Introduction to computers

Are you new to computers? Do you wonder what they do and why you would want to use one? Welcome—you're in the right place. This article gives an overview of computers: what they are, the different types, and what you can do with them.

What are computers?

Computers are machines that perform tasks or calculations according to a set of instructions, or programs. The first fully electronic computers, introduced in the 1940s, were huge machines that required teams of people to operate. Compared to those early machines, today's computers are amazing. Not only are they thousands of times faster, they can fit on your desk, in your lap, or even in your pocket.

Computers work through an interaction of hardware and software. Hardware refers to the parts of a computer that you can see and touch, including the case and everything inside it. The most important piece of hardware is a tiny rectangular chip inside your computer called the central processing unit (CPU), or microprocessor. It's the "brain" of your computer—the part that translates instructions and performs calculations. Hardware items such as your monitor, keyboard, mouse, printer, and other items are often called hardware devices, or devices.

Software refers to the instructions, or programs, that tell the hardware what to do. A word processing program that you can use to write letters on your computer is a type of software. The operating system (OS) is software that manages your computer and the devices connected to it. Two well-known operating systems are Windows and Macintosh operating system. Your computer uses the Windows operating system.

ENIAC

Introduced in 1946, ENIAC (Electronic Numerical Integrator and Computer) was the first general-purpose electronic computer. It was built for the United States military to calculate the paths of artillery shells. Physically, ENIAC was enormous, weighing more than 27,000 kilograms (60,000 pounds) and filling a large room. To process data, ENIAC used about 18,000 vacuum tubes, each the size of a small light bulb. The tubes burned out easily and had to be constantly replaced.

Types of computers

Computers range in size and capability. At one end of the scale are supercomputers, very large computers with thousands of linked microprocessors that perform extremely complex calculations. At the other end are tiny computers embedded in cars, TVs, stereo systems, calculators, and appliances. These computers are built to perform a limited number of tasks.

The personal computer, or PC, is designed to be used by one person at a time. This section describes the various kinds of personal computers: desktops, laptops, handheld computers, and Tablet PCs.

Desktop computers

Desktop computers are designed for use at a desk or table. They are typically larger and more powerful than other types of personal computers. Desktop computers are made up of separate components. The main component, called the system unit, is usually a rectangular case that sits on or underneath a desk. Other components, such as the monitor, mouse, and keyboard, connect to the system unit.

Laptop computers

Laptop computers are lightweight mobile PCs with a thin screen. They are often called notebook computers because of their small size. Laptops can operate on batteries, so you can take them anywhere. Unlike desktops, laptops combine the CPU, screen, and keyboard in a single case. The screen folds down onto the keyboard when not in use.

Handheld computers

Handheld computers, also called personal digital assistants (PDAs), are battery-powered computers small enough to carry almost anywhere. Although not as powerful as desktops or laptops, handhelds are useful for scheduling appointments, storing addresses and phone numbers, and playing games. Some have more advanced capabilities, such as making telephone calls or accessing the Internet. Instead of keyboards, handhelds have touch screens that you use with your finger or a stylus (a pen-shaped pointing tool).

