

# ACTIVITIES

## CROSS-CURRICULAR EXTENSIONS

- 1. SCIENCE** Exchange a test sample board of materials with another school located in an area with a climate different from yours. After one semester, see if the climate makes a difference in how materials degrade.
- 2. MATHEMATICS** Calculate the volume of one soda can or milk carton. Find out how many cans or cartons are used in your school each day. Calculate the total volume of space they would take up in a landfill. How would the volume differ if the containers were crushed?
- 3. COMMUNICATION** Research new forms of biodegradable plastics. Make a radio commercial or video newscast to share the information.

## EXPLORING CAREERS

Information and technology are big business and impact our lives every day. Advances in technology have opened doors for new companies that offer us more career choices than ever before.

**Market Research Analyst** Excellent mathematics skills are important for those interested in a job in market research. These workers collect information on products. Then the companies for which they work use this information to decide on what competing products and services to offer. This is a great job for someone who enjoys asking questions and digging for answers.

**Webmaster** Do you enjoy spending time in cyberspace? Companies employ webmasters to develop and maintain company websites. They handle the technical aspects of the site, including what information is found there and how fast you can access the information. Technical skills in computer programming and graphic design are needed.



## ACTIVITY

Make a list of all the electronic and/or computerized products that you use from the time you get up until you go to bed. How many products are on your list?

# Introducing Computers

**SECTION**

**1** Computer Basics

**2** Using a Word Processor

ACTION ACTIVITY **Word Processing a Document**

**3** Using a Database

ACTION ACTIVITY **Creating a Database**

**4** Using a Spreadsheet

ACTION ACTIVITY **Working with a Spreadsheet**

### THINGS TO EXPLORE

- Describe ways computers are used and give examples.
- Identify basic computer components and peripherals.
- Explain the difference between hardware and software.
- Define ROM and RAM.

### TechnoTerms

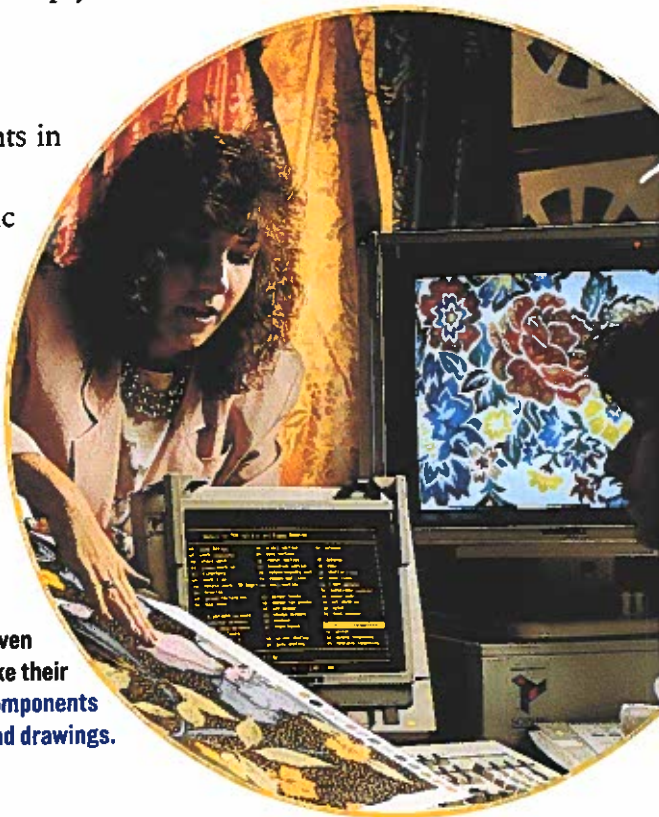
binary counting  
system  
central processing  
unit (CPU)  
hardware  
microchip  
peripherals  
software

Computers are important tools for solving problems. A few major uses of computers include writing, drawing, finding and organizing information, calculating numbers, and controlling other devices. Fig. 4-1. In this chapter and throughout your technology study, computers will be put to use in a variety of ways. Just like any other tool, they are there to help you.

## Computers in Your Life

Did you know, for example, that many events in your life are controlled by computers you may not even see? Fig. 4-2. For example, city traffic lights and telephone networks are computer controlled. Weather forecasters use computers to analyze information received from satellites above the Earth. In some hospitals, computers are used to draw precise diagrams for doctors to use in performing surgery. Even modern cars contain computer devices that control the engine.

**Fig. 4-1.** Designers of fabrics and even wallpaper may use computers to make their drawings. Find out what computer components artists need in order to make freehand drawings.



**OPPOSITE** Can robots play chess? Yes, because computers can play chess, and computers control robots. Research Garry Kasparov and his chess battle with Big Blue.

