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Personal computing

Start-up

Task 1 ——
Name these devices. What are they used for?

a

Listening

Task 2 ——
You will hear two interviews between a market researcher and visitors to a computer exhibition. As you listen, fill in the missing information in the table opposite.
Task 4

Before reading the text on the following page, match each word with the correct definition:

1. mainframe
2. mouse
3. icon
4. operating system
5. software
6. hardware
7. microchip

- Silicon carrying a complex electrical circuit
- A very small piece of silicon carrying a complex electrical circuit
- A device moved by hand to indicate position on the screen
- A visual symbol used in a menu instead of natural language
- Data, programs, etc., not forming part of a computer, but used when operating it.
- A big computer system used for large-scale operations
- The physical portion of a computer system
- The set of software that controls a computer system
- In any case, I’m using the Mac.
In 1952, a major computing company took a decision to get out of the business of making mainframe computers. They believed that there was only a market for four mainframes in the whole world. That company was IBM. The following year they reversed their decision.

In 1980, IBM decided that there was a market for 250,000 PCs, so they set up a special team to develop the first IBM PC. It went on sale in 1981 and set a world-wide standard for IBM-compatibility which, over the next ten years, was only seriously challenged by one other company, Apple Computers. Since then, over seventy million PCs made by IBM and other manufacturers have been sold. Over this period, PCs have become commodity items. Since IBM made the design non-proprietary, anyone can make them.

The history of the multi-billion dollar PC industry has been one of mistakes. Xerox Corporation funded the initial research on personal computers in their Palo Alto laboratory in California. However, the company failed to capitalize on this work, and the ideas that they put together went into the operating system developed for Apple's computers. This was a graphical interface: using a mouse, the user clicks on icons which represent the function to be performed.

The first IBM PC was developed using existing available electrical components. With IBM’s badge on the box it became the standard machine for large corporations to purchase. When IBM were looking for an operating system, they went initially to Digital Research, who were market leaders in command-based operating systems (these are operating systems in which the users type in commands to perform a function). When the collaboration between IBM and Digital Research failed, IBM turned to Bill Gates, then 25 years old, to write their operating system.

Bill Gates founded Microsoft on the basis of the development of MS/DOS, the initial operating system for the IBM PC. Digital Research have continued to develop their operating system, DR/DOS, and it is considered by many people to be a better product than Microsoft's. However, without an endorsement from IBM, it has become a minor player in the market. Novell, the leaders in PC networking, now own Digital Research, so things may change.

The original IBM PC had a minimum of 16K of memory, but this could be upgraded to 512K if necessary, and ran with a processor speed of 4.77MHz. Ten years later, in 1991, IBM were making PCs with 16Mb of memory, expandable to 64Mb, running with a processor speed of 33MHz. The cost of buying the hardware has come down considerably as the machines have become commodity items. Large companies are considering running major applications on PCs, something which, ten years ago, no one would have believed possible of a PC. In contrast, many computers in people's homes are just used to play computer games.

The widespread availability of computers has in all probability changed the world for ever. The microchip technology which made the PC possible has put chips not only into computers, but also into washing-machines and cars. Some books may never be published in paper form, but may only be made available as part of public databases.

Networks of computers are already being used to make information available on a world-wide scale.

Vocabulary
commodity items (1. 2 3) — items which can be produced and traded freely
non-proprietary (I. 24) — not belonging to any single company
capitalize on (I. 3 3) — profit from, turn to one’s advantage
Task 6

When you read the text to decide on a title, which of the following did you do?

Did you:

- read the text slowly and try to understand every word? **Fl**
- read quickly and try to understand the main theme? **Fl**
- underline or mark sentences that you thought were important? **Fl**
- make notes about important points? **Fl**

Which of these reading strategies do you think is most appropriate for this kind of task? Which do you think is least appropriate?

Task 7

Answer these questions about the text.

1. How many mainframes did IBM think it was possible to sell in 1952?
2. How many PCs have now been sold?
3. Who paid for the initial research into PCs?
4. Which company later used the results of this research to develop their operating system?
5. What are command-based operating systems?
6. DR/DOS is an acronym. What does it stand for?
7. Since the invention of the IBM PC, many of its features have been improved. Which of the following features does the text not mention in this respect?
   - a memory
   - b speed
   - c size
   - d cost
8. Give three examples from the text of how the availability of computers has 'in all probability changed the world for ever'.

Using the line references given, look back in the text and find words that have a similar meaning to:

1. international (lines 10-15)
2. contested (lines 15-20)
3. errors (lines 25-30)
4. paid for (lines 25-30)
5. buy (lines 45-50)
6. first (lines 60-65)
7. recommendation (lines 65-70)
8. improved (lines 75-80)

Task 8

Task 9

Writing

Translate the sixth paragraph (starting 'The original IBM PC...') into your own language. Look carefully at the tenses before you start.

Speaking

Task 10

The article states that 'many computers in people's homes are just used to play computer games'.

Discuss the following questions:

1. In what other ways are computers used at home, or outside work?
2. If you already have a PC, how do you use it? (If not, how would you use one?)
The processor

Task 11

Read this passage about the structure of the processor and fill in the gaps using the words below.

Structure of the processor
The processor consists of a **microprocessor**, which is a circuit board on chips, memory chips, and other components linked together by **conductive lines or channels in the form of control, address, and data**. In addition, a processor has **adaptor boards**, which are electronic circuits providing specialized functions such as graphics, or which connect a system board to **input or output devices**. The system board also consists of electronic devices, such as an electronic **clock** for controlling the speed of operation; **accumulators**, which store numeric data during the course of processing; and various **registers**, including sequence control register, address register, and function register.
A processor consists of many different electronic circuits and devices for performing control functions, arithmetic and logic operations, and data transfers. Data may be transferred from backing storage to the internal memory or from the internal memory to the arithmetic unit by means of conductive channels known as buses. The part of the processor which controls data transfers between the various input and output devices is called the control unit.

**Reading**

Use the information in the reading passage and the diagram to help you match the terms below with the appropriate explanation or definition.

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<th>Control bus</th>
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<td>Address bus</td>
<td>Input devices</td>
<td>Output devices</td>
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<td>Registers</td>
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<td>Peripheral bus</td>
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<tr>
<td>Accumulators</td>
<td>Clock</td>
<td>Random access memory chip (RAM)</td>
<td>Read only memory chip (ROM)</td>
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</table>

1. microprocessor chip
2. registers
3. accumulators
4. control bus
5. address bus
6. data bus
7. clock
8. RAM
9. ROM

- a. consists of an arithmetic-logic unit, one or more working registers to store data being processed, and accumulators for storing the results of calculations
- b. used to send address details between the memory and the address register
- c. a group of signal lines used to transmit data in parallel from one element of a computer to another groups of bistable devices used to store information in a computer system for high-speed access
- d. an electronic circuit, usually a quartz crystal, that generates electronic pulses at fixed time intervals to control the timing of all operations in the processor
- e. used for storing part of the operating system and application software known as ‘firmware’; can only be read; cannot be written to or altered in any way
- f. used to store numeric data during processing
- g. a group of signal lines dedicated to the passing of control signals
- h. used for the temporary storage of application programs and data; can be written to and read from
Speaking

Task 13

Work in pairs. Write down the list of terms (1-9) in Task 12 on a piece of paper. Without referring to your book, take turns to ask and answer questions about their functions.

10' Useful expressions

What does/do . . . do%

Word-play

Complete the puzzle and find the key word in 12 down.

Task 14

Across
1 A conductive line such as a data bus. (7)
2 A visual symbol used in a menu to represent a file or program. (4)
3 An input device used in computer games. (7)
4 An_____ device converts the electrical signals inside a computer into a form that can exist outside the computer. (6)
5 The name given to system software that is held in ROM. (8)
6 A device with one or more buttons used to point at locations on a computer screen. (5)
7 The part of the CPU that transmits co-ordinating control signals and commands to the computer. (7,4)
8 1,048,576 bytes. (8)
9 A large store of computerized data. (8)
10 The_____ system was first used commercially on the Apple Macintosh computer, but is now widely used on IBM machines. (7)
11 A signal route dedicated to sending information about locations within a computer. (7,3)

Down
12 A register containing the results of an operation performed by the arithmetic-logic unit. (11)
Exercise 1

Using the sample paragraph as a model, draw a rectangle around the word, or words, that the circled words refer to. Then join the CD and the = with arrows.

Modern accounting firms use spreadsheet software to do complicated calculations. They can provide their clients with an up-to-date report whenever it is needed. This software has many functions and can be integrated with other software. The spreadsheet’s basic component is a cell. This may contain a formula which performs a mathematical operation. It could also contain a label or data. The former describes the information on the worksheet. The latter is the information itself.

The worksheet is the basic work area of a spreadsheet program. It is made up of cells arranged in rows and columns. The number of these varies depending on the software you are using. You can change the width and format of cells. Such parameters are usually quite easy to change with just a few keystrokes.
Exercise 2

Using the line reference given, look back at the reading passage in Unit 1, page 6, and find the reference for the words in *italics*.

1 anyone can make *them* (line 25)
2 the ideas that *they* put (line 34)
3 *This* was a graphical interface (line 37)
4 it became the standard machine (line 44)
5 *these* are operating systems (line 50)
6 *it* has become a minor player (line 68)
7 *this* could be upgraded (line 76)
Portable computers

"This is the smallest, most powerful computer in the world."

"Those? Those are the batteries."

Start-up

Task 1

Discuss the following questions:

1. How small do you think computers can usefully become?
2. To what extent does the size of a computer influence what it can be used for?

Think of examples to illustrate your answer.
Listening

Task 2

Listen to the following extract from a radio talk show called Computerworks in which the host talks with Sandra Cavanah, a writer with a computer magazine. As you listen, fill in the missing information about the various portable computers.

**Portable**

- Power: runs on
- Weight: between 15 and ___ pounds
- Screen size: about ten inches diagonally
- Input device: keyboard

**Notebook**

- Power: runs on rechargeable
- Weight: generally between 8 and 15 pounds
- Screen size: about ___ inches diagonally
- Input device: keyboard

**Clipboard**

- Power: ___ batteries
- Weight: between ___ and 6 pounds
- Screen size: similar to notebook and laptop
- Input device: ___

**Handheld**

- Power: can operate on ___ batteries
- Weight: less than ___ pounds
- Screen size: very small
- Input device: keys
Before reading the text, match these words with their definitions:

- **a** clipboard 1 surface on which pictures or data are shown
- **b** stylus 2 electrical force
- **c** screen 3 pattern used as a guide for creating letters or characters
- **d** grid 4 individual dot on a computer screen
- e voltage 5 network of lines crossing at right angles
- **f** pixel 6 pointed implement for drawing or writing
- **g** template 7 portable board with a clip at the top for holding papers

Read the text and decide why the author chose the title *Delete Keys*. Can you suggest a better title?

---

**Delete Keys - Clipboard Technology**

For the last generation, Silicon Valley and Tokyo have been working to design computers that are ever easier to use. There is one thing, however, that has prevented the machines from becoming their user-friendliest: you still have to input data with a keyboard, and that can require you to do a lot of typing and to memorize a lot of elaborate commands.

Enter the clipboard computer, a technology that has been in development for the last 20 years but took hold in the mass market only this year. Clipboard PCs — which, as their name suggests, are not much bigger than an actual clipboard — replace the keyboard with a liquid crystal display (LCD) screen and an electronic stylus. Users input data by printing individual letters directly on the screen.

There are two technologies at work in a clipboard PC: one allows raw data to get into the computer and the other allows the computer to figure out what that data means. The first technology relies principally on hardware and varies depending on the particular computer. In one system, marketed under the name GRIDPad, the computer's LCD screen is covered by a sheet of glass with a transparent conductive coating. Voltage is sent across the glass in horizontal and vertical lines forming a fine grid; at any point on the grid, the voltage is slightly different. When the stylus — which is essentially a voltmeter — touches the screen, it informs the computer of the voltage at that point. The computer uses this information to determine where the stylus is and causes a liquid so crystal pixel to appear at those coordinates. The position of the stylus is monitored several hundred times a second, so as the stylus moves across the glass, whole strings of pixels are activated.

`What we do is sort of connect the dots,' says Jeff Hawkins, the creator of GRIDPad. 'Users can then write whatever they want on the screen with a kind of electronic ink.'

Making that writing comprehensible to the computer, however, requires the help of some powerful software. When the stylus is being used, the computer is programmed to look for moments when the tip does not touch the screen for a third of a second or more. Every time this happens — and it happens a lot when somebody is printing — the software assumes that one letter or number has been written. The pixel positions of...
this fresh character are then passed	on to the computer's pattern
recognition software, which
instantly identifies the letter or
number written.

The software does this by first
cleaning up the character —
smoothing out crooked lines and
removing errant dots. The
remaining lines and curves are then
compared with a series of templates
in the computer's memory that
represent hundreds of thousands of
different versions of every letter in
the English alphabet and all ten
numerals. When the computer finds
the closest match, it encodes the
character in memory and displays it
on the screen as if it had been typed.
The entire process takes just a
fraction of a second. To delete a
word, you simply draw a line
through it. To move to the next
too page, you flick the stylus at the
bottom of the screen as if you're
flicking the page of a book.

There are a handful of clipboard
computers now on the market,
including GRIDPad, which is sold in
the US; Penvision, manufactured by
NCR and sold around the world;
and Sony's Palmtop and Canon's
Al Note, both sold only in Japan.

IBM and Apple are also pouring
millions of dollars into the
technology.

In addition to this hardware, a
variety of software is also
making its way to the market.

Depending on the power of the
computer and the sophistication
of the software, clipboard
systems can be programmed to
understand the particular quirks
of a particular user's printing;
this is an especially useful
feature in Japan, where
elaborate kanji characters make
up most of the written language.

Improvements in software may
soon allow machines sold in the
US to understand not only
printing but continuous script as
well.

Given such flexibility, the
designers of clipboard computers
are predicting big things — and a
big market — for their products.