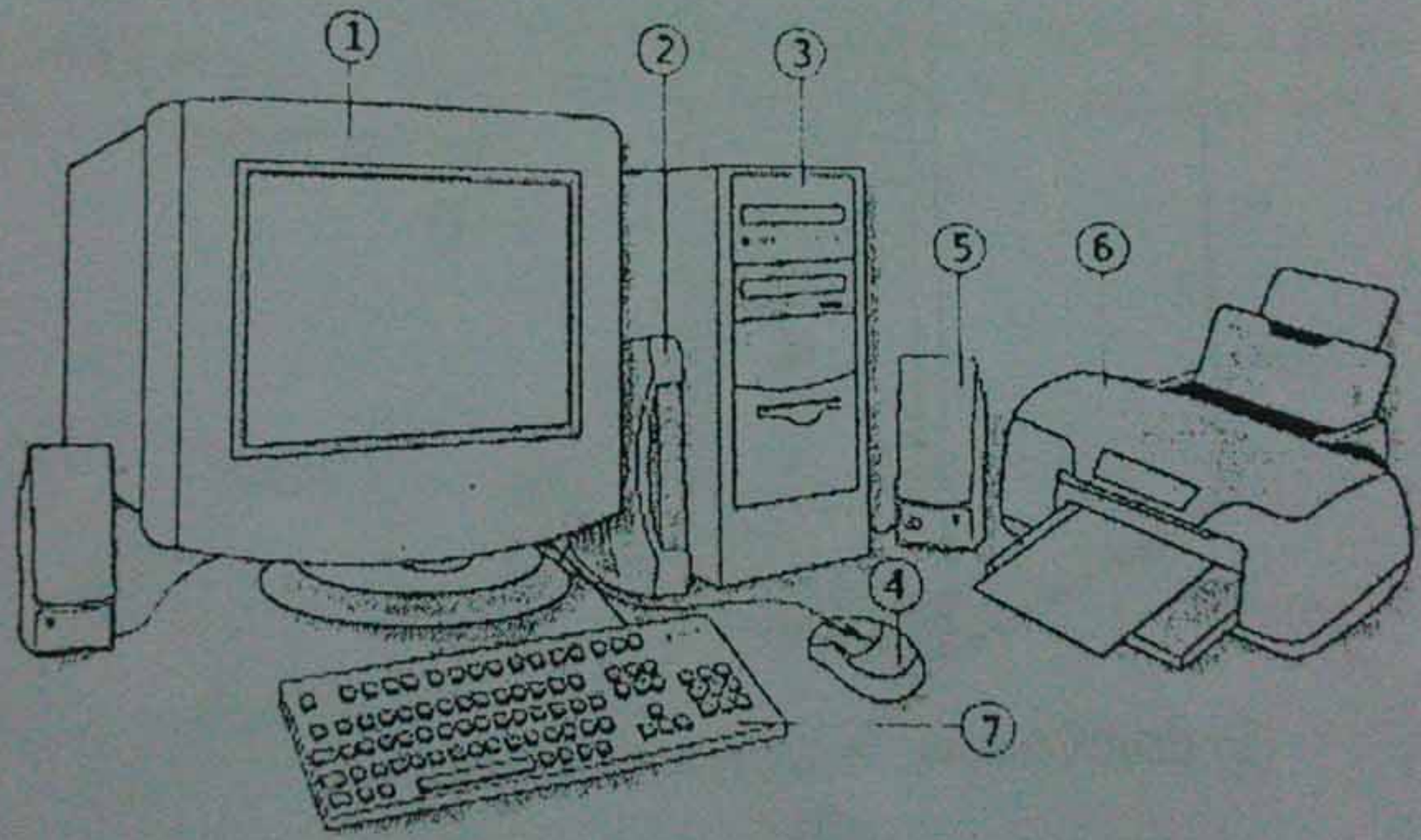
Tablet PCs

Tablet PCs are mobile PCs that combine features of laptops and handhelds. Like laptops, they're powerful and have a built-in screen. Like handhelds, they allow you to write notes or draw pictures on the screen, usually with a tablet pen instead of a stylus. They can also convert your handwriting into typed text. Some Tablet PC's are "convertibles" with a screen that swivels and unfolds to reveal a keyboard underneath.

Parts of a computer

If you use a desktop computer, you might already know that there isn't any single part called the "computer." A computer is really a system of many parts working together. The physical parts, which you can see and touch, are collectively called hardware. (Software, on the other hand, refers to the instructions, or programs, that tell the hardware what to do.)

The illustration below shows the most common hardware in a desktop computer system. Your system may look a little different, but it probably has most of these parts. A laptop computer has similar parts but combines them into a single notebook-sized package.