**Fig. 4-2.** At a shipping center, this computer with a touch screen helps control distribution of products.



## A Brief History of Computers

The computers of the 1950s were huge machines that took up whole rooms. Fig. 4-3. These early computers were used only by the government and big corporations. It wasn't until 1977 that the first home computers became available. Since then, the power of the computer has increased many times, while its size has decreased.

Today a computer that is more powerful than the computers of 40 years ago will fit inside a wristwatch!

The technology that led to smaller and more powerful computers was the **microchip**, or integrated circuit (IC). A microchip consists of a piece of silicon with hundreds of tiny electronic parts linked together to form circuits. Computers use ICs to store information.

### INFOLINK

See Chapter 3, "How Technology Affects You," for an activity investigating integrated circuits.

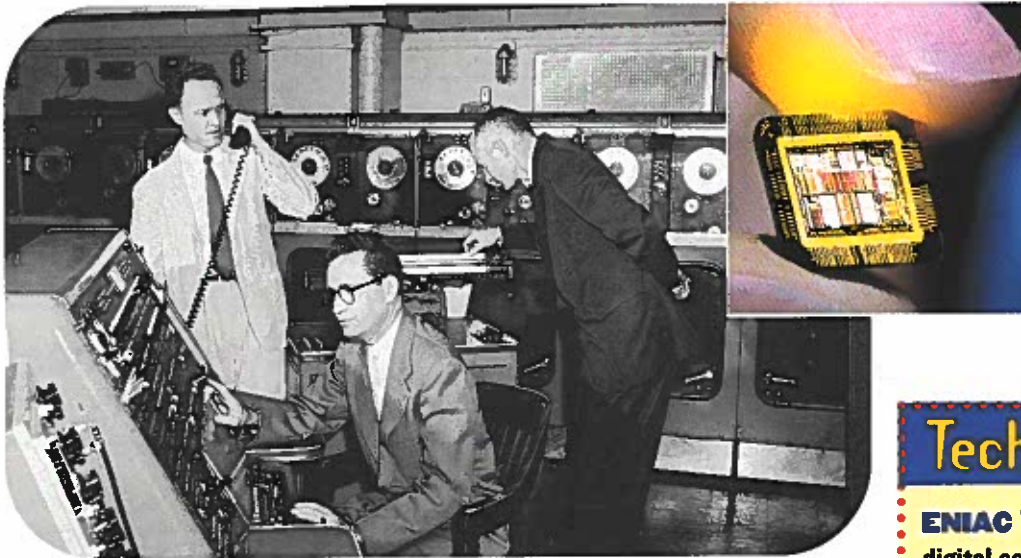
## MATHEMATICS CONNECTION

### The Binary Counting System

The number system you generally use in everyday life is called the **decimal system**. It has ten digits from 0 to 9.

You can use these ten digits to write numbers larger than 9 by using a tens' column, a hundreds' column, a thousands' column, and so on. In other words, each place to the left of the ones' place increases in value by a power of 10. For example, 256 means 2 hundreds ( $10^2$ ) + 5 tens ( $10^1$ ) + 6 ones.

In the *binary system*, each place to the left of the ones' place increases in value by a power of 2. In order to write numbers larger than 1 in binary, you use a twos' column, a fours' column, an eights' column, a sixteens' column, and so on. In the chart, the decimal number 5 is 101 in base 2. That means 1 group of  $2^2$  + 0 groups of  $2^1$  + 1 in the ones' column.



**Fig. 4-3.** All of the power generated by this early room-sized computer is now compressed into a tiny microchip smaller than your fingernail.

## TechnoFact

**ENIAC** The first large digital computer was **ENIAC (Electronic Numerical Integrator And Computer)**. It was 100 feet long and weighed 30 tons. Today, the same computing power is available on a low-cost microchip smaller than your fingertip.

## Computer Code

The smallest unit of information used by computers is called a *bit*. The word *bit* stands for *binary digit*. Eight bits together are called a *byte* (pronounced bite). Computers often process and store information one byte at a time.

Decimal Base 10			Binary Base 2			
100s	10s	1s	8s	4s	2s	1s
		0				0
		1				1
		2			1	0
		3			1	1
		4		1	0	0
		5		1	0	1
		6		1	1	0
		7		1	1	1
		8	1	0	0	0
		9	1	0	0	1
	1	0	1	0	1	0

## ACTIVITY

Write the following numbers in binary:

12  
23

Why is this important? Computers use a code to represent letters, numbers, and punctuation. The code is written using the **binary counting system**. In binary, the two digits, 0 and 1, stand for electronic signals that are either “off” or “on.”