'There's no doubt about it,' says
an optimistic Hawkins. 'You're
going to own one of these things
in the not-too-distant future.' ■

Vocabulary

printing (1. 73) — (in this case) writing separated letters or numbers by hand
kanji (1. 124) — Japanese script which uses Chinese characters

Task 5

Decide whether the following statements are true (T) or false (F) in relation to
the information in the text. If you think a statement is false, change it to make
it true.

1 □ The Americans and the Japanese are working together to produce user-
friendlier computers.

2 □ The clipboard computer was first sold twenty years ago.

3 □ On a clipboard, an electronic pen replaces the traditional keyboard.

4 □ In the GRIDPad system, when the pen touches the screen, it informs the
computer and a liquid crystal pixel appears at that point.

5 □ The software decides that one character or number is complete if the tip of
the stylus is not in contact with the screen for more than half a second.

6 □ The whole process of recognizing letters or numbers and printing them on
the screen takes very little time.

7 □ There are many clipboard computers sold today which are all available
everywhere in the world.

8 □ Clipboard systems can be made to understand any kind of writing.
Task 6

Use the information in the text to complete the dialogue in your own words.

A How big is a clipboard PC?
B

A Does it have a keyboard?
B

A How does the stylus work?
B

A How does the computer know when one letter or number is complete?
B

A And how does the computer recognize different letters?
B

A Can you delete a word after you have written it?
B Yes.

A Are these systems capable of recognizing joined writing?
B

Task 7

Using the line reference given, look back in the text and find the reference for the words in italics.

1 from becoming their user-friendliest (line 7)
2 one allows raw data to get (line 27)
3 it informs the computer (line 45)
4 Every time this happens (line 72)
5 which instantly identifies (line 79)
6 it encodes the character in memory (line 93)
7 this is an especially (line 122)
8 for their products (line 134)

Task 8

Using the line references given, look back in the text and find words or phrases that have a similar meaning to:

1 understand (lines 2 5-30)
2 sold (lines 30-35)
3 covering (lines 35-40)
4 points (lines 50-55)
5 join (lines 55-60)
6 making even (lines 80-85)
7 not straight (lines 80-85)
8 made by mistake (lines 85-90)
9 move quickly and sharply (lines 95-100)
10 unique features (lines 115-120)
Task 9

Choose the correct word to complete each sentence. You may have to change some words slightly.

1  _electron, electronic, electronics, electronically_
   a An   pen is one example of an input device.
   b A computer solves problems
   c Many  ________students go on to work as engineers.

2  _technology, technological, technologically, technologist_
   a The computer is the greatest ________ invention of the twentieth century.
   b There are two ________involved in a clipboard PC.
   c Today's computers are far superior to those used a few years ago.

3  _identify, identifying, identifiable, identity_
   a The clipboard's pattern recognition software immediately the letters and numbers written by the stylus.
   b Most computer companies will not allow people without an card to enter their premises.
   c A password is a mechanism for __________ the computer-user and allowing access.

4  _compute, computing, computation, computerize, computerization_
   a The ________ of the manufacturing division will be expensive in the short term, but cost-effective in the long term.
   b We should be able to ____________________________ our profit for next year fairly accurately with the new program.
   c I could tell from all the in progress. __________ on the board that a maths lesson was

Writing

Translate the third paragraph (starting 'There are two technologies...') into your language. Check the meaning of any unfamiliar technical words in the glossary at the back of this book.

Speaking

Discuss the following questions:

1 What are the limitations of portable computers?
2 Do you think students should be allowed to use portable computers in class?
Task 12

Writing

CF-170 Notebook Computer.
Just the right size and specification from Panasonic.

A Notebook that really gets used.

Think of every reason why you need a portable computer. It's always available. It's productive. It's compatible with your office systems.

You've just described the key features of the CF-170.

A Notebook sized computer has for years stood for mobility and lightness - essential requirements when your work takes you anywhere.

Yet it's not only the size of the CF-170 which impresses. For such a compact machine, it offers powerful production features too.

In Megabyte hard disk built in.

The CF-170 is an IBM PC XT compatible machine. It offers the performance of a built in 20 MB hard disk drive - providing fast and easy access to industry standard software packages.

For added convenience, the CF-170 is equipped with a 3.5 inch floppy disk plus serial and parallel ports, so your data can be transferred or printed whenever it's needed.

The new backlit LCD screen is also well worth a look. With a full 80 characters, and the latest supervision technology, it's faster, easier, clearer reading in all lighting conditions.

As you'd expect of Panasonic (world leader in battery technology), the power department hasn't been overlooked.

The CF-170 is equipped with a highly sophisticated battery pack and our special Power Management feature. This saves battery power by closing down the hard disk and the screen when they're not in use.

For all its advanced features however, there's one component with the CF-170 - at $1295 (RRP + GST) it's one of the most competitively priced machines you can buy.

See a demonstration now.

To see the size and performance advantages of the CF-170 for yourself, visit 100 and ask for Freeform Panasonic, or clip the coupon. We'll put you in touch with your nearest Panasonic authorised dealer, who can arrange for a demonstration of this unique machine at your own premises.

Technical features
- 640 KB RAM • 1.44 MB 3.5" internal floppy drive • 64 KB ROM • 20 MB internal hard disk • Compact: 310mm(W) x 254mm(D) x 44mm (H) • Fully MS-DOS compatible • 10 MHz clock speed • Real time clock • Backlit Super Twist LCD display • 4 levels of greyscale • Parallel and serial ports • Expansion slots for modem card and 1MB RAM card • Weight only 3.2K including battery pack • 4 hour battery life (backlight, low brightness, 90% HDD operation 10%, FDD operation 1%)
Speaking

Work in pairs.

**Student A:** You are a sales representative trying to sell your company’s notebook computer. You are presenting your product to the Sales Director of a manufacturing company which is thinking of buying 30 notebook computers for the sales staff. Decide on the specifications and complete the table below. Then try to persuade the Sales Director to buy your product.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type (size)</th>
<th>Processor type</th>
<th>Operating speed</th>
<th>Memory</th>
<th>Display</th>
<th>Power supply</th>
<th>Cost</th>
<th>Other features</th>
</tr>
</thead>
</table>

- Useful expressions
  - It costs...
  - It runs/operates on...
  - It weighs...

**Student B:** You are the Sales Director of a manufacturing company. You are considering buying 30 notebook computers for your sales staff. Find out about all the specifications of the model on offer. Decide whether it is suitable for your needs.

- Useful expressions
  - How much does it cost?
  - What power source does it use?
  - How big/heavy is it?

Operating systems

Reading

**Task 14**

Before you read the text, try to answer the following questions:

1. What is an operating system and what is its purpose?
2. Where is an operating system stored and how is it transferred to internal memory?
3. List some of the tasks typically performed by an operating system.

Now read the text and check your answers.
General features of operating systems

An operating system is a master control program which controls the functions of the computer system as a whole and the running of application programs. All computers do not use the same operating systems. It is therefore important to assess the operating system used on a particular model before initial commitment because some software is only designed to run under the control of specific operating systems. Some operating systems are adopted as 'industry standards' and these are the ones which should be evaluated because they normally have a good software base. The reason for this is that software houses are willing to expand resources on the development of application packages for machines functioning under the control of an operating system which is widely used. The cost of software is likely to be lower in such circumstances as the development costs are spread over a greater number of users, both actual and potential.

Mainframe computers usually process several application programs concurrently, switching from one to the other, for the purpose of increasing processing productivity. This is known as multiprogramming (multi-tasking in the context of microcomputers), which requires a powerful operating system incorporating work scheduling facilities to control the switching between programs. This entails reading in data for one program while the processor is performing computations on another and printing out results on yet another.

In multi-user environments an operating system is required to control terminal operations on a shared access basis as only one user can access the system at any moment of time. The operating system allocates control to each terminal in turn. Such systems also require a system for record locking and unlocking, to prevent one user attempting to read a record whilst another user is updating it, for instance. The first user is allocated control to write to a record (or file in some instances) and other users are denied access until the record is updated and unlocked.

Some environments operate in concurrent batch and real-time mode. This means that a 'background' job deals with routine batch processing whilst the 'foreground' job deals with real-time operations such as airline seat reservations, on-line booking of hotel accommodation, or control of warehouse stocks, etc. The real-time operation has priority, and the operating system interrupts batch processing operations to deal with real-time enquiries or file updates. The stage of batch processing attained at the time of the interrupt is temporarily transferred to backing storage. After the real-time operation has been dealt with, the interrupted program is transferred back to internal memory from backing storage, and processing recommences from a 'restart' point. The operating system also copies to disk backing storage the state of the real-time system every few minutes (periodic check points) to provide a means of 'recovering' the system in the event of a malfunction.

An operating system is stored on disk and has to be booted into the internal memory (RAM) where it must reside throughout processing so that commands are instantly available. The operating system commands may exceed the internal memory capacity of the computer in which case only that portion of the OS which is frequently used is retained internally, other modules being read in from disk as required. Many microcomputers function under the control of a disk operating system known as DOS.
Task 15

Answer these questions about the text.

1 Why is it important to assess the operating system on a computer before buying it?
2 What is multiprogramming?
3 The text gives some examples of real-time processing. Can you think of some examples of batch-processing?

Task 16

Here is a list of typical tasks performed by an operating system. In each case the main verb has been omitted. Fill in the blanks from the words given. Sometimes more than one may apply.

A typical operating system will:

1 input and output devices.
2 the status of hardware devices.
3 hardware interrupts.
4 new disks.
5 disk directories.
6 disk reading and writing operations.
7 disk errors.
8 disk commands relating to the deletion, copying, renaming, and dumping of files.

execute
monitor
format
diagnose

Task 17

Match these common DOS commands with the appropriate explanation.

1 BACKUP a searches for a specific string of text in a file.
2 CHDIR or CD b allows a text file from the current directory to be displayed on screen.
3 CHKDSK c allows the user to change the name of a file.
4 CLS d saves the contents of the hard disk to a floppy disk for security purposes.
5 DEL e is used when it is necessary to change the current directory.
6 DIR:SORT f clears data from the screen.
7 REN g alphabetically sorts and lists a disk directory.
8 TYPE h makes back-up copies of the contents of one disk to another.
9 FIND i deletes a specified file from the current directory, specified drive, or specified path.
10 DISKCOPY j produces a status report of the currently logged-on disk, indicating the amount of disk space used, the available capacity (in bytes), and the number of files on disk.
**Word-play**

Find the hidden words in this square. Some appear vertically, some horizontally, and some diagonally. They may be upside-down or back to front. Use the clues below to help you. The number of letters in each word and the first letter of the word appear in brackets after the clue. The first one has been done for you.

```
C T A A R I T        P L R
L P N T P I D A E E
I U E A E E B L X T
P R T D L A F M I E
B R E E S N O T P M
O E T G R I D O T P
A E C V K L M P Y L
R N D S T Y L U S A
D E L V E I Y S T T
T P U R R E T N I E
```

Find words which mean:

1 a computer that is small enough to hold in the hand. (7, P)
2 an electronic pen. (6, S)
3 to erase or omit. (6, D)
4 one type of portable computer which operates with an electronic pen. (9, C)
5 the information that the computer processes. (4, D)
6 a network of lines crossing at right angles. (4, G)
7 a signal to a processor to suspend temporarily the current sequence of instructions. (9, I)
8 a pattern used as a guide for creating letters or characters. (8, T)
9 an individual dot on a computer screen. (5, P)
Language focus B

Word formation: prefixes

When you are reading, you will come across unfamiliar words. It is often possible to guess the meanings of these words if you understand the way words in English are generally formed.

An English word can be divided into three parts: a prefix, a stem, and a suffix. Pre-means 'before'. A prefix, therefore, is what comes before the stem. Consider, as an example, the prefix de- (meaning 'reduce' or 'reverse') in a word like demagnetize (meaning 'to deprive of magnetism'). A suffix is what is attached to the end of the stem. Consider, as an example, the suffix -er (meaning 'someone who') in programmer (a person who programs).

Suffixes change the word from one part of speech to another. For example, -ly added to the adjective quick gives the adverb quickly. Prefixes, on the other hand, usually change the meaning of the word. For example, un- changes a word to the negative. Unmagnetizable means 'not capable of being magnetized'.

Let us now consider some prefixes, their usual meanings, and how they change the meanings of English words.

<table>
<thead>
<tr>
<th>Prefixes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative and positive</td>
</tr>
<tr>
<td>un-</td>
</tr>
<tr>
<td>non-</td>
</tr>
<tr>
<td>in-</td>
</tr>
<tr>
<td>dis-</td>
</tr>
<tr>
<td>re-</td>
</tr>
</tbody>
</table>
Exercise 1

Study these tables. Try to find additional examples, using your dictionary if necessary.

1 Negative and positive prefixes:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Negative
  - un-  
  - in-  
  - im-  
  - il-  
  - ir-  
  - non-  
  - mis-  
  - mal-  | not                          | unmagnetized, incomplete        |
|        |                           | impossible, illegal             |
|        |                           | irregular, irrelevant           |
|        | not connected with        | non-programmable, misdirect     |
|        |                           | malfunction                     |
|        | opposite feeling          | disagree                        |
|        | opposite action           | disconnect                      |
| anti-  | against                  | antiglare                       |
| de-    | reduce, reverse           | demagnetize, decode             |
| under- | too little                | underestimate                   |
| Positive
  - re-  | do again                  | reorganize                      |
|        | too much                  | overload                        |

2 Prefixes of size:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>semi-</td>
<td>half, partly</td>
<td>semiconductor</td>
</tr>
<tr>
<td>equi-</td>
<td>equal</td>
<td>equidistant</td>
</tr>
<tr>
<td>mini-</td>
<td>small</td>
<td>minicomputer</td>
</tr>
<tr>
<td>micro-</td>
<td>very small</td>
<td>microcomputer</td>
</tr>
<tr>
<td>macro-</td>
<td>large, great</td>
<td>macroeconomics</td>
</tr>
<tr>
<td>mega-</td>
<td></td>
<td>megabyte</td>
</tr>
</tbody>
</table>

3 Prefixes of location:

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>inter-</td>
<td>between, among</td>
<td>interface, interactive</td>
</tr>
<tr>
<td>super-</td>
<td>over</td>
<td>supersonic</td>
</tr>
<tr>
<td>trans-</td>
<td>across</td>
<td>transmit, transfer</td>
</tr>
<tr>
<td>ex-</td>
<td>out</td>
<td>exclude, extrinsic</td>
</tr>
<tr>
<td>extra-</td>
<td>beyond</td>
<td>extraordinary</td>
</tr>
<tr>
<td>sub-</td>
<td>under</td>
<td>subschema</td>
</tr>
<tr>
<td>infra-</td>
<td>below</td>
<td>infra-red</td>
</tr>
<tr>
<td>peri-</td>
<td>around</td>
<td>peripheral</td>
</tr>
</tbody>
</table>
Exercise 2

Read the following sentences and circle the prefixes. For each word that has a prefix, try to decide what the prefix means. Refer back to the table if you need help.

