

## Chapter Highlights .....

- Technology requires large quantities of energy to make electricity, transport people and products, and process materials.
- Energy is the ability to do work and cause movement.
- Energy can be changed from one form to another, but it cannot be created or destroyed.
- Energy sources include fossil fuels, solar power, water power, wind power, and nuclear power.
- Alternative energy sources are needed to replace sources that are becoming scarce or that pollute our environment.

## Test Your Knowledge .....

1. Why is energy such an important resource of technology?
2. Define *energy*.
3. Give two examples of potential energy.
4. Explain how the examples of potential energy you listed for question 3 could become kinetic energy.
5. List and describe four common forms of energy.
6. List and describe the energy conversions that take place when you turn on your Walkman.
7. Why do we consider fossil fuels to be nonrenewable?
8. Describe how hydroelectric plants generate electricity.
9. What are some of the negative environmental impacts resulting from energy production?
10. Describe two alternative energy sources.

## Correlations .....

## SCIENCE

1. In many chemical reactions, heat is given off. Is this always true? Put a thermometer into a 16-oz. glass with a quarter cup of vinegar. Record the vinegar's temperature. Now add a teaspoon of baking soda. What happens to the temperature?

## MATH

1. Matt's car averages 23 miles per gallon of gas. He fills the 18-gallon tank and starts a 453-mile trip to his grandmother's house. Will he get there without stopping to refuel?

## LANGUAGE ARTS

1. Imagine a nuclear power plant is to be built in an area near your home. What would be the concerns raised in your community? Hold a class discussion about the advantages and disadvantages.

## SOCIAL STUDIES

1. Find out the various forms of energy used to heat American homes around 1900–1940. What kinds of problems were encountered with these? Which ones turned out to be most efficient?
2. Do you think any of those early methods of heating homes were better than today's? Why or why not?



# Capital and Time

## Introduction .....

Capital and time are the hidden resources of technology. Their role in technology may not be as visible as people, materials, energy, machines, and information, but they are just as important.

When we say the word *technology*, what comes to mind? Most people think of fancy machines and robots. Some people see products made of new synthetic materials. Other people think about satellites and instant communication. Your parents may think about the rising costs of energy needed to run your home.

The purpose of this chapter is to help you understand the importance of capital and the role of time in technology. Have you ever considered the amount of money transferred from place to place in the production of a product? Have you ever heard the phrase “time is money”? Is there a connection between time and money in technology?

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

Define capital.

Discuss how money is spent in technology.

List some sources of capital.

Discuss the role of time in technology.

