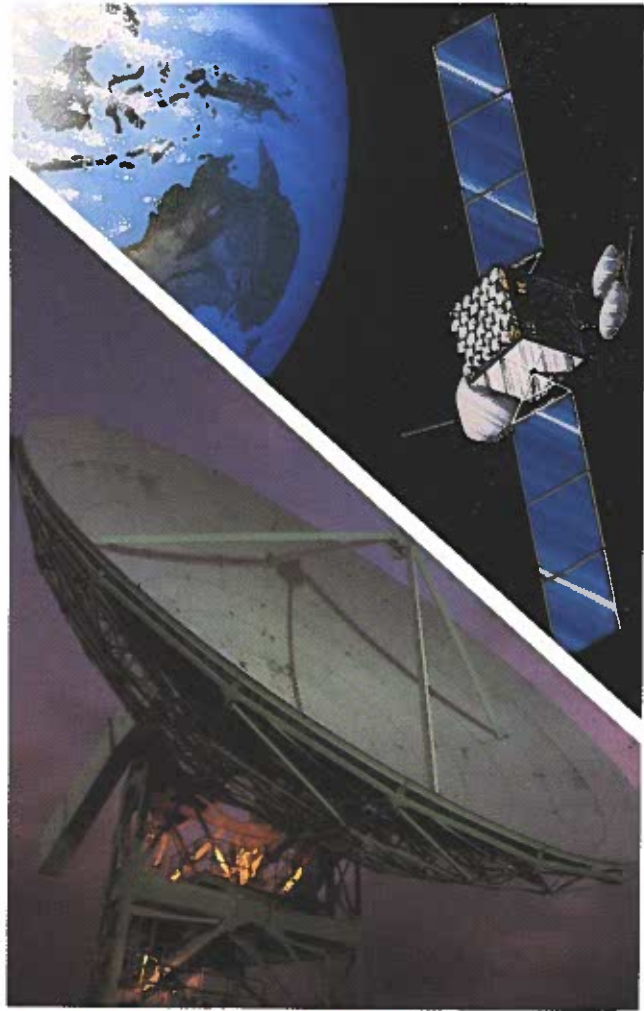


Fig. 1-3. Direct broadcasting by satellite (DBS) brings television programs from around the world directly into our homes.



IMPACT

As you can see from these examples, technology changes our world in many ways. The impacts of technology, whether they are social, economic, or environmental, affect us all. Throughout this book, you will learn about these impacts.

FOR DISCUSSION

1. What products of technology found in your classroom might not have been found in your parents' classroom?
2. How has technology made your life easier? How has it made your life more complicated?



■ Using pictures cut from magazines and newspapers, make a poster that illustrates

one of the following statements:
 "Technology affects our daily lives."
 "Technology makes the world grow smaller."

The Four Families of Technology

There are four families of technology. Each family provides products or services that can help us every day. Fig. 1–5. The four families are:

- communication technology
- production technology
- transportation technology
- biotechnology

The family of technology that helps us gather, store, and share important information is communication technology. This family of technolo-

gy allows us to communicate ideas clearly and quickly across longer distances.

Production technology provides us with the manufactured and constructed products we use each day. Automobiles, furniture, magazines, pens, and even buildings are products of production technology.

People have become very dependent on transportation technology. Products, materials, and people can be sent quickly anywhere in the world through a complex system of transportation technologies.

