

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 dictionaries, encyclopedias, and other resource materials.

brainstorm

manufacturing

production

trial run

elements of design

material processing

prototype

logo

product engineering

resources of technology

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

After the product has been manufactured, evaluate the product and the processes you and your teammates used to produce it. How were the seven resources of technology used in the production process? Answer the following questions based on this evaluation.

- 1. People**—What role did you and your teammates play in the production process?
- 2. Information**—What information had to be obtained to design and manufacture your product?
- 3. Materials**—Make a list of all the materials you used in manufacturing your game.

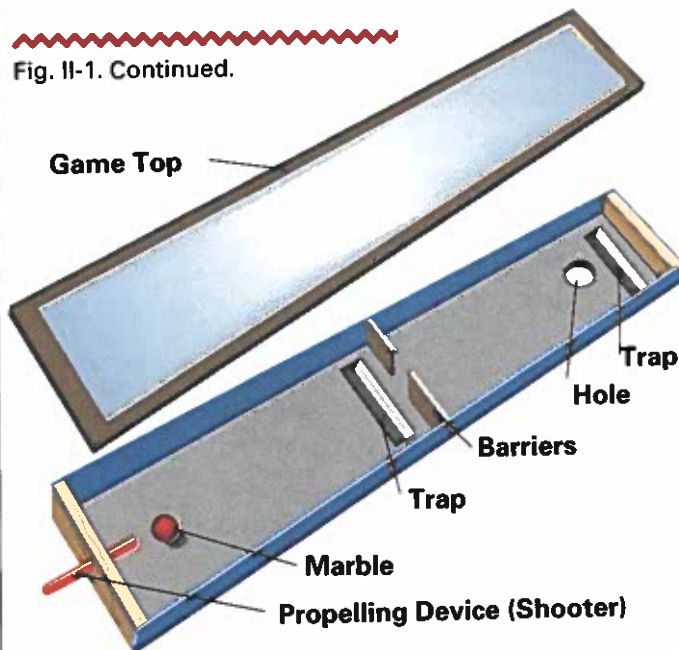
- 4. Tools and Machines**—List the tools and machines you used in manufacturing your game.
- 5. Energy**—You may include in your game a device to propel a marble or ball bearing. Look up potential, kinetic, and mechanical energy. How would these terms apply to using a propelling device?
- 6. Capital**—If you and your teammates actually owned a company that manufactured games, how would money be spent within the company?
- 7. Time**—What changes did you make or could you make in your production sequence to produce products more quickly?

PART 8: Extending Your Experience.....

This activity helps you learn about basic resources of technology. Companies large and small around the world are dependent upon the same resources to produce products and services. You'll find more about the resources of technology in Section II, "Technology Relies on Resources."

New developments involving the seven resources of technology are continually taking place. Watch for articles about these in newspapers and magazines. Also, be alert for reports on television and radio. Share the information you learn with your class.

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Fig. II-1. Continued.



# Resources of Technology/People

## Introduction .....

What if you had a great idea for a new product? How would you transform this idea into a salable item? How would you get this item onto the shelves at your local department store?

Your product, like any other product of technology, would be dependent on many resources. **Resources** are all the things needed to accomplish a goal or to get a job done.

Even simple tasks are dependent on seven resources: people, information, tools and machines, materials, energy, money, and time. In this chapter and the chapters that follow, we will study how people use these same seven resources to create technology that provides us with products and services that meet our needs and wants.

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

Define resources.

Discuss people as a resource of technology.

Explain the role of people as the consumers, creators, and managers of technology.