## Words You Will Need .....

**finance**

**dividend**

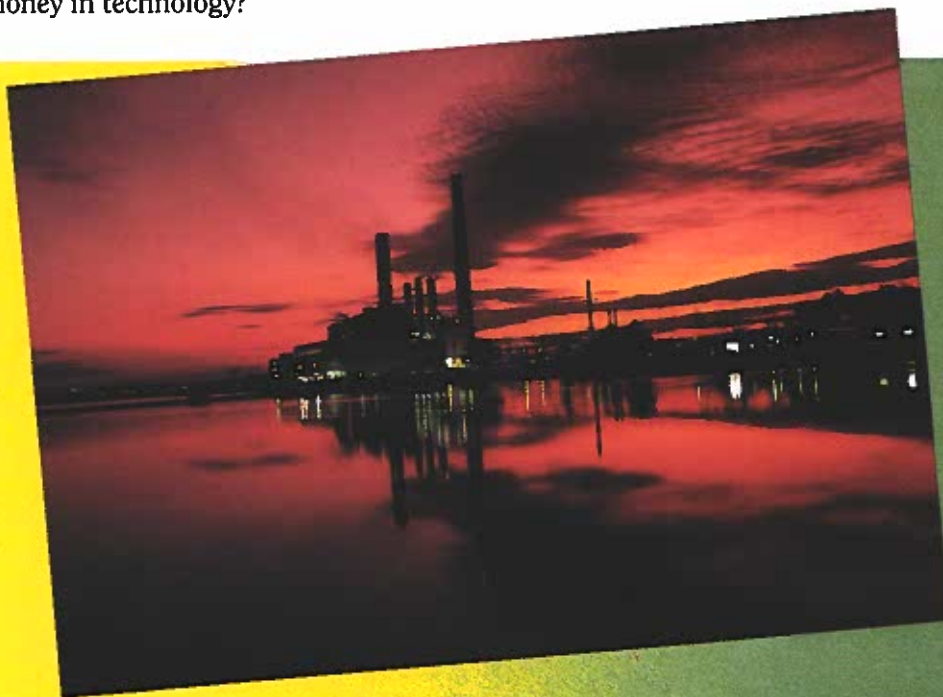
**capital**

**cash flow**

**interest**

**profit**

**stock**



## Capital Resources

What is capital? Is it just money? How do we calculate how much a business is worth? How do we raise the money to start a company? These are all questions about finance. **Finance** is the management of money. People who run businesses must manage their money wisely.

Money is only one form of capital. **Capital** includes all of the buildings, properties, equipment, and goods a business owns. Fig. 8-1.

In Chapter 6, we discussed starting your own disc jockey entertainment service. After being in business for one year, what capital resources might you have? The money you made would certainly be considered capital. Your equipment and compact disc collection, and even the van you use to travel from job to job, would be capital.

### FOR DISCUSSION

1. Your school is like a business. List all the things in your school that could be considered capital.
2. Make a list of the capital you would need for an after-school business.



Money



Supplies



Equipment



Land

Vehicles



Buildings

Fig. 8-1. A company's wealth, or capital resources, may include cash, buildings, equipment, land, goods, vehicles, and any other items the company owns.





■ A donor has given the city of Glenville \$500,000 for community improvements. Have your class act as the city council. For what projects might the money be spent?

## Sources of Capital

The producers of technology need capital, usually in the form of money, to purchase other resources. Fig. 8-2. Materials, energy, equipment, and

salaries cost a great deal of money. Where does this money come from?

Let's imagine that your deejay business is doing so well that you wish to expand it. Your plan is to hire a second deejay, provide the deejay with equipment, and make even more money. How could you finance this expansion?

You could use your personal savings as start-up money. You might also consider a bank loan. When you borrow money from a bank, you have to pay interest. **Interest** is a fee charged by the bank for the use of its money. Fig. 8-3.

Many large corporations sell **stock** to raise capital. When you buy stock, you own a small piece, or share, of the company. Stockholders receive a **dividend**, or money for each share of stock they own. Fig. 8-4.

Fig. 8-2. Capital resources are used to purchase other resources a company needs to produce its products or services.



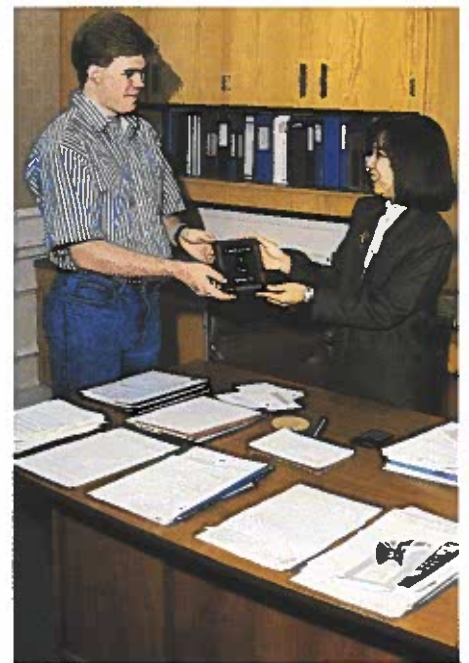
Equipment



Materials



Energy



Salaries



Fig. 8-3. Before a bank loans a company money, it re-searches the company. Companies that have good credit histories have a good chance of getting a loan.