1. Floppy disks are inexpensive and reusable.
2. If a printer malfunctions, you should check the interface cable.
3. The multiplexor was not working because someone had disconnected it by mistake.
4. Improper installation of the antiglare shield will make it impossible to read what is on the screen.
5. After you transfer text using the 'cut and paste' feature, you may have to reformat the text you have inserted.
6. You can maximize your chances of finding a job if you are bilingual or even trilingual.
Peripheral devices can be either input devices (such as keyboards) or output devices (such as printers).

Your pay rise is retroactive to the beginning of June and you will receive a biannual bonus.

The octal and hexadecimal systems are number systems used as a form of shorthand in reading groups of four binary digits.

As the results are irregular, the program will have to be rewritten.

Exercise 3
Fill in the gaps with the correct prefix from the following list.

<table>
<thead>
<tr>
<th>auto</th>
<th>de</th>
<th>dec</th>
<th>inter</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxi</td>
<td>mega</td>
<td>micro</td>
<td>mini</td>
</tr>
<tr>
<td>mono</td>
<td>multi</td>
<td>semi</td>
<td>sub</td>
</tr>
</tbody>
</table>

1 Most people prefer a colour screen to a ____ chrome screen.

2 ___ script is a character or symbol written below and to the right of a number or letter, often used in science.

3 A ____ byte equals approximately one million bytes.

4 Once you finish your program, you will have to test it and______ bug it to remove all the mistakes.

5 The introduction of ____ conductor technology revolutionized the computer industry.

6 If a computer system has two or more central processors which are under common control, it is called a ____ processor system.

7 The ____imal system is a number system with a base of 10.

8 When the user and the computer are in active communication on a graphics system, we refer to this as ____active graphics.
Online services

Start-up

Task 1

Discuss the following questions:

1. What online services are available in your country?
2. What kind of facilities do online services provide?

Reading

Task 2

Decide whether the following statements are true (T) or false (F) in relation to the information in the text which follows. If you think a statement is false, change it to make it true.

1. □ Most people choose an online service because of the price or the number of available files.
2. □ Everybody has one service which he/she likes more than all the others.
3. □ You should judge each BIX.ice according to whether it is better or wBIXe overall than the service you are currently using.
4. □ Eventually, all services will be accessible from the service you are using.
5. □ McGraw-Hill is owned by DELPHI'S
6. □ Tammy Ray and Jeanette Shearer think the BIX service is average.
7. □ French Minitel users have free access to an English-language version of CompuServe, although they cannot use the e-mail facility.
8. □ DELPHI'S Hobby Shop now has two special-interest areas: onlfon classic vehicles, and one on new cars and technology.
Online Services

I’m frequently asked which online service is ‘best’, but the answer is there is no best. Rating a particular service over another is entirely subjective. Price is important to some people, while the number of files available for download is important to others. Because of these and so many other different judgments, there can be no absolute. It all comes down to individual needs and preferences.

Still, users tend to be fiercely loyal to their ‘home’ online service—which is usually the first online service they ever used. They tend to judge all other online services based on this first service - often preventing themselves from seeing the advantages of a specific service. For my part, I like all the services I use and I’m on two dozen.

Each offers one or more products or features that either do not exist elsewhere or are superior to the same features on other services. And I’ve a really subjective reason for being on one service - I use it to send monthly articles to magazines in Japan.

So, the real answer to the question is simple: the best online service is the service that has what you want and is easy for you to use. The point? Keep an open mind when checking out an online service. Judge it based on what it offers and how it meets your needs - not in comparison to what you’re used to using. (It takes a couple of sessions to shake preconceived notions of what an online service ‘should be.’)

Eventually, we’re all going to be interlinked, no matter which service we use, in what DIALOG’s Richard Ream calls a ‘network of networks’.

Until then, most of us have to go to more than one service to find everything we need.

And now, the news ...

What’s new on-line

BIX
TAB Book Clubs Online: You’ve probably seen magazine ads for The Computer Book Club and The Computer Professionals’ Book Society. These are sponsored by TAB Books. This division of McGraw-Hill (BIX’s parent company) is now online on BIX, taking orders and answering questions from members and prospective members. The club conference is moderated by Tammy Ray and Jeanette Shearer. You can check them out by typing JOIN TAB.BOOK.CLUBS.

CompuServe
Dell Computer Forum: Dell Computer Corporation has opened a product support area on CompuServe. The Dell area is part of the PC Vendor D Forum. Type GO DELL or GO PCVEND to take a look.

Minitel Link to CompuServe
CompuServe bolstered its position in Europe by making some of its services available via France’s national Minitel system in July. French Minitel users have access to an extra-cost service that is essentially a ‘limited edition’, English-language version of CompuServe. Among the services available are software and database downloads. E-mail and message-base posting are not available to Minitel users.

DELPHI
Hobby Group Expands: DELPHI’s Hobby Shop special interest group continues to expand its areas of interest. The most recent additions to the database and group topics are Antique Auto, which focuses on classic vehicles, and Autotech, where you can learn about new cars and technology. Type Go GROUP.

In Vocabulary
It all comes down to (1. 10) — It is a question of two dozen (1. 20) — about twenty-four checking out (1. 33) — examining is moderated by (1. 58) — is run by bolstered (1. 68) — strengthened
Task 3

In my opinion, there is no single 'best' online service. The choice depends on your (prltacuair) needs and preferences. Most users have their own (ftrvaioe), but this can prevent them from seeing the (agtvndaeas) of other services. Each one offers something which is either (uqinue) to that service, or which is (bteetr) than the same features on other services. So, when considering an online service, decide whether its features (cosrernopd) to what you need. Until all services (iilktneernd), most of us will need to (cunoitne) using more than one.

Task 4

1. Do you think the English in the text is:
   a. formal?
   b. neutral?
   c. informal?

2. Do you think this article originally appeared in:
   a. a computer magazine?
   b. a general magazine for young people?
   c. a general magazine for adults?
   d. an online bulletin board?
   e. the science page of a newspaper?

Give reasons for your choices.

Task 5

Make these words negative by adding the appropriate prefix from those given below. The first one has been done for you.

in- / un- / im- / dis-

1. infrequently
   in- un-

2. loyal
   im-

3. ______ advantages
   in-

4. specific
   un-

5. ______ like
   im-

6. real
   dis-

7. probably
   dis-

8. available
   im-

Task 6

Match each word or expression in the first column with a synonym in the second column.

1. but (line 2) a. ultimately
2. while (line 6) b. however
3. still (line 12) c. whereas
4. for my part (line 19) d. nevertheless
5. eventually (line 40) e. personally
6. until then (line 44) f. meanwhile
**Listening**

**Task 7**
Listen to Jean-Yves Martin, a sales representative of France Telecom, explaining the Minitel online service to Paul Burgess, an English reporter. Complete Paul's notes.

**Description**
Online service linking terminals in homes to the telephone network - a telephone you can write with.

**Examples of Minitel services**
1. Weather forecasts
2. 
3. Home shopping services
4. 
5. 'Minitel rose'

**Advantages of system**
1. Cheap
2. 
3. 

**Original disadvantages**
1. Primitive graphics
2. 
3. 

**Possible future developments**
1. Addition of ____ to the system (for bank and stock market transactions from the home)
2. (possible use in cars)

**Task 8**
Answer these questions about the interview.

1. What is 'Minitel rose'?
2. When did the system start?
3. How many Minitel terminals did the PTT install originally?
4. Did the first users have to pay?
**Task 9**

Match up the jigsaw pieces to complete the definitions. One has been done for you.

1. An acoustic coupler converts several terminals in one location, connecting each of them to a modem. It then works as a modem.

2. A modem can convert two or more networks, enabling data transfers to be made. In the computer, the data frames are then separated again.

3. A cluster controller may control a digital bit stream into an analog signal over an analog communication channel (telephone circuit). It then converts incoming analog signals back into digital signals.

4. A multiplexor receives the electrical signal from the computer into a coded sound signal which is picked up by the telephone microphone. It may act as a translator between incompatible networks, protocols, or software.

5. A gateway interconnects multiple signals from various terminals and combines them in data frames for transmission on a single high-speed line to the computer. This connection is made on a shared line basis.
Task 10

Using the completed definitions from Task 9 and the information in the text below, fill in the gaps in this diagram.

**Analog transmission**

The older telephone systems function on the basis of analog signals representing voice modulation patterns which are represented by variations in wave forms. When using telephone lines for transmitting data by terminal to a computer, the digital signals from the terminal need to be converted to analog signals by an acoustic coupler or modem prior to transmission. A modem is a device which serves a dual purpose because it acts as a MOdulator (digital to analog) and DEModulator (analog to digital), hence the name MODEM. An analog communication system requires a modem at either end of the communication line. When the signals are received by the distant computer, the signals are reconverted to digital form prior to being input for processing.
Reading

Task 11

Before reading the text below, answer these questions.
1. What are the advantages of digital transmission?
2. How does digital transmission differ from analog transmission?
3. What information does the code supply?

Now read the text to check your answers.

Digital transmission

Analog transmission has been in use for many years as the basis of telephone technology and is very effective for this purpose, but it is not so suitable for high-speed transmission of information. Digital transmission consists of electrical pulses representing data in binary code as a series of 5 on/off pulses. A number of different codes exist, some of which are based on a 6-, 7-, or 8-bit structure. ASCII is a 7-bit code and EBCDIC is an 8-bit code. The codes represent characters, transmission control signals, information separators, and device control. Digital technology has a number of advantages compared to analog, including higher transmission speed, lower incidence of errors, and the facility for mixing data consisting of voice, image, and text on the same circuit. It is for this reason that data transmissions will be increasingly digital in the future. A network structure known as Integrated Services Digital Network (ISDN) facilitates these aspects.

Speaking

Task 12

Work in pairs, A and B. Use the information in this unit to describe the diagrams below. You may make notes first.

Student A: Describe diagram 1 to your partner.

Student B: Describe diagram 2 to your partner.
**Writing**

Task 13

Write a paragraph to show the difference between analog and digital transmission.

**Word-play**

Task 14

Complete the puzzle and find the key word in 13 down.

**Across**

1 A combination of electronic devices and conductors that form a conducting path. (7)
2 An agreement that covers the procedures used to exchange information between co-operating computers. (8)
3 This kind of transmission has been the basis for telephone technology for many years, though it is gradually being replaced. (6)
4 To send programs or data from a central computer to a remote PC. (8)
5 Single vibrations of electric current. (7)
6 A VDU screen and keyboard used to interact with a computer, usually with no computing capacity of its own. (8)
7 This kind of transmission consists of electrical signals representing data in binary code. (7)
8 A public database, for example, that can be accessed over a computer or telephone network. (6, 7)
9 A ____controller controls a number of similar peripheral device such as terminals and links them to the main computer. (7)
10 This merges information from several channels into one channel. (11)
11 A device that converts the computer's digital bit stream into an analog signal for transmission over a telephone line. (5)
12 A ____ board is a public teleconferencing system that allows users to read and write messages. (8)

**Down**

13 The process of sending signals electronically. (1-2)
Language focus C

Word formation: suffixes

We have already seen how prefixes can change the meaning of a word. Let us now consider some suffixes, their usual meanings, and how they change the meanings of English words.

<table>
<thead>
<tr>
<th>Nouns</th>
<th>Verbs</th>
<th>Adjectives</th>
<th>Adverbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ance</td>
<td>-ize</td>
<td>-able</td>
<td>-ly</td>
</tr>
<tr>
<td>-ence</td>
<td>-ate</td>
<td>-ible</td>
<td></td>
</tr>
<tr>
<td>-or</td>
<td>-fy</td>
<td>-less</td>
<td></td>
</tr>
<tr>
<td>-er</td>
<td>-en</td>
<td>-ic</td>
<td></td>
</tr>
<tr>
<td>-1st</td>
<td>-ify</td>
<td>-ical</td>
<td></td>
</tr>
<tr>
<td>-ness</td>
<td></td>
<td>-ish</td>
<td></td>
</tr>
</tbody>
</table>

Exercise 1

Study these tables and try to make additional examples. Use your dictionary if necessary.