When you hit a key on a computer keyboard, you send one byte of information in binary code. For example, if you typed TECH, the binary code would look like this:

T	01010100
E	01000101
C	01000011
H	01001000
Bits and bytes	

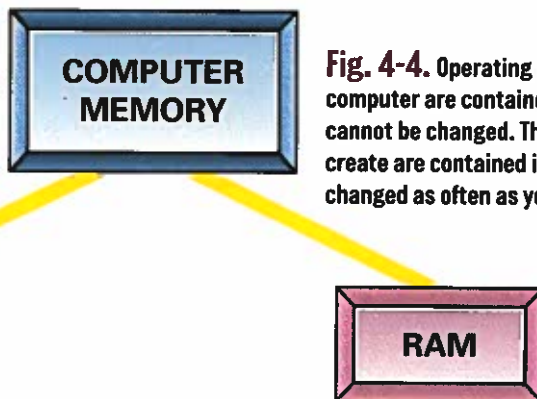
The computer code used in the United States is called ASCII (pronounced ASK-ee). ASCII stands for American Standard Code for Information Interchange.

## Memory and Storage

The data held inside a computer is stored in its memory. Computer memory is one of two kinds—RAM or ROM. Fig. 4-4. RAM stands for *random access memory*. RAM is temporary memory used for computer applications and your documents. ROM stands for *read only memory*. ROM is permanent memory built into the computer’s electronic circuits. ROM contains operating instructions that can be used (read), but not changed by the user.

Information can be stored magnetically on a computer’s hard drive. It can also be stored magnetically on computer disks called *floppy* disks or optically on compact discs called *CD-ROMs* (Compact Disc—Read Only Memory).

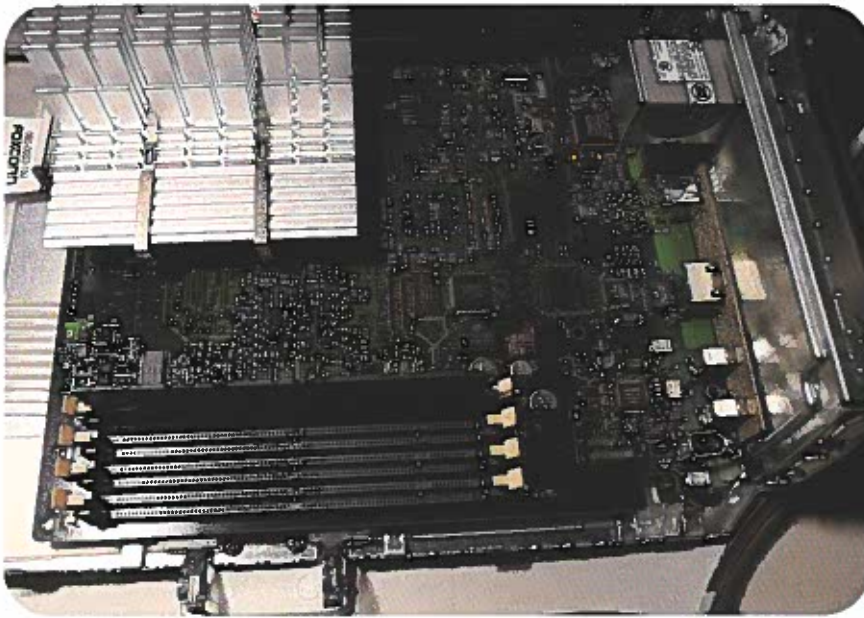
To keep from losing the work you do on a computer, save it to a hard disk or floppy disk frequently. You can also save information on recordable compact discs called *CD-Rs* (recordable only once) or *CD-RWs* (rewritable).



**Fig. 4-4.** Operating instructions for the computer are contained in ROM. They cannot be changed. The documents you create are contained in RAM. They can be changed as often as you wish.

**TechnoFact**

**RUNNING THE SHOW** In Walt Disney’s Magic Kingdom, computers do everything from raising curtains to opening exit doors. Computers make sure that every recorded sound matches the movements of animated figures. If something goes wrong with a ride or special attraction, the computers immediately shut it down.



**Fig. 4-5.** The main circuit board in a computer is called the mother board.

## Hardware

The parts of a computer system are called **hardware**. One piece of hardware, the **central processing unit (CPU)** is the brain of the computer. It is a special kind of integrated circuit that, along with others, is mounted on a printed circuit (PC) board. Some computers have many printed circuit boards. The main circuit board that contains the CPU and connectors to other parts of the computer is called the *mother board*. Fig. 4-5.

Other basic hardware might include a monitor, a mouse, a floppy disk drive, a hard drive, and a keyboard. These are considered basic because they are needed to operate the computer. Other useful devices that can be connected to a computer system are called **peripherals**. Fig. 4-6.

## Software

Computer hardware doesn't work by itself. You need to use some kind of **software**. Software is the coded instructions that tell a computer what to do. Software can be stored on floppy disks, compact disks, or a hard drive.

Software used for a specific purpose is called an *application*, or program. Applications are available for such things as word processing, databases, and spreadsheets. When software is used by the computer, documents are stored in RAM memory.

### TechnoFact

**BOOTING YOUR COMPUTER** "Booting" your computer means to turn it on. For some older models you have to put a floppy disk in before turning it on. For others you have to turn the computer on first and then put in the floppy disk. Newer models have a hard disk drive, and you will not need a floppy disk to start an application. Be sure you know the method your computer requires before you begin.