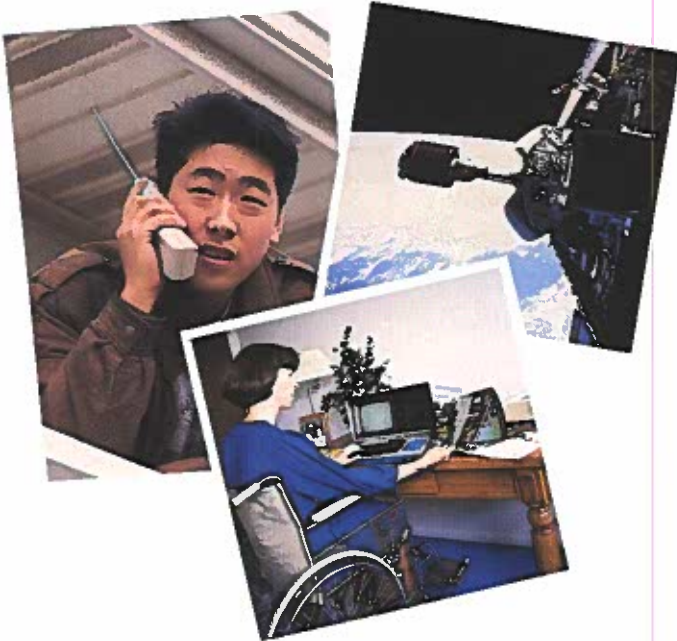
The newest technology family is called *biotechnology*. Biotechnology is the use of living cells to help create new products. Genetic engineering is one part of biotechnology. Genetic engineering allows us to change the characteristics of plants and other organisms. Imagine designing a tomato plant that repels worms or a vaccine that protects people from cancer. Biotechnology may make these things possible.

All of the families, or systems, of technology work together. All four families are related. For example, an automobile is an example of transportation technology, but it is produced using the principles of production technology. By using technology from all four families, people can create a much greater variety of useful products.

TECHNOLOGY TRIVIA

At last count, the United States had a whopping 181,893,000 telephones in use.

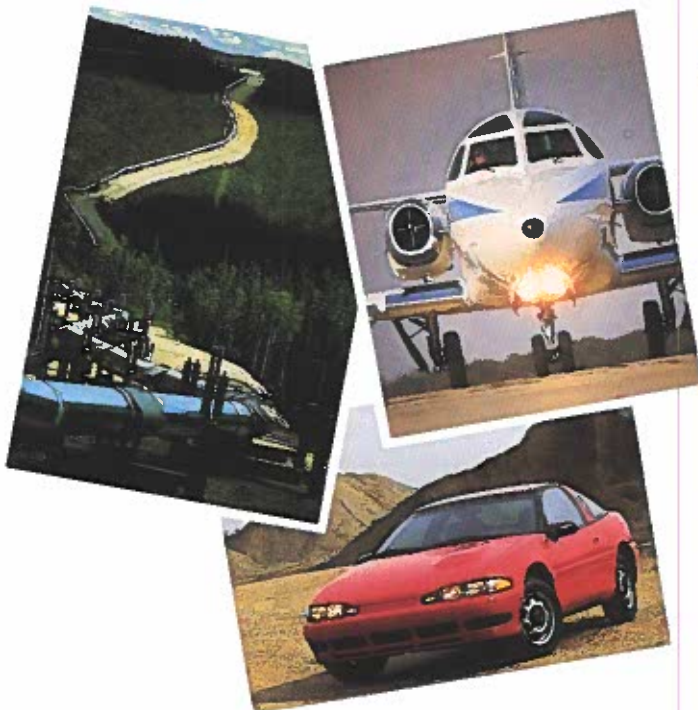
THE 4 FAMILIES OF TECHNOLOGY



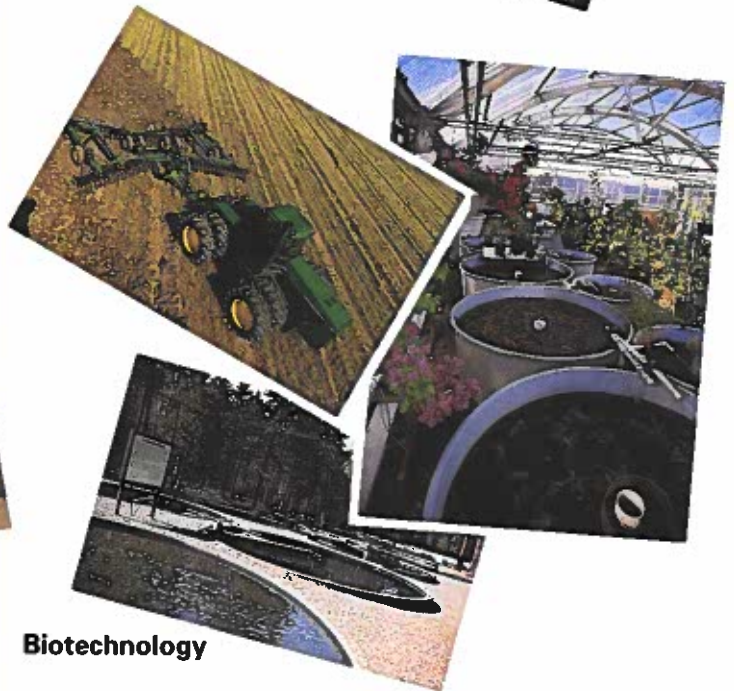
Communication Technology



Production Technology



Transportation Technology



Biotechnology

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Fig. 1-5. Each of the four families of technology provides products or services that make our lives better and easier.