## Words you will need .....

**resources**

**consumers**

**gross domestic product (GDP)**

**entrepreneur**

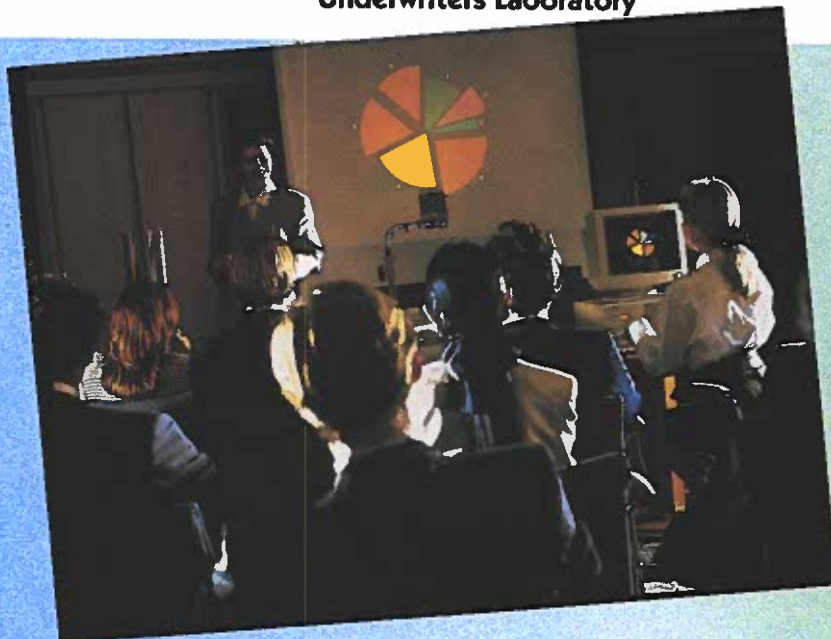
**innovation**

**ergonomics**

**Occupational Safety and Health Administration (OSHA)**

**Environmental Protection Agency (EPA)**

**Underwriters Laboratory**



## What Are Resources?

Suppose you wanted to pop some popcorn. What resources would you need? Fig. 3-1. If you didn't know how to make popcorn, you might ask someone for instructions. *People* would be your first resource. The instructions or *information* you receive would also be a valuable resource. Now you might search the kitchen for additional resources.

*Materials* such as popcorn, salt, and butter would certainly be needed. Without *tools and machines* such as a popcorn popper, bowl, and measuring cup, the job could not be completed. *Energy*

is also an important resource. Electrical energy is needed to power the popcorn popper. Heat energy is used to burst the tiny kernels of corn into fluffy popped corn. *Money* is the resource used to purchase other resources. Finally, all things are dependent on *time*. How long does it take to make popcorn? How long have the popcorn kernels been in your food closet? How long can your friends wait for fresh popcorn? Time is a resource we must learn to manage.

It's hard to say which resource of technology is most important. If we were to remove any one of the seven resources used to make popcorn, the result would be quite different. Perhaps the most critical resource is people. People consume, create, and govern technology.



Fig. 3-1. The products of technology are created by combining the seven resources of technology. For example, to make popcorn, you would need all the resources shown here plus one more—energy. How would energy be used to make the popcorn?

►►► FOR DISCUSSION ◀◀◀

1. How might a popcorn-popping process result if the resource of information were missing?
2. Why are people the most critical resource in technology?

## People Are Consumers of Technology

*Consume* means “to use up.” People consume the products and services of technology. Fig. 3-2. As **consumers**, we create a market for these products. If we like a product, we buy it. Products that we don’t like or that don’t meet our needs are left on the shelves.

How do companies know what consumers want? It is the job of market researchers to determine what new products consumers want and are willing to purchase. Consumer demand for new products keeps a constant flow of new technologies emerging.



Fig. 3-2. As consumers, we purchase the products of technology. Companies use the profits to pay salaries, buy new equipment, and finance new product development.

Through their purchases, consumers also contribute to the strength of our nation’s economy. By purchasing goods and services, consumers create an increased demand for these items. To meet this demand, companies increase production and hire additional employees.

Economists study the production of goods and services and use this information to determine the health of a nation’s economy. Fig. 3.3. A healthy economy produces a large **gross domestic product (GDP)**. The GDP of a nation is measured by the value of all the goods and services produced within a nation’s borders. A fall in GDP means consumers are buying less and production is declining.

### IMPACT

**Consumer demand for products keeps our economy going, but many of those products create problems for our environment. For example, many people buy microwavable meals because they are fast and easy to prepare. Many of these meals come on plastic plates. Does it make sense to use a plate once and then send it to the landfill, where it may last for centuries?**

►►► FOR DISCUSSION ◀◀◀

1. What role did consumers play in the production of new products during the Industrial Era?
2. How does the demand for a product and its availability affect the price of the product?