1 Monitor
2 Modem
3 System unit
4 Mouse
5 Speaker
6 Printer
7 Keyboard

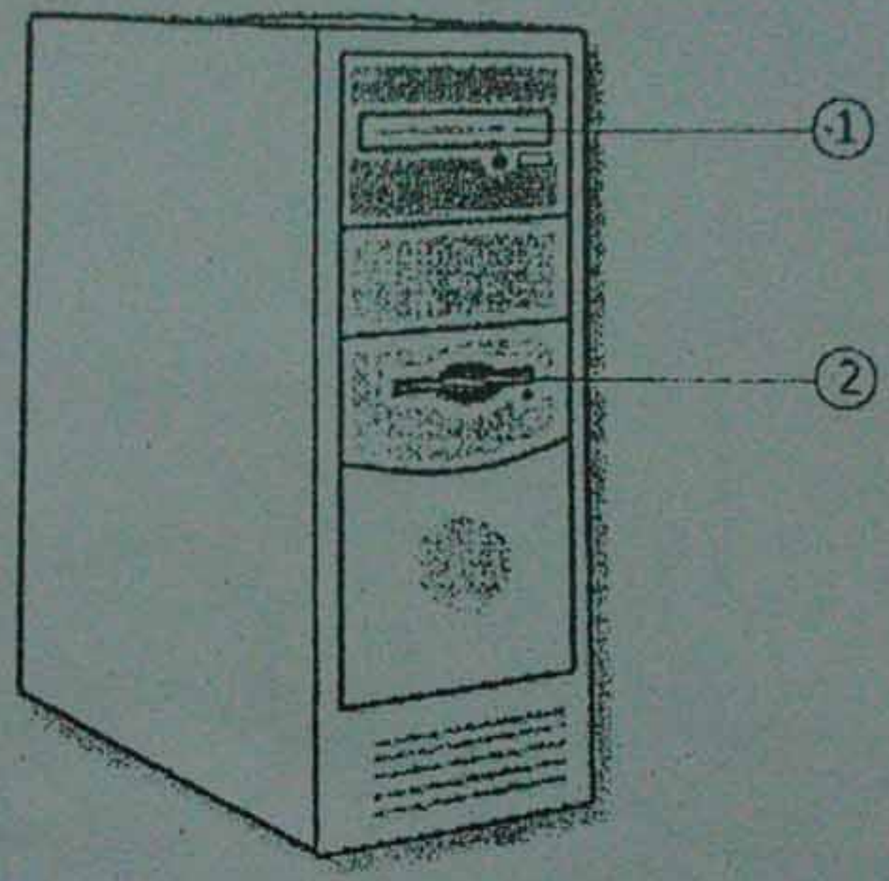
Desktop computer system

Let's take a look at each of these parts.

System unit

The system unit is the core of a computer system. Usually it's a rectangular box placed on or underneath your desk. Inside this box are many electronic components that process information. The most important of these components is the central processing unit (CPU), or microprocessor, which acts as the "brain" of your computer. Another component is random access memory (RAM), which temporarily stores information that the CPU uses while the computer is on. The information stored in RAM is erased when the computer is turned off.

Almost every other part of your computer connects to the system unit using cables. The cables plug into specific ports (openings), typically on the back of the system unit. Hardware that is not part of the system unit is sometimes called a peripheral device or device.



① CD/DVD drive ② Floppy disk drive

System unit

Storage

Your computer has one or more disk drives—devices that store information on a metal o
plastic disk. The disk preserves the information even when your computer is turned off.

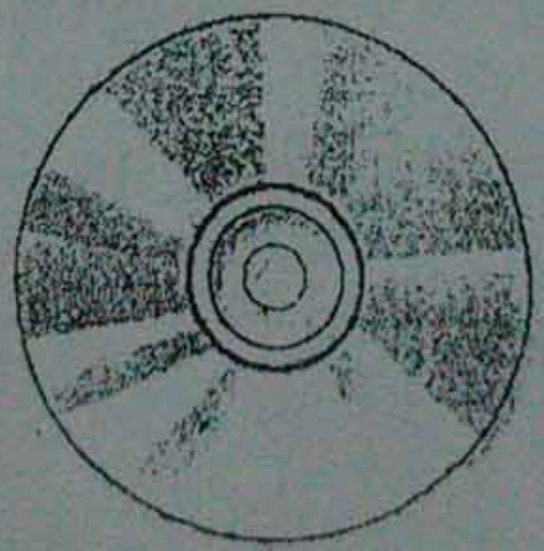
Hard disk drive

Your computer's hard disk drive stores information on a hard disk, a rigid platter or stack of platters with a magnetic surface. Because hard disks can hold massive amounts of information, they usually serve as your computer's primary means of storage, holding almost all of your programs and files. The hard disk drive is normally located inside the system unit.

Hard disk drive

CD and DVD drives

Nearly all computers today come equipped with a CD or DVD drive, usually located on the front of the system unit. CD drives use lasers to read (retrieve) data from a CD, and many CD drives can also write (record) data onto CDs. If you have a recordable disk drive, you can store copies of your files on blank CDs. You can also use a CD drive to play music CDs on your computer.

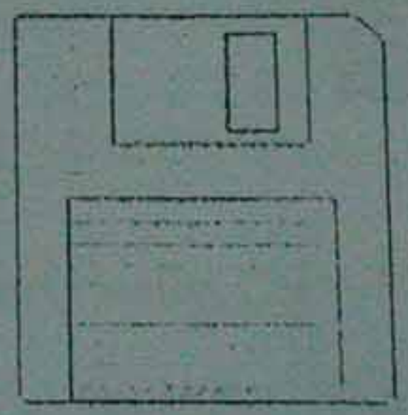


CD

DVD drives can do everything that CD drives can, plus read DVDs. If you have a DVD drive, you can watch movies on your computer. Many DVD drives can record data onto blank DVDs.