1 Noun-forming suffixes:

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ance</td>
<td>state quality of</td>
<td>performance independence</td>
</tr>
<tr>
<td>-ence</td>
<td>a person who</td>
<td>programmer, operator compiler, accumulator</td>
</tr>
<tr>
<td>-or</td>
<td>a thing which</td>
<td>analyst, typist electrician</td>
</tr>
<tr>
<td>-1st</td>
<td>pertaining to the act of</td>
<td>compilation readiness conversion</td>
</tr>
<tr>
<td>-ion</td>
<td>condition of action/state activity</td>
<td>multiplexing measurement electricity</td>
</tr>
<tr>
<td>-ing</td>
<td>state, action</td>
<td>magnetism freedom partnership</td>
</tr>
<tr>
<td>-ment</td>
<td>condition/state form</td>
<td></td>
</tr>
<tr>
<td>-ity</td>
<td>domain/condition</td>
<td></td>
</tr>
<tr>
<td>-ism</td>
<td>condition/state</td>
<td></td>
</tr>
<tr>
<td>-dom</td>
<td>relationship, partnership</td>
<td></td>
</tr>
<tr>
<td>-ship</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 2 Verb-forming suffixes:

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ize/-ise</td>
<td>to make</td>
<td>computerize, automate, activate, calculate</td>
</tr>
<tr>
<td>-ate</td>
<td></td>
<td>simplify, harden, widen</td>
</tr>
</tbody>
</table>

### Adverb-forming suffix:

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ly</td>
<td>in the manner of</td>
<td>electronically, logically, comparably, helpfully</td>
</tr>
</tbody>
</table>

### 4 Adjective-forming suffixes:

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>-al</td>
<td>having the quality of</td>
<td>computational, logical, circular, magnetic, automatic, electrical</td>
</tr>
<tr>
<td>-ar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ic</td>
<td>capable of being</td>
<td>comparable, divisible</td>
</tr>
<tr>
<td>-ical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-able</td>
<td>like, full of</td>
<td>dangerous</td>
</tr>
<tr>
<td>-ible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ous</td>
<td>characterized by</td>
<td>helpful</td>
</tr>
<tr>
<td>-ful</td>
<td>without</td>
<td>careless</td>
</tr>
<tr>
<td>-less</td>
<td>like</td>
<td>yellowish</td>
</tr>
<tr>
<td>-ish</td>
<td>having the quality of</td>
<td>computed, interactive</td>
</tr>
<tr>
<td>-ed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Words ending in -ing are formed from verbs. The -ing form may be used as a noun, part of a noun phrase, or part of a verb.

Examples:

1. *Programming* is an interesting job. (noun)
2. *Programming* in C is interesting. (part of noun phrase)
3. He is working as a programmer. (part of verb)

### Exercise 2

Read the following sentences and circle the suffixes. Underline the stem if it can be used on its own. The first one has been done for you.

1. A programmes designs, writes, and tests programs for performingious tasks on a computer
2. A systems analyst studies organizational systems and decides what action needs to be taken to maximize efficiency.
3 Laser printers are preferable to other types of printing devices because of their speed and quietness.

4 The microcomputer we have purchased does not have a FORTRAN compiler. It is programmable in BASIC only.

5 We have found that operators who have the freedom to take short breaks during the day greatly improve their performance.

6 The number of shipments will increase over the coming months.

7 We decided to computerize the entire plant to give each division more independence.

8 Spooling is a way of storing data temporarily on disk or tape until it can be processed by another part of the system.

9 Turning your office into a paperless environment may be expensive at the beginning but can produce big savings in the long run.

10 Software developers are producing increasingly sophisticated applications for a growing global market.

Now, for each word that has a suffix, indicate what part of speech the word is (e.g. noun, verb, etc.).
Programming and languages

Start-up

Task 1

Can you identify these programming languages?

```c
/* this program finds the minimum of two integers

#include <stdio.h>

main()
    int j, k, m;
    printf("Input two integers: ");
    scanf("%d%d", &j, &k);
    m = min(j, k);
    printf("%d is the minimum of %d and %d\n\n", m, j, k);
```

```asm
1740 REM ***********************
1750 REM Capture alarm data
1760 REM ***********************
1770 SCREEN 1
1780 COLOR BACK, PALL
1800 LOCATE 1, 1
1810 INPUT "Alarm time: ", AT$ $1820 ACS = MID$(AT$, 3, 1)
1830 AHS = MID$(AT$, 1, 2)
1840 AMS = MID$(AT$, 4, 2)
1850 IF ACS <> ";" GOTO 1770
1860 IF LEN (AT$) <> 5 GOTO 1770
1870 AH$ = VAL(AHS)
1880 AMS = VAL(AMS)
1890 IF AH$ > 23 GOTO 1770
1900 IF AMS > 59 GOTO 1770
1910 LOCATE 2, 1
1920 INPUT "Alarm text: ", ATEXT$
1930 IF LEN (ATEXT$) > 30 THEN GOTO 1910
1940 ASW% = 1
1950 LSET FAHS = MKI$(AH$)
1960 LSET FAMS = MKI$(AMS)
1970 LSET FATEXT$ = ATEXT$
1980 LSET FASWS$ = MKI$(ASW%)
1990 PUT 8, 1
2000 CLS
2010 GOTO 2720
```
Reading

Task 2
Before reading the text, try to fill in the gaps in these sentences.

1. A program written in one of the high-level languages.

2. A program written in a high-level language must be interpreted into before the computer will read and process it.

3. A program designed to perform a specific task is called an

4. The or is the program produced when the original program has been converted into machine code.

5. A is a program that converts a high-level language into machine code.

6. The systems program which fetches required systems routines and links them to the object module is known as the

7. The is the program directly executable by the computer.

Now read the text to check your answers.

Programs and programming languages

Computers can deal with different kinds of problems if they are given the right instructions for what to do. Instructions are first written in one of the high-level languages, e.g. FORTRAN, COBOL, ALGOL, PL/I, PASCAL, BASIC, or C, depending on the type of problem to be solved. A program written in one of these languages is often called a source program, and it cannot be directly processed by the computer until it has been compiled, which means interpreted into machine code. Usually a single instruction written in a high-level language, when transformed into machine code, results in several instructions. Here is a brief description of some of the many high-level languages:

**FORTRAN** acronym for FORmula TRANslation. This language is used for solving scientific and mathematical problems. It consists of algebraic formulae and English phrases. It was first introduced in the United States in 1954.

**COBOL** acronym for COmmon Business-Oriented Language. This language is used for commercial purposes. COBOL, which is written using English statements, deals with problems that do not involve a lot of mathematical calculations. It was first introduced in 1959.

**ALGOL** acronym for ALGOrithmic Language. Originally called IAL, which means International Algebraic Language. It is used for mathematical and scientific purposes. ALGOL was first introduced in Europe in 1960.
PL/I Programming Language I. Developed in 1964 to combine features of COBOL and ALGOL. Consequently, it is used for data processing as well as scientific applications.

**BASIC** acronym for Beginner's All-purpose Symbolic Instruction Code. Developed in 1965 at Dartmouth College in the United States for use by students who require a simple language to begin programming.

C developed in the 1970s to support the UNIX operating system. C is a highly portable general-purpose language.

Other such languages are APL (developed in 1962), PASCAL (named after Blaise Pascal and developed in 1971), and LISP and PROLOG, both of which are used for work in artificial intelligence. LOGO is a development of LISP which has been used to develop computer-based training (CBT) packages.

When a program written in one of these high-level languages is designed to do a specific type of work such as calculate a company’s payroll or calculate the stress factor on a roof, it is called an applications program. Institutions either purchase these programs as packages or commission their own programmers to write them to meet the specifications of the users.

The program produced after the source program has been converted into machine code is referred to as an object program or object module. This is done by a computer program called the compiler, which is unique for each computer. Consequently, a computer needs its own compiler for the various high-level languages if it is expected to accept programs written in those languages. For example, in order that an IBM RS/6000 may process a program in FORTRAN, it needs to have a compiler that would understand that particular model and the FORTRAN language as well.

The compiler is a systems program which may be written in any language, but the computer’s operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. Another systems program is the linkage editor, which fetches required systems routines and links them to the object module (the source program in machine code). The resulting program is then called the load module, which is the program directly executable by the computer. Although systems programs are part of the software, they are usually provided by the manufacturer of the machine.

Unlike systems programs, software packages are sold by various vendors and not necessarily by the computer manufacturer. They are a set of programs designed to perform certain applications which conform to the particular specifications of the user. Payroll is an example of such a package which allows the user to input data — hours worked, pay rates, special deductions, names of employees — and get salary calculations as output. These packages are coded in machine language (0s and 1s) on magnetic tapes or disks which can be purchased, leased, or rented by users who choose the package that most closely corresponds to their needs.

**Vocabulary**

payroll (1. 62) — list of employees and the amount of money to be paid to each of them
Task 3
These are answers to questions about the text. Write the questions.

1. No, it is quite wordy so it is used for commercial purposes.
2. To support the UNIX operating system.
3. An applications program.
4. It is done by the compiler.
5. It fetches required systems routines and links them to the object module.
6. No, they are also sold by other vendors.

Task 4
Summarize the information on different high-level computer languages by completing the table below.

<table>
<thead>
<tr>
<th>Language</th>
<th>Developed</th>
<th>Function</th>
<th>Characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORTRAN</td>
<td>1959</td>
<td>mathematical and scientific purposes</td>
<td>combines features of COBOL and ALGOL</td>
</tr>
<tr>
<td>BASIC</td>
<td>1962</td>
<td>to support Unix operating system</td>
<td></td>
</tr>
</tbody>
</table>

Task 5
Find the passages in the text where the following ideas are expressed. Give the line references.

1. Systems programs control the work of the computer system.
2. Software packages are not always sold by the manufacturer.
3. Usually, every high-level instruction translates into many more in machine code.
4. Systems programs are usually provided by the manufacturer.
5. Programmers may be required to write software for their employers.
Task 6

Using the line reference given, look back in the text and find the reference for the words in *italics*.

1 if *they* are given the right (line 1)
2 *it* cannot be directly processed (line 5)
3 *it* is called an applications program (line 38)
4 commission *their* own programmers (line 40)
5 to write *them* to meet (line 40)
6 *that* would understand (line 48)
7 *which* controls the central (line 51)
8 links *them* to the object (line 54)
9 *They* are a set of programs (line 60)
10 *which* can be purchased (line 66)

Task 7

Using the line references given, refer back to the text and find words or phrases that have a similar meaning to:

1 converted (lines 5-10)
2 give the responsibility to (lines 35-40)
3 brings (lines 50-55)
4 are compatible with (lines 60-65)
5 matches (lines 65-67)

Task 8

Choose the correct word to complete each sentence. You may have to change some words slightly.

1 *instruction, instruct, instructed, instructor*
   a Our maths __________ explained to us the principles of binary arithmetic.
   b We were ______________ and data have to be changed to machine code before
   c Both ________________ the computer can operate on them.

2 *compilation, compiler, compile, compiled*
   a Our university computer does not have a PASCAL __________
   b Usually, a programmer __________ his program before he puts in the data.
   c A source program cannot be directly processed by the computer until it has been __________

3 *result, results, resulting*
   a The linkage editor links systems routines to the object module. The __________ program, referred to as the load module, is directly executable by the computer.
   b The __________ of these mathematical operations were obtained from
      the university mainframe and not from my micro.
specification, specify, specific, specified, specifically

a Our company bought three packages with very ________ applications: payroll, accounts receivable, and accounts payable.

b An applications program is designed to do a ________ type of work, such as calculating the stress factor of a roof.

c Did the analyst give the new programmer the ________ necessary to start on the project?

### C language

**Listening**

Listen this interview with David Wendt, an expert on C. Are the following sentences true (T) or false (F)?

1. C was written to support the development of the MS/DOS operating system. **F**

2. C was based directly on a language called BCPL. **T**

3. UNIX was rewritten in C in 1973. **T**

4. C is rarely used for systems programming now. **F**

5. C’s main disadvantage is that it has a small set of operators. **T**

6. C is more powerful than Assembler. **T**

7. C can be used to access memory addresses directly. **T**

8. Pascal and C produce equally fast and efficient code. **F**

9. C is the ideal language for everyone. **F**

10. A language called D is expected to replace C. **F**

Listen again. Change the sentences that are false to make them true.
Task 10

Listen again to the cassette and fill in the gaps in the tapescript below.

INTERVIEWER: Could you give some examples of how it does that?

DAVID WENDT: Yes. With C, the programmer can access the underlying

hardware. He can access memory addresses directly, he can perform

operations on values stored as _________, and he can store variables in

registers, just as in Assembler. This produces faster and more

code than is produced by high-level languages like PASCAL. At the same time,
it provides the fundamental 3 constructs required

for well-structured programs: decision-making, loops, and

These features combined together provide a very powerful tool for the

programmer.

INTERVIEWER: You make it sound like the ideal language for everyone.

DAVID WENDT: Well, no, I'm not saying that. But if you need to write programs

that are 6 fast in execution, and yet 7 from one

computer to another, then C is the language you should be using.

Reading

Task 11

Read the program below and the text on the next page, then complete the

sentences which follow.

/* CALCULATE AVERAGES */

main()

float a, b, c, d, average;

printf("Enter three numbers:");

scanf("%f %f %f", &a, &b, &c);

d = a + b + c;

average = d / 3.0;

printf("The average is %f", average);
Comment Lines
A C source program consists of statements and comment lines. Comment lines are enclosed by the characters /* (at the start of the comment) and */ (at the end of the comment).

The Function main{
Every C program must have a function called main which must appear only once in a program. The parentheses following the word main must be present, but there must be no parameters included. The main part of the program is enclosed within braces {}, and consists of declaration statements, assignment statements, and other C functions. In the above program there are six statements within the braces: a declaration float, two assignment statements (the fourth and fifth statements starting with the variable names d and average), and three function statements, two to print information on the screen and one to scan the keyboard for input.

As C is a free form language, the semicolon (;) at the end of each line is a must. It acts as a statement terminator, telling the compiler where an instruction ends. Free form means that statements can be identified and blank lines inserted in the source file to improve readability, and statements can span several lines. However, each statement must be terminated with a semicolon. If you forget to include the semicolon, the compiler will produce an error, indicating the next line as the source of the error. This can cause some confusion, as the statement objected to can be correct, yet as a syntax error is produced.

Variables and the Declaration Statement
A variable is a quantity that is referred to by name, such as a, b, c; d, and average in the above program. A variable can take on many values during program execution, but you must make sure that they are given an initial value, as C does not do so automatically. However, before variables can be used in a program, they must be declared in a type declaration statement.

1 The Function ___________ must appear only once in a program.

2 /* CALCULATE AVERAGES */ is a __________ line.