**Printer.** A machine that outputs text (words) and graphics (pictures) on paper.

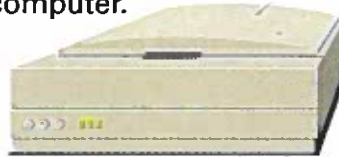


**MIDI (musical instrument digital interface).** A device that lets you put music into a computer from an electronic musical keyboard.



**Modem.** A device that lets your computer communicate with another computer over a telephone line.

**Scanner.** A machine that copies text and graphics from paper into the computer.



**Joystick.** A device that changes hand movements into actions on a computer screen.

**Fig. 4-6.** Peripherals increase a computer's usefulness. Have you ever used one of these devices? Share your experience with the class.

## SECTION 1

### TechCHECK

1. What jobs can you do with a computer?
2. What are the parts of a computer system called?
3. Which form of memory, RAM or ROM, is permanently built into the computer?
4. **Apply Your Knowledge.** Look at the computer systems available for your use at school. Identify and list the basic parts, peripherals, and software you will be able to use with them.



# Using a Word Processor

## THINGS TO EXPLORE

- Define word processing and explain why it is useful.
- Explain what desktop publishing is.
- Create a word processing document.

**TechnoTerms**  
desktop publishing  
(DTP)  
fonts  
word processing

**W**riting text (words) with a computer is called **word processing**. Most businesses now use computers instead of typewriters. A word processor is faster, easier to use, and more efficient than a typewriter. Fig. 4-7.

Imagine you have just typed a 60-page report, but a paragraph on page 3 is missing and there is no room on the page to insert it. If you were using a typewriter, you would have to retype the report completely. On a word processor, you would simply fix the error on the computer screen and reprint the report. Think of the time and effort you just saved!

## Creating a Document

Word-processing software lets you choose different **fonts**, or kinds of type characters (letters). Fig. 4-8. It lets you change the size of the characters and the style of type used. It even lets you change between single and double spacing easily. Most word-processing software will place page numbers, tabs, and paragraphs where you want them.



**Fig. 4-7.** Word processors have replaced typewriters. Locate an old typewriter and try it out. Describe your experience to the class.

**Fig. 4-8.** Several different type styles, sizes, and fonts are shown here. Make a printout showing an example of all the fonts available with the word-processing software you use at school.

## Type Styles

This is plain text  
**This is bold text**  
*This is italic text*  
This is outline text

## Type Sizes

This is 10 point  
This is 14 point  
**This is 24 point**

## Type Fonts

This is the Helvetica font  
This is the Courier font  
*This is the Park Avenue font*

## TechnoFact

**PORTABLE PUBLISHING** The manuscript for this textbook was written using word-processing software on a laptop (portable) computer. This was all done while the authors lived in a camper! They also used graphics software to create some of the graphics. They sent manuscript through e-mail to the editor who edited it with word-processing software. A layout editor then used desktop publishing software to arrange the pages before the final printing. At any stage it was easy to change information without re-keying the entire chapter or book.

Software is available that can point out spelling errors. Some word-processing software packages also include an electronic *thesaurus* that gives you synonyms (words that have the same meaning) to help you in your writing.

## Desktop Publishing

After you create a document with word-processing software, you can organize it using desktop publishing software. **Desktop publishing (DTP)** software lets you put text and graphics together to make a report, newsletter, or newspaper. Desktop publishing has changed the way printed materials, from business cards to books, are published. Now anyone who has learned to use a computer can do things that once only trained professionals such as typesetters and printers could do.

## SECTION 2

### TechCHECK

1. What is word processing?
2. Why is word processing helpful to people?
3. What is desktop publishing?
4. **Apply Your Knowledge.** Using desktop publishing software, create a school bulletin that contains text and graphics.

## Word Processing a Document

### Real World Connection

Businesses use word processing and desktop publishing every day to advertise or communicate. Word-processing software can help you become a better writer by making it easy to rearrange words or sentences. It can even check your spelling and grammar and let you add graphics.

Be sure to fill out your **TechNotes** and place them in your portfolio.

### Design Brief

Choose any one of the following projects or think of your own idea. Then use a computer and word-processing software to make and print your document. Fig. A. Choose one:

- Write a letter to a company requesting information about its products.
- Write a résumé. A *résumé* is a list of important facts about yourself. A résumé is given to employers when you apply for a job.
- Write your own definitions to the key terms in this chapter.
- Write a program for an event at your school, such as a band concert or football or basketball game.
- Write a book report needed for another class.
- Write an article for the school newspaper or a letter to parents about a school event.
- Write a video or audio script.

### Materials/Equipment

- computer with word-processing software
- printer

#### **SAFETY FIRST**

Follow the safety rules listed on pages 42-43 and the specific rules provided by your teacher for tools and machines.