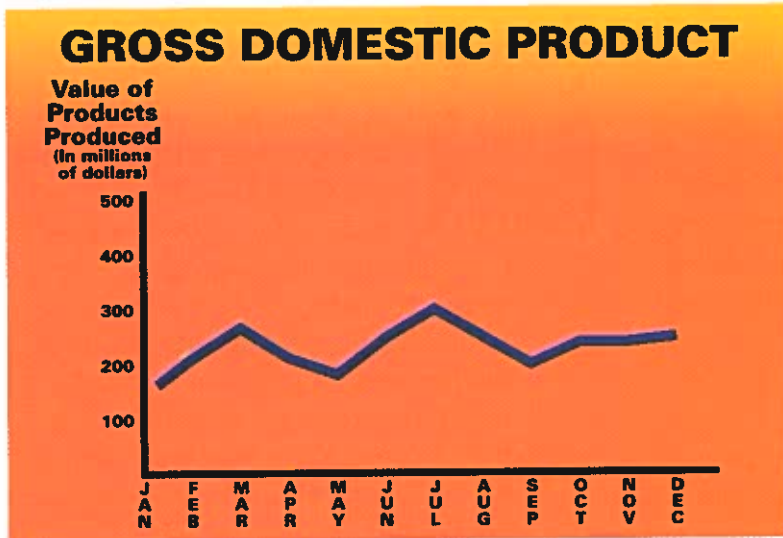


Fig. 3-3. A high GDP means that companies are producing and consumers are purchasing more products. The GDP of the United States can be negatively affected when Americans buy products made in foreign countries rather than products made in the United States.



■ Clip an article from a newspaper or magazine that tells about a new product on the market.

What consumer demand is met by the product? How well do you think the product meets the demand?

## People Create Technology

People are responsible for developing, producing, and maintaining our technical world. The skills and talents of workers around the world create the products and services we use each day.

The use of technology begins when a need or want is identified. People think of products that meet that need. Fig. 3-4. People then combine the seven resources of technology to bring their ideas to reality.

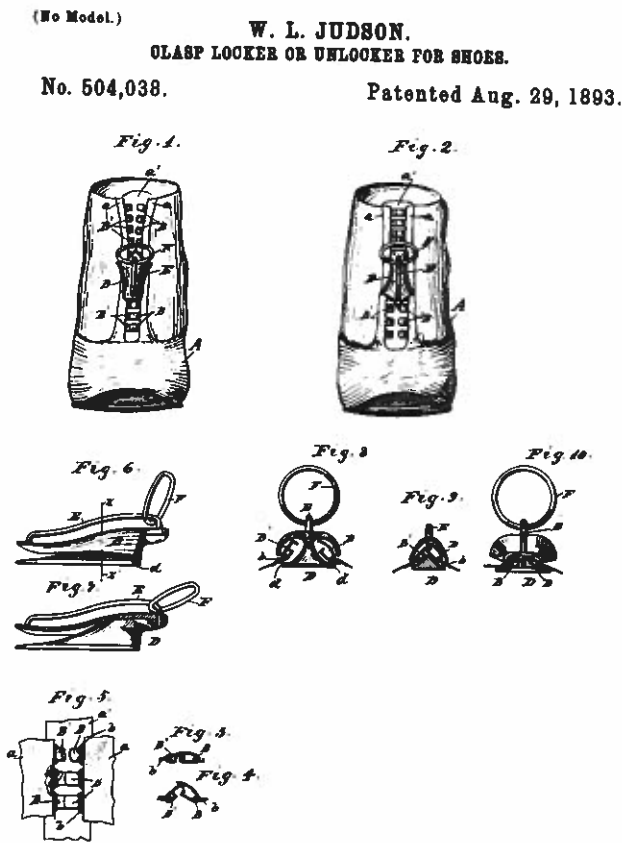
Fig. 3-4. Creative people use many techniques to bring their ideas to reality.



During the late 1800s, Whitcomb Judson saw a need for a device to fasten boots quickly. In 1891, his creative use of resources gave the world the zipper. Fig. 3–5.

Professionals such as engineers, architects, and scientists develop technical ideas and create specific plans for making them. Technicians and skilled workers work from these plans to produce the product or provide the service.