3 The statement float a,b,c,d,average; is a__________ statement.

4 The program below contains __________ function statements.

5 The assignment statements are on lines ___________ and ___________

6 The main part of the program is enclosed within ___________

7 Each line of any C program must end with a __________ , which acts as a statement

8 If you forget to include the correct punctuation, the __________ will produce a __________ error.

9 A quantity referred to by name is known as a

10 A _________________ statement must be used to declare variables.
Task 12
Find words in the text which mean:
1 brackets (lines 5-10)
2 not fixed (lines 10-15)
3 systematically check (lines 10-15)
4 recognized (lines 15-20)
5 completed (lines 20-25)
6 starting (lines 25-29)

Task 13
The table below shows C's relational operators. Fill the gaps in the table.

<table>
<thead>
<tr>
<th>C symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>==</td>
<td>equal to</td>
</tr>
<tr>
<td>&lt;</td>
<td></td>
</tr>
<tr>
<td>=</td>
<td>equal to or less than</td>
</tr>
<tr>
<td>&gt;</td>
<td></td>
</tr>
<tr>
<td>&gt;=</td>
<td></td>
</tr>
<tr>
<td>!=</td>
<td></td>
</tr>
</tbody>
</table>

Writing
Task 14
Using the completed table above, write sentences to illustrate the following:
1 a != b
2 a > b
3 a <= b
4 a >, b
5 a < b
6 a == b

Speaking
Task 15
Read the statements below. Which do you agree with more? Why?
‘Learning a programming language is like learning any natural language. The only difference is that you are communicating with a machine instead of another person.’
‘I get annoyed when I hear people comparing programming languages with natural languages. They have almost >=thing in common.’
## Task 16

Word-play

Solve the anagrams in the right-hand column and match them with the words in the left-hand column to complete the phrases. The first one has been done for you.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>high-level</td>
<td>a</td>
<td>mestnttae</td>
</tr>
<tr>
<td>2</td>
<td>machine</td>
<td>b</td>
<td>thirmacite</td>
</tr>
<tr>
<td>3</td>
<td>systems</td>
<td>c</td>
<td>peat</td>
</tr>
<tr>
<td>4</td>
<td>object</td>
<td>d</td>
<td>taporeor</td>
</tr>
<tr>
<td>5</td>
<td>linkage</td>
<td>e</td>
<td>omelud</td>
</tr>
<tr>
<td>6</td>
<td>magnetic</td>
<td>f</td>
<td>egguanal</td>
</tr>
<tr>
<td>7</td>
<td>binary</td>
<td>g</td>
<td>trodite</td>
</tr>
<tr>
<td>8</td>
<td>declaration</td>
<td>h</td>
<td>deco</td>
</tr>
<tr>
<td>9</td>
<td>comment</td>
<td>i</td>
<td>enil</td>
</tr>
<tr>
<td>10</td>
<td>relational</td>
<td>i</td>
<td>nituroe</td>
</tr>
</tbody>
</table>
Language focus D

Organizing information

A paragraph is a group of related sentences that develop an idea. In nearly every paragraph, there is one idea that is more important than all the others. The main idea of the paragraph is usually found at the beginning.

Sample paragraph 1:

All computers, whether large or small, have the same basic capabilities. They have circuits for performing arithmetic operations. They all have a way of communicating with the person(s) using them. They also have circuits for making decisions.

In sample paragraph 1, the first sentence, *All computers, whether large or small, have the same basic capabilities.* expresses the main idea of the paragraph.

All main idea sentences have a topic and say something about the topic.

Example:

*All computers* [topic], *whether large or small, have the same basic capabilities* [about the topic].

In some of your reading, finding main ideas may serve your needs but, in much of your studying, you need to understand details. It is sometimes more difficult to understand details than main ideas. You will find it helpful if you think of details as growing out of the main idea. In sample paragraph 1, there are three major details growing out of the main idea. These are the major details:

1. *They have circuits for performing arithmetic operations.*
2. *They all have a way of communicating with the person(s) using them.*
3. *They also have circuits for making decisions.*

A major detail often has minor details growing out of it. These minor details tell more about a major detail, just as major details tell more about a main idea. In studying, you often find a paragraph that has many small details that you must understand and remember. Breaking up a paragraph of this kind into its three components: the main idea, major details, and minor details will help you to understand and remember what it is about.

Sample paragraph 2:

It is the incredible speed of computers, along with their memory capacity, which makes them so useful and valuable. Computers can solve problems in a fraction of the time it takes man. For this reason, businesses use them to keep their accounts, and airline, railway, and bus companies use them to control ticket sales. As for memory, modern computers can store information with high accuracy and reliability. A computer can put data into its memory and retrieve it again in a few millionths of a second. It also has a storage capacity for as many as a million items.
If you were to organize this paragraph into its three components, it would look like this:

<table>
<thead>
<tr>
<th><strong>Main idea</strong></th>
<th>It is the incredible speed of computers, along with their memory capacity, which makes them so useful and valuable.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major details</strong></td>
<td>Computers can solve problems much faster than humans. Modern computers can store information with high accuracy and reliability.</td>
</tr>
<tr>
<td><strong>Minor details</strong></td>
<td>Businesses use them to keep accounts. Transport companies use them to keep track of ticket sales. A computer can put data into its memory and retrieve it again in a few millionths of a second. It also has a storage capacity for as many as a million items.</td>
</tr>
</tbody>
</table>

In making a block diagram you don't have to write every word in the main idea sentence or in each of the detail sentences.

**Exercise 1**

Practise finding the main idea, major details, and minor details by completing the block diagram after reading the following paragraph.

The computer has changed the production of copy in the newspaper industry. There are three steps involved in the process: input, correction, and output. First, the computer numbers each story, counts words, and gives a listing of the length of each story. Then, a page is made up, advertisements are placed in, the copy is shifted or deleted, and corrections are made. Finally, the computer hyphenates words, and the result of all this is a newspaper page.

<table>
<thead>
<tr>
<th><strong>Main idea</strong></th>
<th>The computer has changed the production of copy in the newspaper industry.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major details</strong></td>
<td><strong>Minor details</strong></td>
</tr>
<tr>
<td><strong>Minor details</strong></td>
<td></td>
</tr>
</tbody>
</table>
Practise finding the main idea, major details, and minor details by completing the diagram after reading the following paragraph.

Railway companies use large computer systems to control ticket reservations and to give immediate information on the status of their trains. The computer system is connected by private telephone lines to terminals in major train stations, and ticket reservations for customers are made through these phone lines. The passenger's name, type of accommodation, and the train schedule is put into the computer's memory. On a typical day, a railway's computer system gets thousands of telephone calls about reservations, space on other railways, and requests for arrivals and departures. A big advantage of the railway computer ticket reservation system is its rapidity because a cancelled booking can be sold anywhere in the system just a few seconds later. Railway computer systems are not used for reservations alone. They are used for a variety of other jobs including train schedules, planning, freight and cargo loading, meal planning, personnel availability, accounting, and stock control.
Computer software

Start-up

Make a list of software products that you use (e.g. word processing, spreadsheets, etc.). Are there some features of the products you never use? Are there any features missing?

Reading

In the magazine article which follows, a number of software developers express opinions on the future of software technology. Read the article and tick (V) the relevant boxes to show which opinions are expressed by the speakers.

Opinions

In general, customers are getting what they want. ☑
In general, customers are not getting what they want. ☐
Software is too complex. ☒
Software is not complex enough. ☑
Software developers know what users want. ☐
Software developers don’t know what users want. ☑

Catherine Bull investigates

This week: software

Software technology is getting more complicated. Developers have to cut through a jungle of computer languages, operating environments, and shifting standards to choose how they’ll create their software. It’s not an easy job. Software purchasers will have to live with the results for years to come. Which advances in software technology will prevail? Which ones will be just a flash in the pan?
I chose four well-known software developers and asked each to talk about current and future trends in software technology. Their comments reveal some common and diverse themes.

I began by asking them if they thought that software purchasers are getting what they need? What should developers be doing differently to give purchasers a better product?

**Mary Evans** In general, I think people are getting what they want — there are a lot of creative things being done with paint software, word processing, DTP (desktop publishing) systems, and the like. Do users want more? Of course! Users will always want more. The computer is an incredibly powerful tool, and any software that makes it easier, faster, more creative, or more cost-effective will inevitably be in demand. But I'm generally optimistic about the way things are going at the moment. I think most of the major software manufacturers are able to read the market quite well.

**Gerry Harper** I'm afraid I completely disagree with Mary. I just don't think that software purchasers are getting the technical support they need. While the products are getting more and more complex, and more and more expensive, it seems that support is starting to be thought of as an additional business opportunity. More generally, I've thought for some time that applications are getting too big, and that they're trying to do too much. Yes, they're versatile and powerful, but they're also often overwhelming. I think what we need are simple little programs that are easy to understand and use, and that work together to accomplish more complex tasks.

**Matt Andrews** I really can't agree with that. To imagine we can just go back to "simple little programs" just ignores the complex needs of many of today's software users. No, I'm sure that you can't stop progress. Suppliers know what their customers want — they just can't supply it quickly enough. I've studied the market very closely, and I've found that purchasers' needs seem always to exceed the capability of the available software by a constant time-frame of about six to twelve months.

**Bob Bolton** I think users are getting what they want, provided that their needs fit the off-the-shelf application. Specialized software is usually so specific that it should be written in-house for businesses. Developers should add features that the customer needs, not what they think customers want. Some effort should be made to get feedback from the users before making an upgrade so that the proper features are added.

**Vocabulary**

*a flash in the pan* (1. 6) — a success that lasts only a short time and is not repeated

*off-the-shelf* (1. 41) — mass-produced: not made according to the individual needs of the customer
Task 3

Each of the following comments from the text is followed by two paraphrases. Decide which paraphrase (a or b) is closer in meaning to the original comment. Remember to look at the comments in their original context.

1 'Developers have to cut through a jungle of computer languages, operating environments, and shifting standards...' (line 1)
   a The huge number of languages, environments, and standards makes life difficult for software developers.
   b Software developers have to act to reduce the number of languages, environments, and standards which currently exist.

'Their comments reveal some common and diverse themes.' (line 8)
   a They talk about ordinary and wide-ranging topics.
   b They agree about some issues, but disagree about others.

3 'I think most of the major software manufacturers are able to read the market quite well.' (line 20)
   a Most software manufacturers understand what consumers want.
   b Most software manufacturers know how to influence users to buy more of their products.

4 ´...it seems that support is starting to be thought of as an additional business opportunity.' (line 25)
   a Increased technical support is a means of making software more attractive to businesses.
   b Software manufacturers are using the fact their products are complex to start selling technical support to their customers.

5 ´...purchasers' needs seem always to exceed the capability of the available software by a constant time-frame of about six to twelve months.' (line 37)
   a It takes about six to twelve months for purchasers to understand fully the software they buy.
   b The software customers want now will only become available in about six to twelve months.

Task 4

Which of the four speakers do you most agree with? Why?

Task 5

Using the line references given, look back in the text and find words or phrases in the text that have a similar meaning to:

1 penetrate (lines 1-5)
2 changing (lines 1-5)
3 win, survive (lines 5-10)
4 buyers (lines 10-15)
5 understand (lines 20-25)
6 flexible (lines 25-30)
7 too big/complex to manage (lines 25-30)
8 achieve (lines 30-35)
9 go beyond (lines 35-40)
10 information about a product/service (lines 40-45)

Writing

Task 6

Translate Mary Evans's comments (the paragraph beginning 'In general, I think people...') into your own language.
Listen to the following radio talk show called *Computer Forecast*, in which Barry Harris, the host, is discussing the future of software technology with his two guests. Are the following sentences true (T) or false (F)?

1. Liz thinks that most PC users are too tolerant of design faults.  
2. Liz thinks that only ten per cent of software users really know what they are doing.  
3. Liz thinks that the increased sophistication of software will make the problem of lack of expertise among users even worse in the future.  
4. Sam agrees that the vast majority of users of a single PC are inexperienced.  
5. Sam estimates that the number of experienced users and first-time buyers among his customers is about the same.  
6. Liz thinks that multimedia isn't having a big impact on the software market because of its high price and the lack of appropriate technology.  
7. Sam disagrees with Liz about multimedia, and believes that it will replace conventional desktop publishing.  
8. Both Liz and Sam agree that, in future, new software products will all have to be network-compatible.

Listen again. Change the sentences that are false to make them true.
Task 8

F-1. Read this extract from the tapescript of the conversation and fill in the gaps. To help you, the first letter of each missing word is given, and each gap is followed by a synonym for the missing word.

LIZ: No, I don’t think that most PC users are s_________ (experienced) – far from it. Compared with users on other systems, they are far more tolerant of f_________ (defective) design.

HOST: That’s a very strong c_________ (assertion), Liz. Aren’t you exaggerating the problem?

LIZ: No, I don’t think I am exaggerating. I h_________ (truly) think the v_________ (great) majority of software users I’ve interviewed are not at all sophisticated. In fact, they’re b_________ (scarcely) able to cope with the programs they are using. I e_________ (guess) they probably use only 10% of the features in any given application. Now we all agree that new software will d_________ (certainly) be bigger and much more complicated, so the problem can only g_________ (deteriorate).

Now listen to the recording again and check your answers.

Speaking

Task 9

Discuss the following questions.

1. If you were a developer of software, what kind of software package would you develop? Why?
2. Do you think software developers should develop educational software more like the software developed for games? Why?
Reading

Task 10

The features below are common in commercially available word-processing and desktop publishing packages. Match each feature with the correct definition. The first one has been done for you.

1 auto-kerning  a  can automatically generate a table of contents for a document
2 mail merge  b  can carry out simple calculations within a document such as totalling columns, etc.
3 style sheets  c  a single text file can contain several 'rulers' with different margins and tab settings
4 input tagging  d  automatic numbering of figures, paragraphs, etc.
5 maths functions  e  can adjust the space between successive characters to produce a 'best fit'
6 table of contents  f  program can read in names and addresses from a database and create personalized letters for mail-shots
7 auto numbering  g  can automatically generate a sorted alphabetical index for a document
8 outliner  h  text from word processors and databases can be precoded with tags to allow the correct format to be applied automatically
9 index generation i  these help to ensure uniform style throughout a document
10 multiple rulers  j  a writing aid enabling the structure of the document to be worked out beforehand and used as a guide when doing the detailed writing
Task 11

Complete the following sentences, using the information in the table below.