►►► FOR DISCUSSION ◀◀◀

1. What might be some of the risks and benefits of using personal capital to start a business?
2. If a bank charged you 5¢ interest on every dollar you borrowed, how much interest would you pay on a \$2,000.00 loan?

## Profit and Expenses

What kind of cash flow does your deejay entertainment business have? **Cash flow** is a comparison of a business's income and expenses. To maintain a positive cash flow, your company needs to make more money than you spend on expenses.

Your **profit** is determined by subtracting your expenses from your income. Profit is the money left over after expenses. Figure 8-5 shows what your cash flow might look like for a single month.

►►► FOR DISCUSSION ◀◀◀

1. What unforeseen expenses might occur over which a company has no control?
2. What might you do with the profits you made during your first year in business?

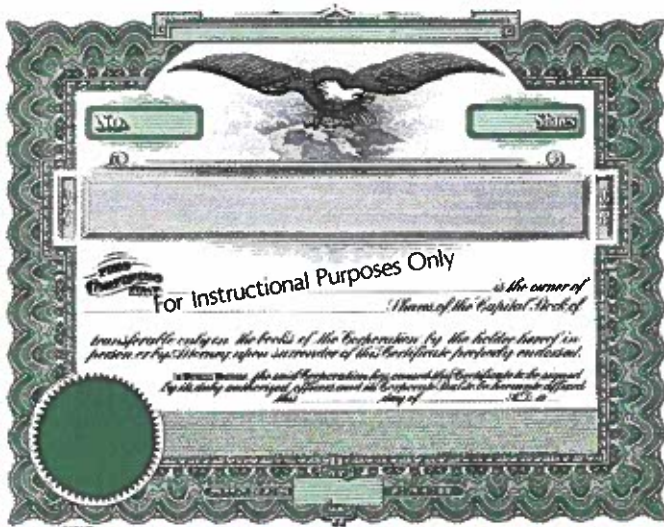


Fig. 8-4. Stock certificates are issued to stockholders to show partial ownership in the company.

Fig. 8-5. An income and profit statement shows your cash flow each month. Profit is calculated by subtracting expenses from income. This company made a profit of \$142.00 for the month shown.

<i>D.J. Entertainment Company</i>			
<i>Monthly Income &amp; Profit Statement</i>			
<u>Expenses</u>		<u>Income</u>	
Advertising	\$10.00	Party 9/12	\$100.00
Loan Payment	60.00	School Dance 9/20	<u>150.00</u>
New CDs	25.00		
Repair of Equipment	10.00		
Transportation	<u>3.00</u>		
Total	<u>\$108.00</u>	Total	\$250.00

Income	\$250.00
Expenses	<u>\$108.00</u>
Profit	<u>\$142.00</u>



## Technology and the Resource of Time

Time is a measure of how long it takes for something to happen. It is a factor that influences the production and consumption of products. Therefore, people who create technology must consider how to use time wisely.

### Time in the Workplace

“Time is money” is a favorite phrase used by many people. In technology, it is an accurate statement. The faster products can be produced, the cheaper they can be sold. Fig. 8–6. Henry Ford used this concept when he developed his assembly line. Saving time is also one reason for the introduction of robots into the workplace. Robots work faster, cheaper, and with fewer movements than humans.

Time is money for the worker also. Many employees are paid based on how many hours they work. Employers may use punch clocks to keep an accurate record of how many hours each employee works. Fig. 8–7.

Many processes or changes done on materials require strict management of time. For example, certain plastics must *cure* (sit) for a period of time before they can be used. In biotechnology, cells may have to *incubate* (be kept at a certain temperature) for days before they start to reproduce. Fig. 8–8.