(Continued on next page)

**Brady High School  
Senior Class Play**

*Shakespeare's*  
*King Lear*



**March 3 - March 10  
8:00 p.m.**

**Murchison Auditorium  
Brady High School  
135 West Main Street**

**Main floor \$10  
Balcony \$7.50**

***Reserved seating only***

**Fig. A**

## Procedure

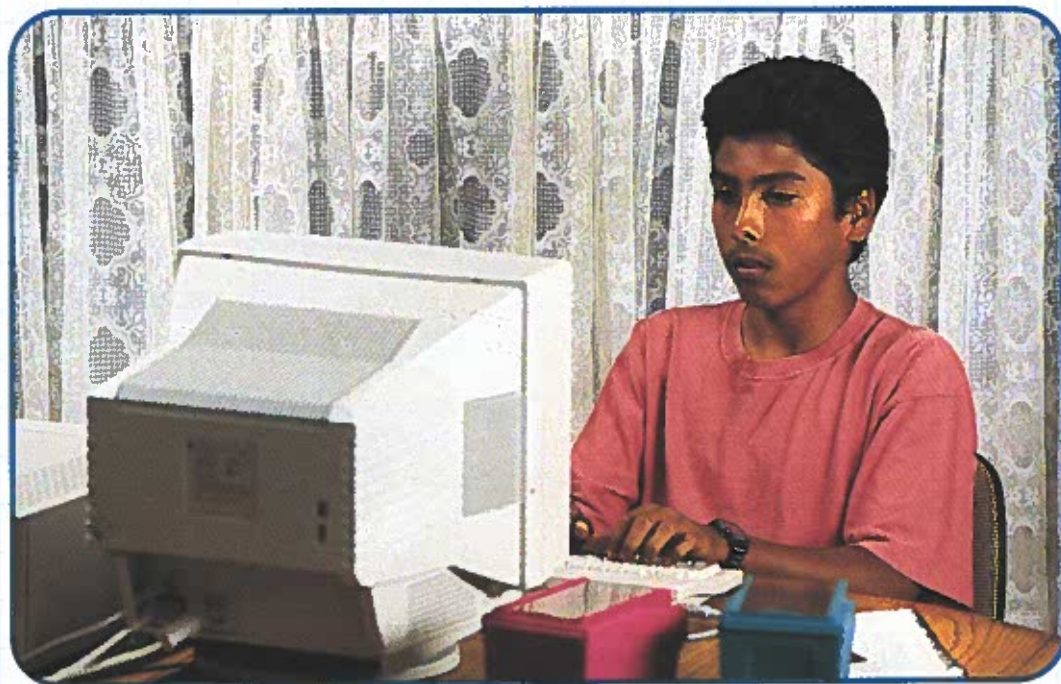
1. Boot a computer with word-processing software.
2. Type your document. Use one of the ideas suggested or get your teacher's approval for your own idea.
3. Learn how to rearrange words and sentences using the word-processing software.
4. Experiment with changing type sizes, styles, and fonts.
5. Check the spelling and grammar of your document using special software.
6. Have a friend *proofread* (check over) your work.
7. Save your document to a floppy disk or hard drive.
8. Print your document.

## Evaluation

1. What was the easiest part of doing word processing?
2. Time yourself for one minute as you type. How many words per minute did you type?
3. **Going Beyond.** Ask your teacher, or use the *documentation* (instructions) for the word-processing software, to find out how to do the following: set tabs, change line spacing, make columns, and set or change margins.

### SAFETY FIRST

- **Avoid eye strain.** Look away from the screen often. Refocus your eyes on distant objects.
- **Avoid strain on your neck, back, arms, or wrists.** Stretch frequently. Get up and walk around at least once an hour.