1. and are the only two packages without a grammar check facility.
2. is the cheapest product.
3. Only Wordstar for Windows and Word for Windows are ranked the same number of words in their spell check dictionaries.
4. and are both the most expensive products.

Word processors

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
<th>Spell check dictionary size</th>
<th>Features</th>
<th>Price</th>
<th>Comments</th>
<th>Supplier and tel. no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ami Pro 2.0</td>
<td>£445</td>
<td>135,000</td>
<td>•</td>
<td>•</td>
<td>Drawing, charting, image processing</td>
<td>Lotus 0784 455445</td>
</tr>
<tr>
<td>JustWrite</td>
<td>£199</td>
<td>100,000</td>
<td>•</td>
<td>•</td>
<td>Table editor, DDE support</td>
<td>Symantec 0628 776343</td>
</tr>
<tr>
<td>Professional Write Plus</td>
<td>£249</td>
<td>130,000</td>
<td>•</td>
<td>•</td>
<td>Harvard graphics import</td>
<td>Software Publishing 0344 867100</td>
</tr>
<tr>
<td>Upword</td>
<td>£395</td>
<td>OCED</td>
<td>•</td>
<td>•</td>
<td>DDE links with DOS and Windows</td>
<td>Wang 081 568 9200</td>
</tr>
<tr>
<td>Word for Windows 2</td>
<td>£445</td>
<td>130,000</td>
<td>•</td>
<td>•</td>
<td>Many DTP capabilities, plus drawing and charting tools</td>
<td>Microsoft 0734 270000</td>
</tr>
<tr>
<td>Wordperfect for Windows</td>
<td>£399</td>
<td></td>
<td>•</td>
<td>•</td>
<td>Powerful macro command language</td>
<td>Wordperfect Corp. 0932 850500</td>
</tr>
<tr>
<td>Wordstar for Windows</td>
<td>£399</td>
<td></td>
<td>•</td>
<td>•</td>
<td>Keystroke compatible with Wordstar 6</td>
<td>Wordstar International 081 643 8866</td>
</tr>
</tbody>
</table>

Task 12

The table on the following page contains information about five DTP products (a—e). Using the hints below, identify the products.

1. PageMaker 4.0 and Ventura Publisher Windows 4.0 are both the same price.
2. PageMaker 3.01 has the fewest features.
3. Ventura Publisher Windows 4.0 has a spell check and an auto numbering facility.
4. Legacy is cheaper than Ami Pro for Windows 2.0.

a

b

d

58
Writing

Task 13

Imagine that you are the product reviewer for a PC magazine. Decide which word-processing product in Table 1 is the best, then write a paragraph explaining your choice.

Speaking

Task 14

Work individually, then in pairs, using the information in the table on word processors in Task 11.

1 Individually, list the word-processing packages in order of merit (1 = best; 7 = worst).

2 In pairs, compare your lists. Explain the reasons for the order you chose. Try to persuade your partner to change his/her list to match yours.
You may use the space below to write your lists.

10- Useful expressions

I agree with you about...
I'm afraid I can't agree with you about... I think...
I don't think...
X is too expensive.
Y has more/fewer features.
Word-play

Task 15  Complete the puzzle and find the key word in 11 down.

Across
1 A program designed to perform a specified function. (11)
2 A general term for programs which do not form part of a computer but are used when operating it. (8)
3 A facility which allows the user to read in a file of names and create "personalized" letters. (4,5)
4 A sequence of instructions that is repeated until a desired condition is reached. (4)
5 A program that manipulates rows and columns of figures, used especially for accounting. (11)
6 The combined use on computer of text, graphics, video, animation, and sound. (10)
7 The _____ editor is a systems program that fetches required systems routines and links them to the object module. (7)
8 The business of preparing, printing, and distributing books or magazines, etc. to the public. (10)
9 Someone who creates new software products. (9)
10 A program or series of programs directed at some generic application (e.g. word processing) that can be tailored by the user to match his individual needs. (7)

Down
11 An IBM-_____ computer is one which can be used with other IBM hardware. (10)
Making comparisons

Formation

The regular comparative and superlative forms of descriptive words (adjectives and adverbs) are shown below:

1 Words of one syllable add the ending -er and -est.

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjectives</td>
<td>new</td>
<td>newer</td>
<td>newest</td>
</tr>
<tr>
<td>Adjectives</td>
<td>old</td>
<td>older</td>
<td>oldest</td>
</tr>
<tr>
<td>Adjectives</td>
<td>big</td>
<td>bigger</td>
<td>biggest</td>
</tr>
<tr>
<td>Adjectives</td>
<td>soon</td>
<td>sooner</td>
<td>soonest</td>
</tr>
<tr>
<td>Adjectives</td>
<td>late</td>
<td>later</td>
<td>latest</td>
</tr>
</tbody>
</table>

2 Words with three or more syllables are preceded by more and most.

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjectives</td>
<td>interesting</td>
<td>more interesting</td>
<td>most interesting</td>
</tr>
<tr>
<td>Adjectives</td>
<td>convenient</td>
<td>more convenient</td>
<td>most convenient</td>
</tr>
<tr>
<td>Adjectives</td>
<td>beautiful</td>
<td>more beautiful</td>
<td>most beautiful</td>
</tr>
<tr>
<td>Adverbs</td>
<td>easily</td>
<td>more easily</td>
<td>most easily</td>
</tr>
<tr>
<td>Adverbs</td>
<td>carefully</td>
<td>more carefully</td>
<td>most carefully</td>
</tr>
</tbody>
</table>

3 Adjectives with two syllables may be like 1 or 2 above in that they will add the ending -er and -est if they end in -y or -ly, -ow, -le and -er.

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>-y</td>
<td>tiny</td>
<td>tinier</td>
<td>tiniest</td>
</tr>
<tr>
<td>-y</td>
<td>speedy</td>
<td>speedier</td>
<td>speediest</td>
</tr>
<tr>
<td>-ly</td>
<td>early</td>
<td>earlier</td>
<td>earliest</td>
</tr>
<tr>
<td>-ly</td>
<td>friendly</td>
<td>friendlier</td>
<td>friendliest</td>
</tr>
<tr>
<td>-ow</td>
<td>shallow</td>
<td>shallower</td>
<td>shallowest</td>
</tr>
<tr>
<td>-ow</td>
<td>narrow</td>
<td>narrower</td>
<td>narrowest</td>
</tr>
<tr>
<td>-er</td>
<td>clever</td>
<td>cleverer</td>
<td>cleverest</td>
</tr>
</tbody>
</table>
4 Most of the remaining two-syllable adjectives take *more* and *most* in front of them.

Examples:

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>careful</td>
<td>more careful</td>
<td>most careful</td>
</tr>
<tr>
<td>careless</td>
<td>more careless</td>
<td>most careless</td>
</tr>
<tr>
<td>boring</td>
<td>more boring</td>
<td>most boring</td>
</tr>
<tr>
<td>awful</td>
<td>more awful</td>
<td>most awful</td>
</tr>
<tr>
<td>complex</td>
<td>more complex</td>
<td>most complex</td>
</tr>
</tbody>
</table>

5 Some common two-syllable adjectives can have either type of formation.

Examples:

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>common</em></td>
<td>commoner/</td>
<td>commonest/</td>
</tr>
<tr>
<td></td>
<td>more common</td>
<td>most common</td>
</tr>
<tr>
<td>gentle</td>
<td>gentler/</td>
<td>gentlest</td>
</tr>
<tr>
<td></td>
<td>more gentle</td>
<td>most gentle</td>
</tr>
<tr>
<td>quiet</td>
<td>quieter/</td>
<td>quietest/</td>
</tr>
<tr>
<td></td>
<td>more quiet</td>
<td>most quiet</td>
</tr>
</tbody>
</table>

6 Two-syllable adverbs ending in *-ly* take *more* and *most*.

Examples:

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td>quickly</td>
<td>more quickly</td>
<td>most quickly</td>
</tr>
<tr>
<td>slowly</td>
<td>more slowly</td>
<td>most slowly</td>
</tr>
<tr>
<td>badly</td>
<td>more badly</td>
<td>most badly</td>
</tr>
</tbody>
</table>

7 A small number of adjectives and adverbs have an irregular comparative and superlative form.

Examples:

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Absolute</th>
<th>Comparative</th>
<th>Superlative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bad</td>
<td>worse</td>
<td>worst</td>
</tr>
<tr>
<td></td>
<td>far</td>
<td>further/farther</td>
<td>furthest/farthest</td>
</tr>
<tr>
<td></td>
<td>good</td>
<td>better</td>
<td>best</td>
</tr>
<tr>
<td></td>
<td>many</td>
<td>more</td>
<td>most</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverbs</th>
<th>bad</th>
<th>worse</th>
<th>worst</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>far</td>
<td>further/farther</td>
<td>furthest/farthest</td>
</tr>
<tr>
<td></td>
<td>little</td>
<td>less</td>
<td>least</td>
</tr>
<tr>
<td></td>
<td>much</td>
<td>more</td>
<td>most</td>
</tr>
<tr>
<td></td>
<td>well</td>
<td>better</td>
<td>best</td>
</tr>
</tbody>
</table>
Use in sentences

Comparisons may show equivalence, non-equivalence, the highest degree of something, and parallel increase.

1 Equivalence: the following words or constructions are used to show that things or people are similar in some way.

as ... as
as many ... as
as much ... as
the same ... as
similar to
the same
are similar
equal to
is like
similar/ly
equal/ly
compared to/with
each
either
either
equality
all
both
alike
Examples:

1 Here, the term 'processor' is equivalent to the central processing unit.
2 Laptops are as powerful as microcomputers.
3 Some companies have as many computers as employees.
4 Some companies use both disks and conventional filing systems for storing data.
5 A computer virus is like a virus in the human body. It can do a lot of damage.
6 Many word-processing programs are similar in that there are certain common functions.

2 Non-equivalence: the following words and constructions are used to compare or contrast things or people that are separate from each other.

not as ... as
...-er than
more ... than
fewer ... than
less ... than
greater than
not as many ... as
not as much ... as
not equal to
unequal(ly)
unlike
not the same as
not all
Examples:

1 A mainframe is larger and more expensive than a microcomputer.
2 Learning to use a computer is not as difficult as learning to program.
3 A fax board costs less than factory-sealed software. Pirated versions may contain viruses.
4 Unlike factory-sealed software, pirated versions may contain viruses.
5 Desktop publishing is the same as electronic publishing.
6 You can save money with a network because you will need fewer printers.

3 The highest degree: the following words and constructions are used to compare one member of a group with the whole group (superlative).

the ...-est
the most ...
the least ...
Examples:

1 This is the most popular package on the market today.
2 BASIC is probably the least difficult programming language to learn.
3 The best programs are those adapted specifically to your own needs.
4 Parallel increase: the following words and constructions are used to show parallel increase (two comparatives).

the ...-er, the more ... the more ..., the ...-er the ...-er, the less ...

Examples:
1 The more memory your computer has, the more data it can store.
2 The bigger your computer system, the less time you spend waiting.
3 The more training you give to your employees, the better they will perform.

Exercise 1
The following sentences express computer capabilities and limitations. Decide whether the sentences express equivalence, non-equivalence, or the superlative, then underline the words expressing the comparison. The first one has been done for you.
1 equivalence Speeds for performing decision-making operations are comparable to those for arithmetic operations.
2 Even the most sophisticated computer, no matter how good it is, must be told what to do.
3 A computer can perform similar operations thousands of times, without becoming bored, tired, or careless.
4 For example, modern computers can solve certain classes of arithmetic problems millions of times faster than a skilled mathematician.
5 ______ One of the most important reasons why computers are used so widely today is that almost every big problem can be solved by solving a number of little problems.
6 Finally, a computer, unlike a human being, has no intuition.

Exercise 2
Read the following sentences taken from previous units. Decide whether the sentences express equivalence, non-equivalence, or the superlative, then underline the words expressing the comparison.
1 Digital Research have continued to develop their operating system, DR/DOS, and it is considered by many people to be a better product than Microsoft's. (Unit 1)
2 For the last generation, Silicon Valley and Tokyo have been working to design computers that are ever easier to use. (Unit 2)
3 There is one thing, however, that has prevented the machines from becoming their user-friendliest: ... (Unit 2)
4 Clipboard PCs — which, as their name suggests, are not much bigger than an actual clipboard — replace the keyboard with a liquid crystal display (LCD) screen and an electronic stylus. (Unit 2)
5 When the computer finds the closest match, it encodes the character in memory and displays it on the screen as if it had been typed. (Unit 2)
6 There are a handful of clipboard computers now on the market, including GRIDPad, which is sold in the US; Penvision, manufactured by NCR and sold around the world; and Sony's Palmtop and Canon's Al Note, both sold only in Japan. (Unit 2)
7 I'm frequently asked which online service is 'best' but, the answer is, there is no best. (Unit 3)
They tend to judge all other online services based on this first service — often preventing themselves from seeing the advantages of a specific service. (Unit 3)

Each offers one or more products or features that either do not exist elsewhere or are superior to the same features on other services. (Unit 3)

Judge it based on what it offers and how it meets your needs — not in comparison to what you're used to using. (Unit 3)

Exercise 3

Refer back to the table of word-processing packages (Unit 5, page 58) and write ten sentences comparing the products advertised.

Examples:

*Upword is more expensive than JustWrite.*

*Ami Pro 2.0 has the largest spell check dictionary.*
‘There! That should make life easier!’

Start-up

Task 1

Try to answer these questions.

1 What is a LAN?
2 What is a WAN?
3 What is a distributed system?

Reading

Task 2

Before reading definitions.