Fig. 3-5. The simplest of ideas often have the greatest impact: Whitcomb Judson's zipper was a creative idea that solved a basic want. Judson submitted this drawing of his device to the patent office.



People in a variety of occupations will be needed when MegalIndustries builds its factory near

Glenville and the town begins to grow. Think of ways to attract people to the community. Write a newspaper ad or prepare an informational brochure to accomplish this. In your ad or brochure, describe the community and the expected changes.

### Entrepreneurs

How creative are you? Do you often come up with great ideas or solutions to technical problems? You might someday make a lot of money as an entrepreneur. An **entrepreneur** is a person who forms or starts his or her own business. Your business might be based on a brand new invention or an innovation. **Innovations** are modifications to products that already exist.

Bette Claire Graham was an entrepreneur. As a secretary for a Texas bank, she made her share of typing mistakes. In a search for a quick correction process, she drew upon her knowledge as an amateur artist. Mixing white paint and turpentine, she developed the first liquid correction fluid. She sold her product to secretaries in her building. Her small company grew into a nation-wide industry. Bette Graham died in 1980. Her business was sold to the Gillette Company for \$45.5 million.

### Human Factors Engineering

Have you ever sat in a chair and noticed that the chair back just didn't fit the contour of your spine? It probably was not a very comfortable