Floppy disk drive

Floppy disk drives store information on floppy disks, also called floppies or diskettes. Compared to CDs and DVDs, floppy disks can store only a small amount of data. They also retrieve information more slowly and are more prone to damage. For these reasons, floppy disk drives are less popular than they used to be, although some computers still include them.

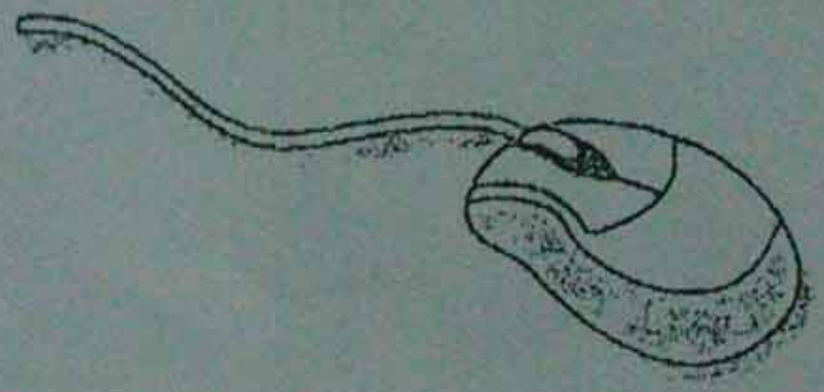


Floppy disk

Why are floppy disks "floppy"? Even though the outside is made of hard plastic, that's just the sleeve. The disk inside is made of a thin, flexible vinyl material.

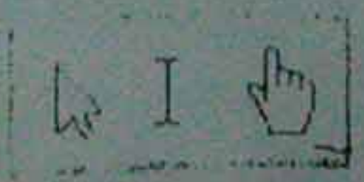
Mouse

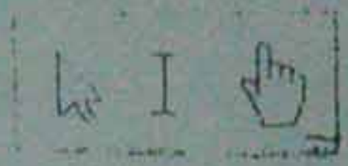
A mouse is a small device used to point to and select items on your computer screen. Although mice come in many shapes, the typical mouse does look a bit like an actual mouse. It's small, oblong, and connected to the system unit by a long wire that resembles a tail. Some newer mice are wireless.



Mouse

A mouse usually has two buttons: a primary button (usually the left button) and a secondary button. Many mice also have a wheel between the two buttons, which allows you to scroll smoothly through screens of information.





When you move the mouse with your hand, a pointer on your screen moves in the same direction. (The pointer's appearance might change depending on where it's positioned on your screen.) When you want to select an item, you point to the item and then click (press and release) the primary button. Pointing and clicking with your mouse is the main way to interact with your computer.

Keyboard

A keyboard is used mainly for typing text into your computer. Like the keyboard on a typewriter, it has keys for letters and numbers, but it also has special keys:

- The function keys, found on the top row, perform different functions depending on where they are used.
- The numeric keypad, located on the right side of most keyboards, allows you to enter numbers quickly.
- The navigation keys, such as the arrow keys, allow you to move your position within a document or webpage.

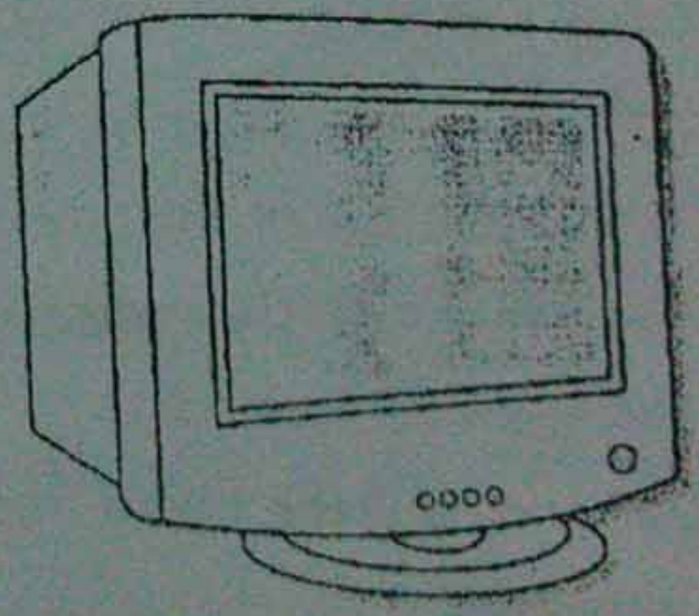
You can also use your keyboard to perform many of the same tasks you can perform with a mouse.