1 protocol
2 bulletin board
3 user interface
4 make a query
5 parse
6 synchronous

the text opposite, match these words and phrases with their

a analyse the syntax of a string of input symbols
b a teleconferencing system allowing users to read messages left by other users
c agreement governing the procedures used to exchange information between co-operating computers
d means of communication between a human user and a computer system
e taking place at exactly the same time as something else
f request a search
Computer networks

Computer networks link computers by communication lines and software protocols, allowing data to be exchanged rapidly and reliably. Traditionally, networks have been split between wide area networks (WANs) and local area networks (LANs). A WAN is a network connected over long-distance telephone lines, and a LAN is a localized network usually in one building or a group of buildings close together. The distinction, however, is becoming blurred. It is now possible to connect up LANs remotely over telephone links so that they look as though they are a single LAN.

Originally, networks were used to provide terminal access to another computer and to transfer files between computers. Today, networks carry e-mail, provide access to public databases and bulletin boards, and are beginning to be used for distributed systems. Networks also allow users in one locality to share expensive resources, such as printers and disk systems. Distributed computer systems are built using networked computers that co-operate to perform tasks. In this environment each part of the networked system does what it is best at. The high-quality bit-mapped graphics screen of a personal computer or workstation provides a good user interface. The mainframe, on the other hand, can handle large numbers of queries and return the results to the users. In a distributed environment, a user might use his PC to make a query against a central database. The PC passes the query, written in a special language (e.g. Structured Query Language — SQL), to the mainframe, which then parses the query, returning to the user only the data requested. The user might then use his PC to draw graphs based on the data. By passing back to the user's PC only the specific information requested, network traffic is reduced. If the whole file were transmitted, the PC would then have to perform the query itself, reducing the efficiency of both network and PC.

In the 1980s, at least 100,000 LANs were set up in laboratories and offices around the world. During the early part of this decade, synchronous orbit satellites lowered the price of long-distance telephone calls, enabling computer data and television signals to be distributed more cheaply around the world. Since then, fibre-optic cable has been installed on a large scale, enabling vast amounts of data to be transmitted at a very high speed using light signals.

The impact of fibre optics will be considerably to reduce the price of network access. Global communication and computer networks will become more and more a part of professional and personal lives as the price of microcomputers and network access drops. At the same time, distributed computer networks should improve our work environments and technical abilities.
Computer networks link computers locally or by external communication lines and software allowing data to be exchanged rapidly and reliably. The distinction between local area and wide area networks is, however, becoming unclear. Networks are being used to perform increasingly diverse tasks, such as carrying e-mail, providing access to public databases, and for parsing. Networks also allow users in one locality to share resources.

Distributed systems use networked computers. PCs or workstations provide the user. Mainframes process and return the results to the users. A user at his PC might make a query against a central database. The PC passes the query, written in a special language, to the mainframe, which then parses the query, returning to the user only the data requested. This allows both the network and the individual PC to operate efficiently.

In the 1980s, at least 100,000 were set up world-wide. As orbit satellites have lowered the price of long-distance telephone calls, data can be transmitted more cheaply. In addition, cable has been installed on a large scale, enabling vast amounts of data to be transmitted at a very high speed using light signals. This will considerably reduce the price of network access, making global networks more and more a part of our professional and personal lives. Networks should also improve our work and technical abilities.

distinction fibre-optic protocols synchronous
distributed systems LANs queries workstations
environments parses screen handling

Using the line references given, look back in the text and find words that have a similar meaning to:

1 unclear (lines 15-20)
2 place (lines 25-30)
3 carry out (lines 35-40)
4 cost (lines 70-75)
5 world-wide (lines 80-85)

Now look back in the text and find words that have an opposite meaning to:

1 disparate (lines 10-15)
2 conflict v (lines 30-35)
3 preventing (lines 70-75)
4 tiny (lines 75-80)
5 increase (lines 80-85)
Writing

Task 7
Translate the third paragraph, beginning 'Distributed computer systems...' into your own language.

Listening

Task 8
Listen to this extract from the radio programme *Computerworks* about LANs. Indicate whether the following items are mentioned (✓) or not mentioned (x).

1. LANs are equally useful to large and small companies.
2. Companies can install their own LANs, provided they are not too big.
3. Whether or not a company builds a 'do-it-yourself' LAN depends on the amount of space available for the installation.
4. It is sometimes still possible to install part of a LAN if you don't have the computer knowledge or time to do the whole job yourself.
5. You need at least three years' computer maintenance experience before you should attempt to install a LAN.
6. In order to install your own LAN, you need to be used to opening up computers, adding and removing expansion boards, and consulting computer documentation.
7. When installing your own LAN you should expect to have to repeat the same process several times.
8. The installation process often causes computers to break down.
Task 9

Read this extract from the tapescript and try to fill in each gap with an appropriate word.

When you're installing a LAN, you may be __ your computers for as much as a day or so. A lot depends on how __ the installation proceeds, and that depends on your own __. Professional installers can have each of your machines __ of __ for only a few minutes at a time. If you can't live without your computers for a while, you might want to __ doing it yourself.

Installing a LAN involves running cable to several __. This may require you to install junction boxes in walls, do the wiring, and maybe install electrical __ as well. If you aren't __ with these skills, and if you aren't a __ electrician, you will need to hire someone for this part, at least. Of course, if you're installing your LAN in one room, then you might not need to hire __

Now listen again to the last part of the recording. Check to see whether your answers match those used by the speaker.

Network configurations

Reading

Task 10

Read the following texts. Match each text with the correct illustration.

a

![Diagram](image)

b

![Diagram](image)
1 **Star**
In the star configuration, the central computer performs all processing and control functions. All access devices are linked directly to the central computer. The star configuration has two major limitations. First of all, the remote devices are unable to communicate directly. Instead, they must communicate via the central computer only. Secondly, the star network is very susceptible to failure, either in the central computer or the transmission links.

2 **Switched**
The central switch, which could be a telephone exchange, is used to connect different devices on the network directly. Once the link is established, the two devices communicate as though they were directly linked without interference from any other device. At the end of the session, the connection is closed, freeing capacity for other users and allowing access to other devices. Multiple switches can be used to create alternative transmission routes.

3 **Ring**
Each device is attached to a network shaped as a continuous loop. Data proceeds in only one direction and at a constant speed round the loop. Devices may send information only when they are in control of the 'token'. The token is a package of data which indicates which device has control. The receiving device picks up the token, then clears it for another's use once it has received the message. Only one device may send data at any given moment, and each device must be working for the network to function.

4 **Bus/Ethernet**
A bus network consists of one piece of cable terminated at each end to which all devices are connected. In a bus-based network, each device is able to broadcast a message when it has detected silence for a fixed period of time. All devices receive the broadcast and determine from the content of the message whether it was intended for them. The only problem occurs when two devices try to send at the same time. When a sending device detects another's transmission, it aborts its own.
Task 11  These are answers to questions about the texts. Write the questions.
1 To connect different devices on the network directly.
2 No, it goes in only one direction round the loop.
3 No, only one device may send data at any given moment.
4 From the content of the message.
5 It cancels its own transmission.

Task 12  Which of the network configurations on page 71 does this flowchart refer to?

Task 13  The columns below describe characteristics of the bus and ring configurations. Which column refers to which configuration? How did you decide?

<table>
<thead>
<tr>
<th></th>
<th>bus</th>
<th>ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>varied time response</td>
<td>calculable time response</td>
<td></td>
</tr>
<tr>
<td>easy expansion</td>
<td>difficult reconfiguration</td>
<td></td>
</tr>
<tr>
<td>fault-tolerant</td>
<td>fault-intolerant</td>
<td></td>
</tr>
<tr>
<td>simple</td>
<td>more complex</td>
<td></td>
</tr>
</tbody>
</table>

Speaking

Task 14  Work in pairs, A and B, using the information in the advertisement opposite. Prepare the role-play in advance and try not to refer to the advertisement during the activity.
Student A: You are a customer interested in the Netplan Eazy Kit. Before deciding whether to buy it, ask questions to find out:

1. what you need in order to use the Netplan Eazy Kit.
2. the total number of PCs you can run on it.
3. the cost of adding additional PCs.
4. how difficult it is to install.
5. what software it runs.
6. the other features offered.

Student B: You represent the makers of the Netplan Eazy Kit. Make notes about the features of the product. Answer any questions and try to encourage the customer to buy it.

---

**Netplan Eazy Kit**

*from as little as £215*

This is not the only way to share software. If your idea of sharing software is looking over a colleague’s shoulder, then Netplan may have the ideal solution. To benefit from a network you only need two PCs.

The Netplan Eazy Kit costs just £215 and gives you all the hardware, software, and cabling you need to link two PCs. And for £100 per PC you can extend the network to up to six users. With Netplan Eazy even the smallest business can save time, money, and effort.

**Extra efficiency**

The Netplan Eazy Kit allows PCs to share the same data and software without having to copy and transfer disks. So whether you’re dealing with customer enquiries or updating accounts, you can do it from the same machine. You can even send messages from one PC to another by e-mail.

Netplan Eazy will also save you money on expensive resources like printers.

**It's so Eazy**

If you can use a screwdriver, you can install Netplan Eazy yourself. That’s all it takes. And once installed, it runs on all popular software.

We also offer our customers unlimited access to our Freephone Helpline as part of the package. So why wait? Contact your nearest Netplan dealer today. Details are on the back cover of this magazine.
**Word-play**

**Task 15**

Solve the crossword puzzle using the clues below.

### Across
1. The means of communication between a human and a computer. (4,9)
2. Taking place at exactly the same time as something else. (11)
3. See 9 across.
4. An _______ board may be inserted into a computer to give it added features. (9)
5. To load software on to a computer, ready for use. (7)
6. The opposite of 9 across and 3 down. (3)
7. To transmit a message to all nodes on a network. (9)
8. The network configuration in which all devices are linked through the central computer. (4)
9. and 3 down Usually found in one building or a group of buildings close together. (5,4,7)
10. This kind of network often uses a telephone exchange to connect different devices directly. (8)

### Down
2. See 9 across.
4. An _______ board may be inserted into a computer to give it added features. (9)
Language focus

Time sequence

In activities such as scheduling, doing routine activities, and conducting and describing experiments, it is important to recognize the sequence of events. As we know, events do not simply occur in isolation, they occur either before, during, or after other events. This time sequence may be chronological, logical, or causal. The following tables show examples of time relaters.

1 Before given time-references:

| Time relaters | Adjectives | Adverbials |
|---------------|------------|--|-----------|
|               | earlier    | preceding |
| Adjectives    | former     | previous  |
|               | already    | earlier   |
| Adverbials    | prior      | first     |
|               | before     | formerly  |
|               | before that| originally|
|               | before then|           |

Examples:

1 *The memory storage capacity of earlier* computers was not as large as those of today.
2 *When the first digital computer was developed, the first analog computer had already been in use for some time.*
3 *Up to now, voice recognition technology has not been developed for mass marketing.*

2 Simultaneous with given time-references:

| Time relaters | Adjectives | Adverbials |
|---------------|------------|--|-----------|
|               | at present | meantime |
| Adjectives    | at this point | meanwhile |
|               | now/then | in the meantime |
| Adverbials    | today | when |
|               | for the time being at the moment | at the same time |
|               | at that time | |
Examples:

1. At that time many new computer programs were being developed for use in businesses.
2. Computers may soon take over many daily tasks, but in the meantime ordinary people must continue to do them themselves.
3. Computer magazines keep us informed about contemporary issues in the computing world.

3. After given time-references:

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Time relaters</th>
<th>Adverbials</th>
</tr>
</thead>
<tbody>
<tr>
<td>following</td>
<td>later</td>
<td>next</td>
</tr>
<tr>
<td>afterwards</td>
<td>since</td>
<td>by the time</td>
</tr>
<tr>
<td>after that</td>
<td>by the end</td>
<td>soon</td>
</tr>
<tr>
<td>eventually</td>
<td>next</td>
<td></td>
</tr>
</tbody>
</table>

Examples:

1. Since the development of the chip, computers have become cheaper and more compact.
2. You should have a good idea of the various applications of computer software by the time you finish reading this book.
3. Although initial versions of word-processing programs were not very complex, later versions were much more sophisticated.

Sample paragraph:

Computers, as we know them today, have not been around for a long time. It was not until the mid-1940s that the first working digital computer was completed. But since then, computers have evolved tremendously. Vacuum tubes were used in the first-generation computers only to be replaced by transistors in the second-generation computers at the beginning of the early 1960s. By the end of the 1960s, transistors themselves were replaced by tiny integrated circuit boards and, consequently, a new generation of computers was on the market. Fourth-generation computers are now produced with circuits that are much smaller than before and can fit on a single chip. Even now, new technologies are being developed to make even better machines.

Exercise 1

Read the following paragraph and, as you read, underline the time relaters.

During the seventeenth and eighteenth centuries, many easy ways of calculating were devised. Logarithm tables, calculus, and the basis for the modern slide rule were invented during this period. It was not until the early 1800s that the first calculating machine appeared and, not too long after, Charles Babbage designed a machine which became the basis for building today's computers. A hundred years later, the first analog computer was built, but the first digital computer was not completed until 1944. Since then, computers have gone through four generations: digital computers using vacuum tubes in the 1950s, transistors in the early 1960s, integrated circuits in the mid-60s, and a single chip in the 1970s. In the 1980s, we saw computers become smaller, faster, and cheaper. Earlier this decade, computers became portable, from laptops to palmtops. At the rate computer technology is growing now, we can expect further dramatic developments before the end of the century.
Exercise 2

Read the following sentences which come from previous units. Underline the time relaters and indicate whether they refer to before, during, or after the given time reference. The first one has been done for you.