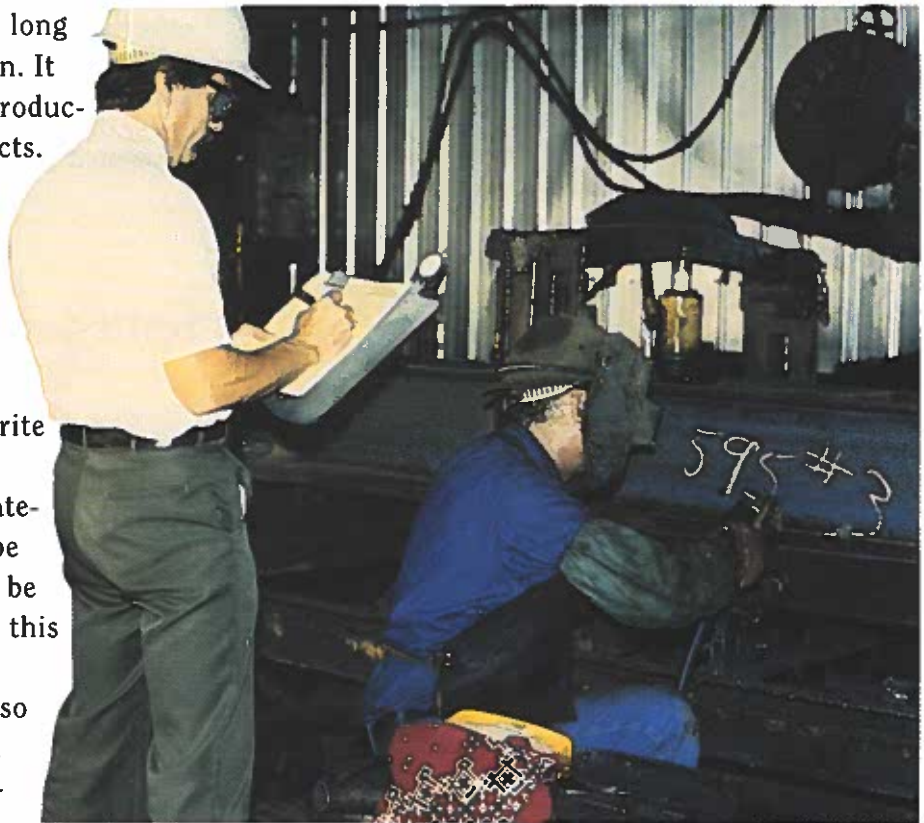


Fig. 8-6. Companies conduct time-motion studies to see how long it takes to complete specific tasks.

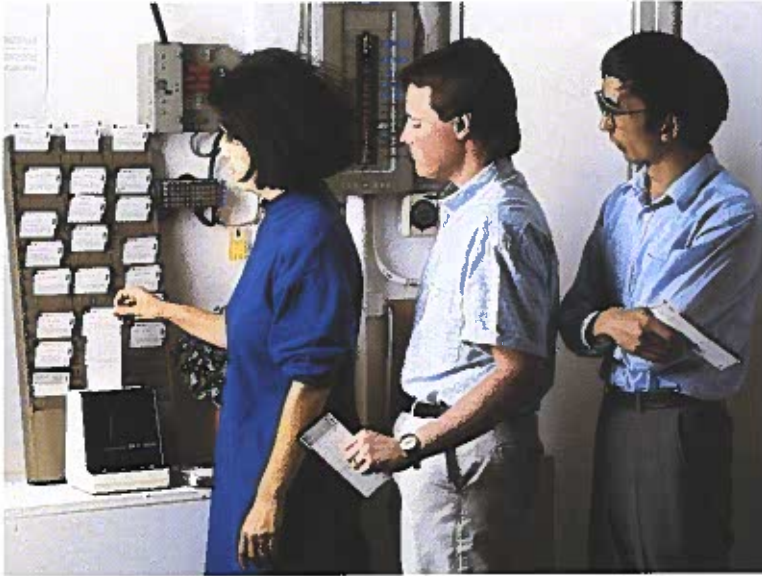


Fig. 8-7. Some employees are paid by the hour. A time clock is used to keep track of how many hours they work.



Fig. 8-8. Microorganisms grown for biotechnology may require strict timing to ensure good cell growth.