## TechnoTerms

data  
database  
field  
file  
record

## THINGS TO EXPLORE

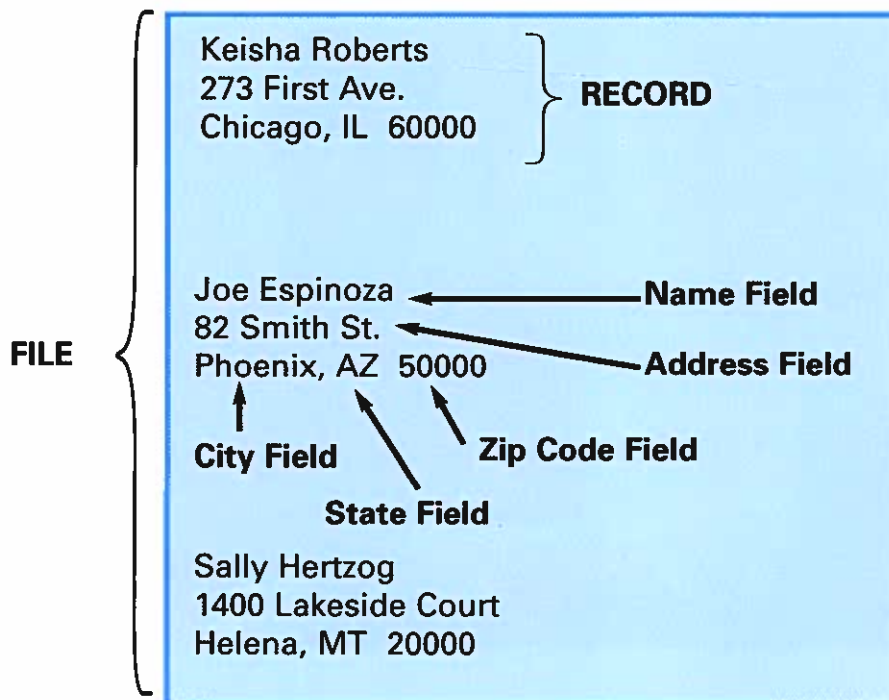
- Explain what a database is and how it is used.
- Identify a field, file, and record.
- Create a database.

**D**ata is another word for “information.” A **database** is a computer application that lets you find and organize information quickly and easily. This is why databases are sometimes called “electronic filing cabinets.” For example, your school has a file for every student, including you!

## Databases Save Time

Suppose the school needed to send a letter to the parents of seventh-grade girls taking technology classes. Without a computer, the school secretary would first have to find the files for all the seventh graders. Then he or she would have to sort out all

the girls and go through each girl’s file to see if she is in a technology class. This process could take a long time! However, a computer database application could do it in a manner of seconds.



**Fig. 4-9.** Many fields make up one record. Many records make up a file.

## Setting Up a Database

To start a database, you need to make fields, records, and files. These are the major parts of most databases. Fig. 4-9.

- **Field:** One part of the data that helps describe the record. For example, a person's name would be one of many fields that make up a record.
- **Record:** All of the fields put together for one entry. For example, a person's record might include fields such as a first and last name.
- **File:** A group of records, such as all the records of the students in the seventh grade.

In the school records example, the fields would contain first name, last name, parents' names, address, class schedule, and so on for an individual student. A record would be the information in all the fields for one seventh-grader. A file would contain the records for all seventh graders.

## Uses for Databases

In everyday life, databases are often used by companies to keep track of information on possible customers. Credit information, hobbies, sports interests, and travel preferences are some kinds of data stored about you and your family on computers. This kind of database sometimes leads to "junk mail" being sent to your home. Some people consider this use of computers as an invasion of their privacy. What do you think?

### TechnoFact

**IDENTITY THIEVES**  
You're 22, working full-time, and buying a new car. You apply for a loan and it's denied! Digging deeper, you find out that someone in another state has assumed your identity and run up big debts in your name. It may take years to clear your credit record. This can and does happen. Low-tech thieves steal driver's licenses or snatch bank statements from the trash. High-tech hackers find their way into databases, then copy and sell private information on hundreds of people!

### SECTION 3

### TechCHECK

1. What is a database?
2. What is a database field? Give examples.
3. How do people use databases?
4. **Apply Your Knowledge.** Make a database that includes everyone in your class.

## Creating a Database

Be sure to fill out your **TechNotes** and place them in your portfolio.

### Real World Connection

You have learned that the amount of information in the world, called our knowledge base, is doubling every few years. That's a lot of data!

In this activity you will work in groups to design a database. You will then use the database to organize and sort information.

### Design Brief

Design and create a database that can be used to organize and find information. Fig. A. Choose any of the following topics, or think of your own:

- Events in the development of technology
- Space exploration
- Major inventions
- Instructional videos
- Technology-related magazine articles

### Materials/Equipment

- computer with database software
- printer

#### **SAFETY FIRST**

- Follow the safety rules listed on pages 42-43 and the specific rules provided by your teacher for tools and machines.
- Avoid eye strain. Look away from the screen often. Refocus your eyes on distant objects.
- Avoid strain on your neck, back, arms, or wrists. Stretch frequently. Get up and walk around at least once an hour.



## Procedure

1. Work in groups of three or four. Choose one of the ideas in the design brief, or get your teacher's permission to use your own idea.
2. Determine the fields that would make up a database record for your topic.
3. Show your database design to your teacher.
4. Research your topic, and enter the data into a database application on a computer.
5. Save your data for future use.
6. Try to use your database to find and sort information on a topic. Challenge other students in other groups to use your database to do research.

## Evaluation

1. List 10 purposes for which stores or companies might use a database.
2. Do you think that a database with information about you should be given to companies, or should it be kept confidential (secret)? Explain.
3. **Going Beyond.** Use the documentation (instructions) for the database software to do the following:
  - Sort alphabetically
  - Sort numerically
  - Create a report
  - Edit (change) data already entered



Fig. A

## THINGS TO EXPLORE

- Define what a spreadsheet is and how it is used.
- Identify rows, columns, and cells.
- Make and use a spreadsheet.