## ►►► FOR DISCUSSION ◀◀◀

1. Consider the Walkman radio. Which families of technology are involved in its creation and use?
2. Many people are concerned that some products of transportation technology are polluting the environment. Explain how transportation technology can be used to solve this problem.

## The Science-Technology Relationship

Many people think science and technology are the same thing. This just isn't true. Science and technology help one another, but they are very different subjects.

**Science** is the study of our natural world. In science class, we explore nature by learning about biology, physics, chemistry, and earth science. For example, we might observe living microorganisms under a microscope or test chemicals for acidity.

As we have noted, technology is the study of our people-made world. In technology class, we might explore transportation systems, communication systems, and production systems. We might build a rocket and study its flight. We might calculate the altitude it reaches.

Even though science and technology are very different subjects, they often work together. Technology and science are most powerful when they work hand in hand. When science and technology work as teammates, the results are often incredible.

The pacemaker is a good example of how this teamwork can produce a miracle. Your heart beats about 70 times each minute. Each beat sends blood from the heart to all parts of the body.

In science class, you have learned that the body needs oxygen, carried in the blood, to stay alive. Unfortunately, some people suffer from a defect in the natural system that controls the number of times the heart beats. The result is that not enough oxygen gets to the cells in the body.

Doctors and engineers together developed the pacemaker to fix this breakdown in the natural system. The pacemaker is a small machine that is placed under the skin. It controls the number of times per minute the heart beats. The machine sends a tiny electrical shock to the heart muscle each time the heart muscle should pump. Fig. 1-6.

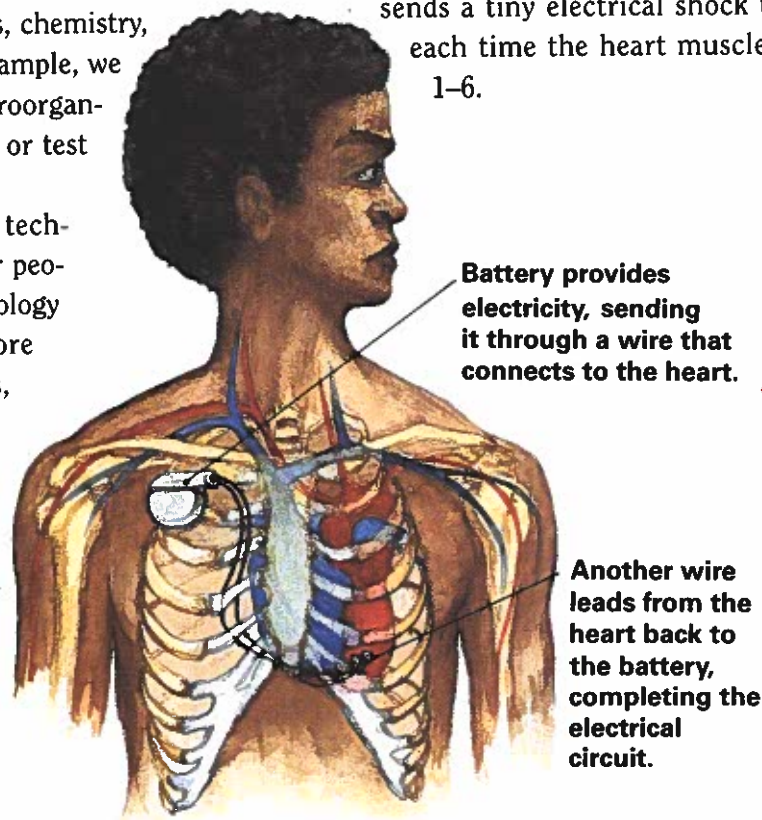


Fig. 1-6. The pacemaker is a product of technology that helps replace a faulty natural system.