## Time and the Consumer

People who use the products of technology are also dependent on the measurement of time. When you buy a roll of film, do you check the expiration date? The expiration date is placed there by the manufacturer. The manufacturer guarantees the film's performance through this date. Fig. 8-9.

Products of technology can be seasonal. This means they are used only at certain times during the year. Consumers can save money by purchasing items off-season, when there is less need or demand for the product.

Consumers should also consider a product's durability and life expectancy. How long should you expect your bicycle to work before you have to replace it? Items such as appliances and



Fig. 8-9. Many products have a "shelf life." A product's shelf life is the length of time it can be stored before the manufacturer can no longer predict the results of using it.

automobiles are expected to perform well for several years before they need to be replaced.



■ Visit a store that offers for sale many different types of items. Find at least two types of products besides food products and film that are marked with expiration dates.

## Technology Influences Time

New technologies often decrease the amount of time needed to accomplish a task. Communication technologies allow companies to transfer information instantly. Computers can do complicated calculations in a flash.

Advances in transportation technology move people and products from place to place faster than ever before. The rate at which products can be moved from the factory to the store affects the price of the product. The rate at which food and medical products can be moved affects their quality.

### ►►► FOR DISCUSSION ◀◀◀

1. Give three examples of how a restaurant owner might have to manage time.
2. How could you streamline your school day so it would end half an hour earlier?

### IMPACT

Medical technology has given us more time. We have learned how to prevent or cure many diseases that once killed millions. As a result, most of us will live into our 70s or 80s.



**Chapter Highlights** .....

- Capital consists of money, buildings, property, equipment, and all the other goods a business may own.

- Companies can raise capital by making bank loans, selling stock, or using their own funds.

- Profit is the money left over after all the company's expenses have been paid.

- Time influences the way products are made, how much they cost, and how people use them.

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

1. List the types of capital that might be owned by a large farm.
2. List three sources of capital a company might use to finance expansion.
3. What is interest?
4. Why might stockholders not receive any dividends from a company in which they hold stock?
5. What do you call the money left after your company deducts expenses?
6. If your company had poor cash flow, should you be concerned? Explain.
7. Give two examples of why, in technology, "time is money."
8. List three products that have expiration dates.

9. Explain one method used in technology to speed up production.

10. List three seasonal items. When would be the best time to purchase each item?

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

1. Milk has a "sell by" date stamped on the carton. Open a container of milk on this "sell by" date and pour some milk into seven small containers. Put an airtight cover on each and refrigerate. Check one container each day for a week. Did any of the milk spoil? When?

**MATH**

1. Suppose you borrow \$3500 from a bank at 6% interest. How much money will you owe the bank at the end of one year? Use the formula  $\text{Interest} = \text{Principal} \times \text{Rate} \times \text{Time}$ .

**LANGUAGE ARTS**

1. Think about the phrase "time is money." In a paragraph, give your own explanation of this phrase.

**SOCIAL STUDIES**

1. Where did Henry Ford get the idea for assembly line production? Find out how he set it up in his car production plant. How fast could Ford's workers manufacture a car? What did this do to the price of cars?



# Using Systems to Combine Resources

## Introduction .....

The word *system* is used often in technology. What is a system? Can you name some everyday systems?

You may have seen the word *system* used to describe machines. You may even have some small systems at home. Computer systems and stereo systems are found in many homes today. Have you ever seen an advertisement in a newspaper for an intruder alarm system or low-cost heating system?

You may watch a TV news broadcast covering a debate over the proposed construction of a solid waste disposal system in your community. Each day, you may travel along a complex highway system on your way to school.

Systems—thousands of them—are all around us. Some are gigantic, like our nation's highway system. Some systems are as small as a home computer system. The purpose of this chapter is to help you understand how systems are used in technology to combine resources.

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

Define and give examples of systems in technology.

Explain the similarities among systems.

Diagram simple systems.

Separate large systems into smaller subsystems.

Discuss the impacts of systems.

## Words you will need .....

**system**

**input**

**process section**

**output**

**system diagram**

**feedback**

**subsystems**