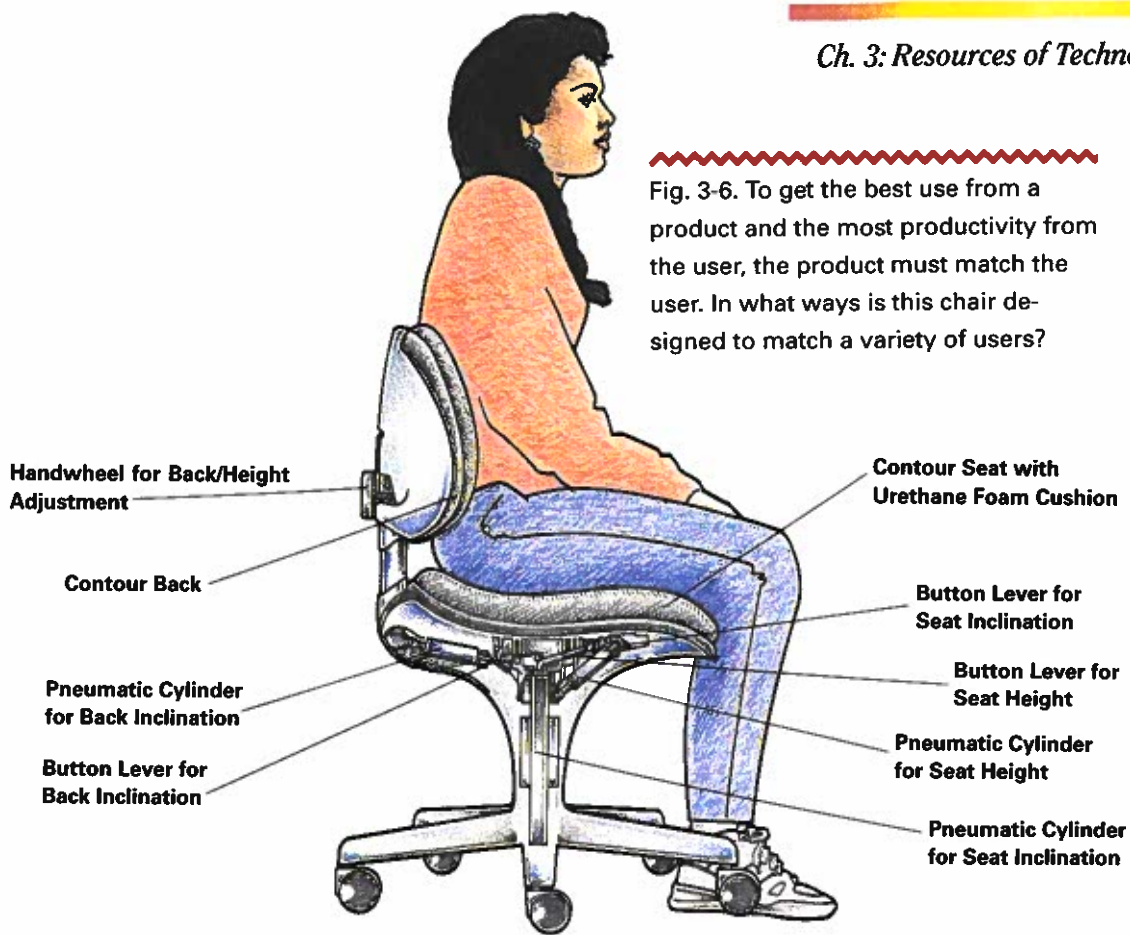


Fig. 3-6. To get the best use from a product and the most productivity from the user, the product must match the user. In what ways is this chair designed to match a variety of users?

chair—one you wouldn't want to spend a great deal of time in. Sometimes the products of technology don't seem to match the people that use them. When people create technology, they must consider "the human factor."

Human factors engineering, also called **ergonomics**, is a type of designing in which the designer studies how to match the product to the human user. Fig. 3-6. If the designer of that uncomfortable chair had studied human posture, a more comfortable chair might have resulted.

▶▶▶ FOR DISCUSSION ◀◀◀

1. Pick a product in your classroom and show how each of the seven resources of technology were incorporated into that product.
2. If you had a great idea for a product, how might you raise the money to fund your business?



■ Select an object and think about how you would redesign it ergonomically. For example, how would you make a calculator easier to use? How about a telephone or a bicycle or a rake? Sketch your ideas and tell how your design would improve the product.

## People Govern Technology

Technology brings about change within the community and the workplace. People are responsible for governing and regulating this change. By creating rules and laws, people can maintain control



Fig. 3-7. Federal, state, and local governments create regulations that govern the creation and use of technology.

over the impacts of technology. Fig. 3-7. Regulations are designed to protect workers, consumers, and the environment from the negative effects of technology.

### Worker Safety

The technological workplace can be a hazardous place. Conditions are much better now than they were in the early days of sweatshops and 18-hour work days. Fig. 3-8. This came about through regulations designed to create better working conditions. The **Occupational Safety and Health Administration (OSHA)** is the federal office that creates many of these regulations.



Fig. 3-8. In the early days of the Industrial Revolution, children worked long hours in unsafe and unhealthy conditions. Child labor laws were finally passed, making it illegal for children to work in the factories. Other regulations have improved the safety and health conditions in the workplace.



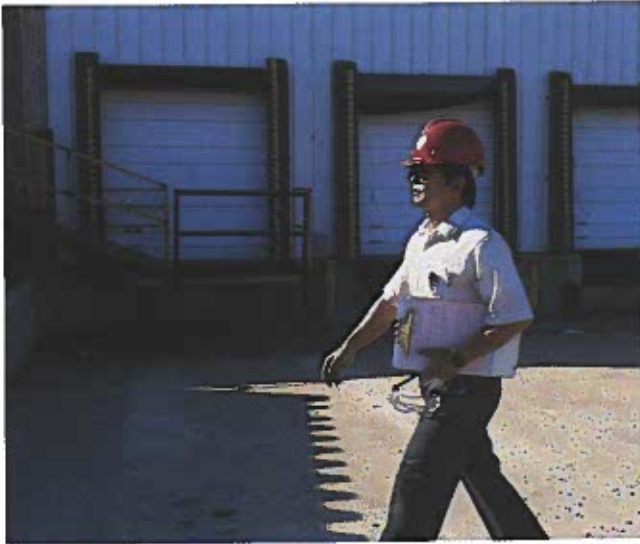


Fig. 3-9. OSHA inspectors check work sites for safety hazards. Random inspections help reduce accidents and increase a company's productivity.

OSHA regulations are designed to protect the health and welfare of workers. OSHA inspectors make surprise visits to factories and other workplaces. They make sure employees are wearing proper protective clothing, machines are safe, and the company is following the regulations set up by OSHA to protect the employees. Fig. 3-9. If violations are found, the employer can be fined.

Minimum wage laws set a limit on how low wages can be. Workers' compensation laws provide medical care and income if a worker is hurt on the job.

### Consumer Safety Laws

Product safety laws are designed to protect consumers from products that might be unsafe.