■ **Look around your community. Identify systems in each of the four families of technology.**

**Make a list of these systems. Later, as your class plans a model community, you will find this information useful.**

Science provided the information about the natural function of the human body. Technology, using this information, developed a machine that could replace the faulty natural system. The powers of science and technology now keep 500,000 people alive each year with pacemakers.

Science and technology are very different subjects. Together, however, they form a powerful tool to make life easier and better. Together, they improve our lives and surroundings. Fig. 1-7.

▶▶▶ **FOR DISCUSSION** ◀◀◀

- 1. The pacemaker is one example of technology and science working together. Name some others.**
- 2. Why are science and technology working together more powerful than either one working alone? Explain.**

Fig. 1-7. The connection between science and technology can easily be seen in the space program. Scientists and technologists are working together to develop life support systems for space travel.

**THE TECHNOLOGY/SCIENCE CONNECTION**

**TECHNOLOGY**

**Material engineers design new materials to meet new needs.**

**Structural engineers design structures that will support specific loads.**

**Technology provides life-support systems for long stays in space.**

**Hydroponic food production will support long stays in space.**



**SCIENCE**

**Chemists help us understand the structure of materials better.**

**The science of physics explains how forces act on an object under a load.**

**Physiology is the study of living organisms and their biological systems.**

**Geneticists develop new varieties of plants.**



**Chapter Highlights** .....

- Technology is people using tools, materials, and information to create products or services that meet our wants and needs.

- The products of technology have become part of our everyday lives. Technology can be found throughout everything we do.

- The families of technology are communication technology, production technology, transportation technology, and biotechnology.

- Science is the study of our natural world, whereas technology is the study of our people-made world.

- Science and technology together make a powerful team that can improve our people-made world.

**Test Your Knowledge** .....

1. Define *technology*.
2. What family of technology helps us gather, store, and share information?
3. What family of technology provides most of our everyday products?
4. How has technology brought the world community closer together?
5. If you were studying how the planets revolve around the sun, would you be studying science or technology?
6. Give two examples of how science and technology working together have improved your life or surroundings.
7. Farmers may soon be harvesting plants that have been developed to resist freezing in cold weather. What family of technology will this product come from?

8. Explain the differences between science and technology.

9. List five ways technology has influenced your daily routines.

10. What products in your home are the result of communication, transportation, and production technology? List two products for each of these families of technology.

**Correlations** .....**SCIENCE**

1. Tomatoes are fragile. Packing them for shipment is hard because they are round. Find out what science and biotechnology have done to create a more cube-shaped tomato.

**MATH**

1. You read in this chapter that pacemakers regulate heartbeats. If a person's heart beats 70 times per minute, how many times will the heart beat in one 24-hour period?

**LANGUAGE ARTS**

1. For one day, try not using a television or telephone. How did you spend your time? How did you communicate with friends outside your home? In a paragraph or two, describe your day.

**SOCIAL STUDIES**

1. Make a list of the brand-name products in your home. Report your findings to the class. Determine the top ten brand names listed in the entire class and find out where these companies have factories.
2. Draw a map of the world and write the company names from Activity 1 in their respective countries.

# Technology Brings About Change

## Introduction.....

Technology is a powerful force that brings about changes in the way people live and work. The impacts, or influences, of technology can be positive, negative, or sometimes both. You can feel the impacts of technological change in your home, your community, and the world.

New technologies have changed forever how people communicate, produce products, transport things, and meet their daily needs. Changes due to technology can take place quickly or very gradually. In a mere 75 years, people have gone from dreaming about flying to landing on the moon. In a short 50 years, we have gone from no television to live TV programs viewed around the world by way of satellite systems.

## After reading this chapter, you should be able to .....

Explain when and how technological change began.

Discuss how people satisfy their needs with technology.

Discuss the impacts of the Agricultural Era.

Discuss the impacts of the Industrial Era.

Discuss the impacts of the Information Era.

## Words you will need.....

**Agricultural Era**

**Industrial Revolution**

**Industrial Era**

**mass production**

**factory system**

**cottage industry**

**Information Era**

**service industry**

**electronic cottage**