## TechnoTerms

cell  
spreadsheet

The computer's ability to calculate is often called number "crunching" because it happens so fast! A **spreadsheet** application helps keep track of the calculations. For example, spreadsheets are often used to make budgets. Suppose you wanted to know how long it would take you to save enough to buy a stereo system. You might create a spreadsheet showing your monthly income like the one in Fig. 4-10.

## Basic Parts of a Spreadsheet

All spreadsheets are made up of columns and rows. Usually rows are horizontal and numbered, and columns are vertical and given letter names. In the spreadsheet shown in Fig. 4-10, the income and expenses are in columns. The data for each month are in rows.

Each space in a column or row is called a **cell**. A cell can be identified by a combination of its column letter and row number. The cell in the upper left corner, for example, would be A1.

Cell A1    Column A

Month	Income	Expenditures	Balance
September	\$22.50	\$10.35	\$12.15
October	\$25.00	\$ 8.50	\$16.50
November	\$42.25	\$ 7.25	\$35.00
December	\$65.00	\$23.00	\$42.00
		Cash Available	\$105.65

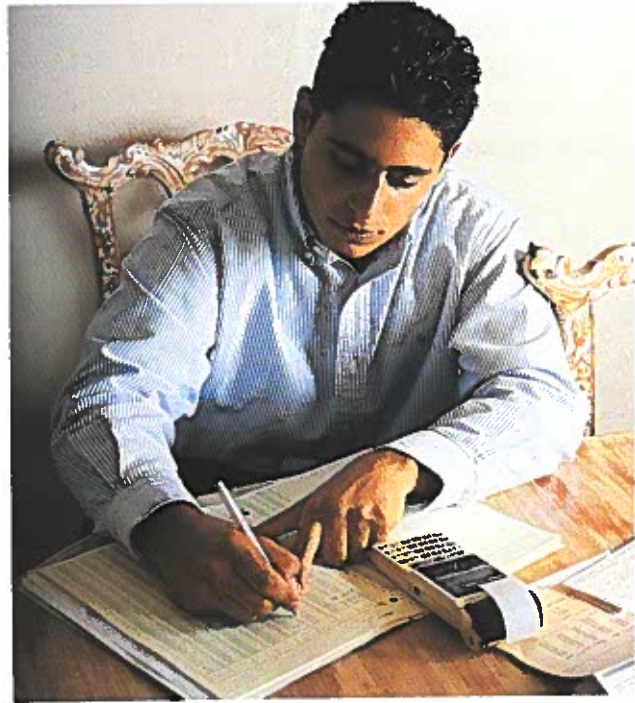
**Fig. 4-10.** Expenditures must be subtracted from income to find out how much is left. *How much did this person spend all together?*

## Spreadsheet Formulas

The advantage of using a spreadsheet is that it lets you answer “what-if” questions. For example, you might ask, “What if I earned twice as much money in January? How would that change my total income?” To find the answer, you would use a formula—in this case, addition—and the spreadsheet would show you the answer.

A formula might be as simple as adding numbers in a row or column. On the other hand, it might be more complicated. It could be an engineering calculation.

When balancing your checkbook, the spreadsheet application can automatically calculate how much money is left (balance) after each expense. You can even add your own formulas to a spreadsheet application. Fig. 4-10.



## Super Computers

Today’s super computers like the Cray T3E can make a trillion calculations per second. For example, if everyone in the United States (about 250 million people) wrote ten checks, it would take a super computer only a fraction of a second to balance all the checkbooks!

▲ When you first prepare a spreadsheet, try planning it out on paper before setting it up on the computer. How might this approach avoid problems?

### SECTION 4

## TechCHECK

1. What is a spreadsheet?
2. What is a cell?
3. How are formulas used in spreadsheets?
4. **Apply Your Knowledge.** Find out what spreadsheet applications are useful in schools. Check with your school secretary, the lunch program managers, and so on.

## Working with a Spreadsheet

Be sure to fill out your **TechNotes** and place them in your portfolio.

### Real World Connection

Whenever a lot of numbers need to be combined in any way, a computer spreadsheet can help. Spreadsheets are often used by businesses to keep track of money. Fig. A. In this activity, you will design and use a spreadsheet.

### Design Brief

Make a spreadsheet that will do any of the following, or think of your own idea:

- Budget money to be spent on presents for family members and friends
- Keep track of money earned from odd jobs and allowances; keep track of expenses
- Keep track of products made by a certain company

### Materials/Equipment

- computer and spreadsheet software
- printer

### SAFETY FIRST

- Follow the safety rules listed on pages 42-43 and the specific rules provided by your teacher for tools and machines.
- Avoid eye strain. Look away from the screen often. Refocus your eyes on distant objects.
- Avoid strain on your neck, back, arms, or wrists. Stretch frequently. Get up and walk around at least once an hour.