Products are tested to ensure that they are safe to use. Take a look at your radio or stereo. There is probably a UL label somewhere on the product. The **Underwriters Laboratory (UL)** tests products to ensure that they work properly. Fig. 3-10.

Local towns and cities use building codes to set standards on methods used in construction. Electrical codes, plumbing codes, and construction codes ensure that buildings and homes are constructed safely.



Fig. 3-10. Toys, appliances, and many other products are tested for safety and reliability by the manufacturers and by outside agencies. This symbol on a product means that it has been tested and approved by Underwriters Laboratory.

### Environmental Laws

Many of the impacts of technology are unforeseen or not realized when the technology is first developed. Henry Ford never dreamed that the automobile would have such a negative effect on the environment. People have created laws and regulations to protect our environment from further damage.

The **Environmental Protection Agency (EPA)** is the office of the federal government that creates regulations to protect our air, land, and water. EPA laws regulate the dumping of industrial waste into our waters and land.

Fig. 3-11. People must protect the environment from the products of their own design. Environmental laws set regulations controlling emission of pollutants into the atmosphere.



People have also created laws to regulate the fumes coming out of smokestacks and the tailpipes of automobiles. Fig. 3-11. Other environmental laws require developers or builders to fill out Environmental Impact Statements before they begin any major construction projects. Environmental Impact Statements try to predict the impact of construction on the environment, wildlife, and the surrounding community.

**TECHNOLOGY TRIVIA**

Each American produces approximately 1,500 lbs. of garbage each year.

**FOR DISCUSSION**

1. If your neighbors built a second floor on their house that blocked the sunlight hitting your solar hot water collectors, should they have to take it down? Explain.
2. What would you do if the smokestack of a neighborhood factory continually puffed black smoke into the air?

**Chapter Highlights** .....

- Technology depends on seven resources: people, information, tools and machines, materials, energy, money, and time.

- Each resource of technology is necessary for the production of goods and services.

- People create, produce, and maintain the products and services of technology.

- The products people produce and consume have an impact on our nation's economy.

- People create laws to control the use of technology and its impacts on society and the environment.

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

1. List the seven resources of technology.
2. Imagine that you are the owner of a company that manufactures sunglasses. Give one example of each of the seven resources of technology you need to produce your product.
3. How does the consumption of products and services affect our nation's economic health?
4. As a consumer of products, how can you have an impact on what is sold in local stores?
5. Explain what "human factors engineering" involves.
6. What is an entrepreneur? Name at least one modern entrepreneur.
7. How are product innovations different from inventions?
8. Which federal office is responsible for creating environmental regulations?
9. Name one agency that tests products to make sure they are safe.

10. Schools, like factories, have regulations designed to protect your safety. List three safety rules that apply in your school.

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

1. Choose one of the following industrial materials and write a report about the health risks faced by the people who work with the material: asbestos, polyvinyl chloride, uranium, coal dust, naphtha, benzene.

**MATH**

1. Matt has developed a protective case for Nintendo® cartridges. The production costs are \$0.78 each. He sells them for \$1.45 each. How much profit does he make on one item? On a dozen?

**LANGUAGE ARTS**

1. How would you like to become an entrepreneur? Develop an idea for a business that would appeal to other students. You may invent or innovate, but consider all seven resources. Describe your new company in a news release.

**SOCIAL STUDIES**

1. Your book defines the economic term GDP. What is America's current gross domestic product? What industries in the United States have decreased the most in production? See if you can find out at least one reason why the GDP has changed in the last ten years.

# Tool and Machine Resources

## Introduction .....

It was not by accident that the first attempt at technology resulted in a tool. Tools make work easier. Our ancient ancestors were trying to make everyday life less difficult.

Modern technology uses many different kinds of tools and machines to accomplish this same goal. In this chapter, we will look at many tools and machines and how they help change materials, energy, and information into products and services.

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

Discuss the different families of tools and what they do.

Identify specific tools and machines.

Understand the importance of safe tool and machine operation.

Understand the importance of safe conditions in a laboratory.

## Words you will need .....

**force**

**mechanical advantage**

**measuring**

**layout**

**separating**

**forming**

**combining**

**optical**