Monitor

A monitor displays information in visual form, using text and graphics. The portion of the monitor that displays the information is called the screen. Like a television screen, a computer screen can show still or moving pictures.

There are two basic types of monitors: CRT (cathode ray tube) monitors and LCD (liquid crystal display) monitors. Both types produce sharp images, but LCD monitors have the advantage of being much thinner and lighter. CRT monitors, however, are generally more affordable.

LCD monitor (left):



CRT monitor (right)

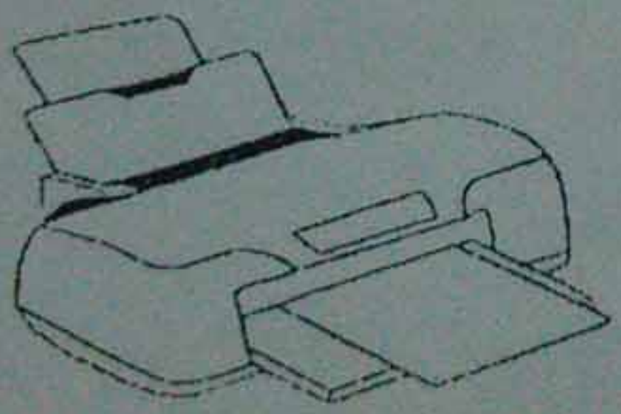
LCD monitor (left):

CRT monitor (right)

Printer

A printer transfers data from a computer onto paper. You don't need a printer to use your computer, but having one allows you to print e-mail, cards, invitations, announcements, and other materials. Many people also like being able to print their own photos at home.

The two main types of printers are inkjet printers and laser printers. Inkjet printers are the most popular printers for the home. They can print in black and white or in full color and can produce high-quality photographs when used with special paper. Laser printers are faster and generally better able to handle heavy use.



Inkjet printer (left)

laser printer (right)

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Pronunciation of mathematical expressions

The pronunciations of the most common mathematical expressions are given in the list below. In general, the shortest versions are preferred (unless greater precision is necessary).

1. Logic

$\exists$	there exists
$\forall$	for all
$p \Rightarrow q$	p implies q / if p, then q
$p \Leftrightarrow q$	p if and only if q /p is equivalent to q / p and q are equivalent

2. Sets

$x \in A$	x belongs to A / x is an element (or a member) of A

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2. Sets

$x \in A$	x belongs to A / x is an element (or a member) of A
$x \notin A$	x does not belong to A / x is not an element (or a member) of A
$A \subset B$	A is contained in B / A is a subset of B
$A \supset B$	A contains B / B is a subset of A
$A \cap B$	A cap B / A meet B / A intersection B
$A \cup B$	A cup B / A join B / A union B
$A \setminus B$	A minus B / the difference between A and B
$A \times B$	A cross B / the cartesian product of A and B

3. Real numbers

$x + 1$	x plus one

3. Real numbers

$x + 1$	x plus one
$x - 1$	x minus one
$x \pm 1$	x plus or minus one
xy	xy / x multiplied by y
$(x - y)(x + y)$	x minus y. x plus y
$\frac{x}{y}$	x over y
$=$	the equals sign
$x = 5$	x equals 5 / x is equal to 5
$x \neq 5$	x (is) not equal to 5

5. Functions

$f(x)$	f of x / f of x / the function f of x
$f : S \to T$	a function f from S to T
$x \mapsto y$	x maps to y / x is sent (or mapped) to y
$f'(x)$	f prime x / f dash x / the (first) derivative of f with respect to x
$f''(x)$	f double-prime x / f double-dash x / the second derivative of f with respect to x
$f'''(x)$	f triple prime x / f triple-dash x / the third derivative of f with respect to x
$f^{(4)}(x)$	f four x / the fourth derivative of f with respect to x
$\frac{\partial f}{\partial x_1}$	the partial (derivative) of f with respect to x_1
$\frac{\partial^2 f}{\partial x_1^2}$	the second partial (derivative) of f with respect to x_1
$\int_0^\infty$	the integral from zero to infinity
$\lim_{x \to 0}$	the limit as x approaches zero
$\lim_{x \to +0}$	the limit as x approaches zero from above
$\lim_{x \to -0}$	the limit as x approaches zero from below

$\lim_{x \to -0}$	the limit as x approaches zero from below
$\log_e y$	log y to the base e / log to the base e of y / natural log (of) y
$\ln y$	log y to the base e / log to the base e of y / natural log (of) y