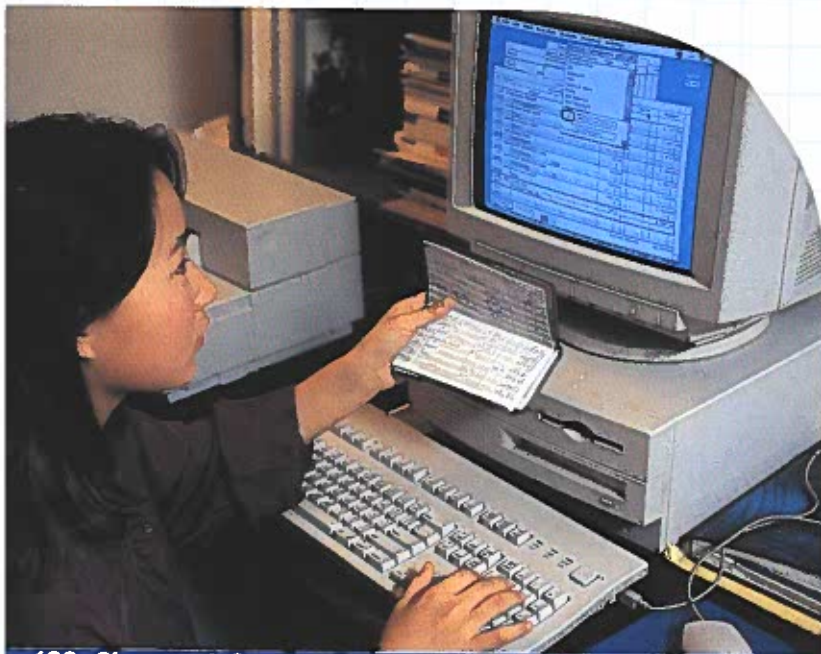


Fig. A

## Procedure

1. Work with a partner. Pick one of the topics listed, or think of your own. If you are using your own idea, get help from your teacher.
2. Design your spreadsheet on paper first.
3. Boot a computer that has spreadsheet software installed.
4. Enter the column and row headings that you need.
5. Enter the numbers in the correct cells.
6. With the help of your teacher, enter the formulas that you need in order to add, subtract, multiply, or divide.
7. Change the number in one of the cells to see how it affects the other cells.
8. Save your document.
9. Make a hard copy (printout) of your spreadsheet. Fig. B.

## Evaluation

1. Think of five different uses for a spreadsheet in the real world.
2. What advantage is there in using a spreadsheet instead of a calculator?
3. **Going Beyond.** Design and make a spreadsheet that will do one of the following jobs:
  - Calculate gas mileage from automobile trips
  - Keep track of expenses for your household
  - Organize information related to sports statistics in any sport you choose

### Money Spent on Gifts

Person	Birthday	Anniversary	Total Per Person
Mom	\$15.78	\$21.96	\$37.74
Dad	\$18.24	\$26.02	\$44.26
Joe	\$12.56		\$12.56
Denise	\$13.26		\$13.26
Grandma	\$22.37		\$22.37
		Total Spent	\$130.19

**Fig. B.** Here's an example of a completed spreadsheet. This spreadsheet helps keep track of the money spent on gifts.

## REVIEW &amp;

## CHAPTER SUMMARY

## SECTION 1

- Major uses of computers include writing, drawing, organizing information, calculating numbers, finding information, and controlling other devices.
- The technology that led to smaller and more powerful computers was the microchip, or integrated circuit (IC).
- The parts of a computer system make up its hardware; the applications are called software. Peripherals are extra hardware components.
- ROM and RAM are different types of computer memory.

## SECTION 2

- Writing text with a computer is called word processing.
- Desktop publishing (DTP) lets you put text and graphics together.

## SECTION 3

- A database is a computer application that lets you organize and find information quickly and easily.
- The parts of a database include fields, records, and files.

## SECTION 4

- A spreadsheet application keeps track of numbers and calculations.
- Spreadsheets contain rows and columns that intersect at cells.

## REVIEW QUESTIONS

1. Why is the microchip such an important invention?
2. What is the difference between hardware and software?
3. If you are doing a project that involves adding many numbers, would you use a database or spreadsheet application?
4. What application can help you write a letter?
5. What is a database record?

## CRITICAL THINKING

1. Use a word-processing application to write a long paper or report evaluating the effects of technology on you and your friends. Include a cover and title page made using a graphics application.
2. Create an acronym (a word made from parts of other words) that will remind you of the basic steps to follow in using a computer.
3. Explain how you think computers are used to forecast weather or control traffic.
4. Set up a spreadsheet to keep track of how you spend your allowance.
5. Suppose your school athletic program needed to prove that, on average, a certain number of students attended most events. How could they do this using a computer application?