1. After Since then, over seventy million PCs made by IBM and other manufacturers have been sold. (Unit 1)

2. Over this period, PCs have become commodity items. Since IBM made the design non-proprietary, anyone can make them. (Unit 1)

3. Ten years later, in 1991, IBM were making PCs with 16Mb of memory, expandable to 64Mb, running with a processor speed of 33MHz. (Unit 1)

4. Large companies are considering running major applications on PCs, something which, ten years ago, no one would have believed possible of a PC. (Unit 1)

5. When the computer finds the closest match, it encodes the character in memory and displays it on the screen as if it has been typed. (Unit 2)

6. Enter the clipboard computer, a technology that has been in development for the last 20 years but took hold in the mass market only this year. (Unit 2)

7. Eventually, we're all going to be interlinked, no matter which service we use, in what DIALOG's Richard Ream calls a 'network of networks'. (Unit 3)

8. Until then, most of us have to go to more than one service to find everything we need. (Unit 3)

Exercise 3

Now refer back to paragraphs 1, 2, 4, and 5 of the text entitled Computer networks (page 67, Unit 6). Underline all the time relaters and indicate whether they refer to before, during, or after the given time reference.
Computer viruses

Start-up

Task 1

Try to answer these questions.

1 What is a computer virus?
2 How does a virus work?

Reading

Task 2

Before reading the text, match the words and definitions listed below.

1 a detonator a protective device
2 an infector b to remove all traces of something
3 to boot c a device used to set off an explosion or other destructive process
4 to trigger d to discover or recognize that something is present
5 to erase e to set a process in motion
6 pirated f something which transmits a disease or virus
7 a shield g stolen, obtained without the owner's consent
8 to detect h to load the operating system into memory
How computer viruses work

A computer virus — an unwanted program that has entered your system without you knowing about it—has two parts, which I’ll call the infector and the detonator. They have two very different jobs. One of the features of a computer virus that separates it from other kinds of computer program is that it replicates itself, so that it can spread (via floppies transported from computer to computer, or networks) to other computers.

After the infector has copied the virus elsewhere, the detonator performs the virus’s main work. Generally, that work is either damaging data on your disks, altering what you see on your computer display, or doing something else that interferes with the normal use of your computer.

Here’s an example of a simple virus, the Lehigh virus. The infector portion of Lehigh replicates by attaching a copy of itself to COMMAND.COM (an important part of DOS), enlarging it by about 1000 bytes.

So let’s say you put a floppy containing COMMAND.COM into an infected PC at your office — that is, a PC that is running the Lehigh program. The infector portion of Lehigh looks over DOS’s shoulder, monitoring all floppy accesses. The first time you tell the infected PC to access your floppy drive, the Lehigh infector notices the copy of COMMAND.COM on the floppy and adds a copy of itself to that file.

Then you take the floppy home to your PC and boot from the floppy. (In this case, you’ve got to boot from the floppy in order for the virus to take effect, since you may have many copies of COMMAND.COM on your hard and floppy disks, but DOS only uses the COMMAND.COM on the boot drive.)

Now the virus has silently and instantly been installed in your PC’s memory. Every time you access a hard disk subdirectory or a floppy disk containing COMMAND.COM, the virus sees that file and infects it, in the hope that this particular COMMAND.COM will be used on a boot disk on some computer someday.

Meanwhile, Lehigh keeps a count of infections. Once it has infected four copies of COMMAND.COM, the detonator is triggered. The detonator in Lehigh is a simple one. It erases a vital part of your hard disk, making the files on that part of the disk no longer accessible. You grumble and set about rebuilding your work, unaware that Lehigh is waiting to infect other unsuspecting computers if you boot from one of those four infected floppies.

Don’t worry too much about viruses. You may never see one. There are just a few ways to become infected that you should be aware of. The sources seem to be service people, pirated games, putting floppies in publicly available PCs without write-protect tabs, commercial software (rarely), and software distributed over computer bulletin board systems (also quite rarely, despite media misinformation).

Many viruses have spread through pirated — illegally copied or broken — games. This is easy to avoid. Pay for your games, fair and square.

If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC’s drives without a write-protect tab. Carry a virus-checking program and scan the PC before letting it write data onto floppies.

Despite the low incidence of actual viruses, it can’t hurt to run a virus checking program now and then. There are actually two kinds of antivirus programs: virus shields, which detect viruses as they are infecting your PC, and virus scanners, which detect viruses once they’ve infected you.

Viruses are something to worry about, but not a lot. A little common sense and the occasional virus scan will keep you virus-free.

Remember these four points:
Viruses can’t infect a data or text file.
Before running an antivirus program, be sure to cold-boot from a write-protected floppy.
Don’t boot from floppies except reliable DOS disks or your original production disks.
Stay away from pirated software.

Vocabulary

fair and square (1. 113) — honestly
it can't hurt (1. 126) — it's probably a good idea
Task 4

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you feel a statement is false, change it to make it true.

1. Viruses cannot be spread through a computer network, only via floppies transported from computer to computer.
2. The virus will spread as soon as you put the infected floppy in your PC.
3. The infector works by interfering in some way with the normal use of your computer.
4. The detonator in Lehigh works by altering what you see on your screen.
5. Most viruses spread through pirated games.
6. You should run an antivirus program every time you use your computer.
7. There are not very many viruses in circulation.
8. Virus shields are more effective than virus scanners.

Task 5

Indicate the line reference where the following ideas are found in the text.

line
1 1. The Lehigh virus must infect four copies of COMMAND.COM before damage is done to data.
2 1. Always boot your computer from dependable DOS disks or your original disk.
3 1. The infector part of a virus must first copy itself somewhere before the detonator part damages the data on your disks.
4 1. Virus scanners discover viruses after the infection and virus shields discover viruses during the infection process.

Task 6

These are answers to questions about the text. Write the questions.

1. Two, one that infects and one that does the damage.
2. By interfering in some way with the normal use of the computer.
3. After it has infected four copies of COMMAND.COM.
4. Every time you access a hard disk subdirectory or a floppy disk containing COMMAND.COM.
5. Yes, by using your common sense and by occasionally scanning for them.

Task 7

Using the line reference given, look back in the text and find the reference for the words in italics.

1. They have two very (line 7)
2. is that it replicates itself (line 12)
3. enlarging it by about (line 36)
4. of itself to that file (line 53)
5. and infects it (line 73)
6. This is easy to (line 112)
7. which detect viruses (line 131)
8. once they’ve infected (line 134)
Task 8

Using the line references given, look back in the text and find words or phrases with a similar meaning to:

1 reproduces (lines 10-15)
2 infect (lines 12-17)
3 changing (lines 20-25)
4 immediately (lines 65-70)
5 complain (lines 85-90)

Using the line references given, look back in the text and find words or phrases that have an opposite meaning to:

6 reducing (lines 35-40)
7 removed from (lines 65-70)
8 records (lines 80-85)
9 ignorant (lines 95-100)
10 frequently (lines 100-105)

Computer security

"Security breach blamed on hacker"

12 year-old hacks into bank's database

Computer fraud on the increase

Speaking

Task 9

In pairs, try to answer these questions:

1 Who or what is a 'hacker'?
2 How many ways can you think of to make the data in a computer secure?

Listening

Task 10

Listen to Steve, a computer technician, and Richard, the office manager at a language institute, talking about computer security.

As you listen to the conversation, answer the following questions.

1 What is the problem with the computer system at the language institute?
2 What would someone need to connect his/her PC to the office network?
3 What are the disadvantages of security passwords, according to Steve and Richard?
4 How does the 'smart' card work? Is it safe?
5 How much do you think Steve and Richard know about security systems?
Speaking

Task 11

Steve and Richard must decide what to do. What advice would you give them? In groups or pairs, note down the advantages and disadvantages of the possible solutions. Think about safety, cost, and ease of use. Try to decide on the best solution.

Reading

Task 12

Who Knows What Evil Lurks In The Darkest Corners Of Your PC?

The combined threat of viruses wreaking havoc on your PC and probing meddlers gaining access to sensitive data can strike fear into the hearts of even the most mild-mannered PC managers. Relax. XTree Company has the ultimate in PC protection. AllSafe teams superior virus prevention with aura 011701 and security reporting.

And while most anti-virus products simply scan or known virus signatures, AllSafe actually looks for the signs of viruses attempting to replicate. Once a virus is spotted, AllSafe isolates it, preventing the virus from infecting your PC. If the virus is known, AllSafe quickly removes it. Even if the virus is unknown, AllSafe studies it and learns its signature immediately, letting you automatically update the virus signature database. Then you can use AllSafe to scan other disks or systems right away before an infection can spread, without waiting for a new signature from the publisher. So, if you use a standalone PC, fear not. It's over for the evil virus.

Just as scary as the viruses are those characters that attempt to invade your computer files without authorization. AllSafe's flexible password options let you share or limit access to as much of your hard disk as you wish. AllSafe keeps out the evil invaders!

When you need a complete solution—protection against both viruses and unauthorized entry—choose AllSafe. And like all XTree Company products, they're easy to install and use. For more information or to find out where you can buy AllSafe, call one of our distributors:

Softsel UK (081) 588-8866
Ingram Micro UK (0908)260460
Frontline (0256)27890

The flowchart on the following page represents the steps in the process by which AllSafe removes viruses from PCs. Using the information in the advertisement, match each step with the corresponding letter in the flowchart.
1 Virus signature database is updated.

2 Is virus known?

3 AllSafe scans other disks or systems in order to prevent further infection immediately.

4 AllSafe searches for indications that viruses are attempting to copy themselves.

5 AllSafe identifies and isolates the virus.

6 AllSafe eliminates the known virus.

7 AllSafe analyses the virus and learns its signature straight away.

**Task 13** Find words or phrases in the text which mean:

1 wickedness, badness, danger
2 hides (while waiting to attack)
3 causing a lot of damage
4 people who interfere without authorization
5 terrify, make very afraid
6 combines
7 identified, recognized
8 frightening
9 choices
10 attackers

**Speaking**

**Task 14** Discuss the following questions:

1 What technique does the advertisement use to persuade people to buy the product?
2 Do you think the advertisement is successful? Give reasons for your opinion.
3 What other techniques could be used to sell this kind of software?
Writing

Design an advertisement for a PC protection package. Your advertisement should mention all the features listed below, but you may add others. Choose a name, and decide on the best way to present your product.

Features
Password protection — system manager controls what each user is permitted to do
File encryption — plain text messages are converted into cipher (code) so that only authorized recipients can read them
Keyboard lock — screen is cleared and keyboard is locked after pre-set period of inactivity

Reading

Read this news report and discuss the questions that follow.

**NSA consultant's son is computer saboteur**

`Worm' came from graduate student

A court heard today how a Cornell University graduate student, Robert T. Morris Jr. (25), infected a host of government and educational computer centres with a computer virus, known as a 'worm', which literally brought all computational activity to a halt in over 6,000 installations. Morris, the son of a prominent National Security Agency computer consultant, was sentenced for his offences yesterday. As punishment, he was required to spend no time in prison but, instead, serve three years' probation, contribute 400 hours of community service, and to pay a $10,000 fine along with associated court and probation costs.

1 How serious do you think Robert Morris's crime was?
2 Do you think the punishment was
   a too severe?
   b about right?
   c not severe enough?
3 Do you know of any similar incidents of computer hacking?
## Word-play

The words and phrases below are taken from this unit. In pairs or groups, decide if they have a 'protective' or a 'destructive' meaning as they are used in the unit, then put them under the correct heading.

<table>
<thead>
<tr>
<th>protective</th>
<th>destructive</th>
</tr>
</thead>
<tbody>
<tr>
<td>detonator</td>
<td>pirated</td>
</tr>
<tr>
<td>infect</td>
<td>write-protect tab</td>
</tr>
<tr>
<td>hacker</td>
<td>worm</td>
</tr>
<tr>
<td>signature</td>
<td>virus scanner</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How many other ways can you think of to classify them?
Language focus G

Listing

It is important when reading to recognize and understand the relationship in which sentences and groups of sentences combine to present information. This information may be linked by means of a connective word or marker.

Making a list, for example when enumerating, and giving instructions, indicates a cataloguing of what is being said. It is important to note that most enumerations belong to clearly defined sets. The following table is a list of the markers that can be used to show the order in which things are to be said.

<table>
<thead>
<tr>
<th>Markers</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, etc.</td>
<td>1, 2, 3, etc.</td>
</tr>
<tr>
<td>one, two, three, etc.</td>
<td>one, two, three, etc.</td>
</tr>
<tr>
<td>first(ly), second(ly), third place</td>
<td>first(ly), second(ly), third place</td>
</tr>
<tr>
<td>another, next, then</td>
<td>another, next, then</td>
</tr>
<tr>
<td>furthermore, afterwards, moreover</td>
<td>furthermore, afterwards, moreover</td>
</tr>
<tr>
<td>lastly/finally</td>
<td>lastly/finally</td>
</tr>
<tr>
<td>to begin/start with, and to conclude</td>
<td>to begin/start with, and to conclude</td>
</tr>
<tr>
<td>first and foremost</td>
<td>first and foremost</td>
</tr>
<tr>
<td>above all</td>
<td>above all</td>
</tr>
<tr>
<td>last but not least</td>
<td>last but not least</td>
</tr>
</tbody>
</table>

There are many ways of showing sequential relationships. Those given in the table above are not the only ones, they are the most common ones used in listing or enumerating. The -ly forms are usually used when listing.

Sample paragraphs:

More and more police departments are now using sophisticated devices to help control the increasing crime rate. Some of these devices are: firstly, a computer terminal inside a police vehicle to answer an officer's questions, secondly, a computer-controlled display unit for displaying fingerprints, and thirdly, educational systems for police officers such as terminals, enabling them to verify changes in laws, rules, and regulations.

The computer memory of many law enforcement systems contains all kinds of information. First and foremost, it has data on stolen items such as cars, licence plates, and property. Second, it has information on missing persons and wanted fugitives. Last but not least, it contains information on political extremist groups and their activities.
Computers have certainly revolutionized police work by providing access to millions of items of information with the least possible delay and speeding up the process of apprehending suspicious-looking characters.

**Exercise 1**

Complete the following paragraph about the various steps in the creation of a database by filling in the blanks with appropriate listing markers.

When you are creating a new database, you must decide how many fields you will need in your database. You will have to provide up to five items of information about each field. Each field needs to have a name. The field type has to be defined. Character, numeric, date, and logical are some common types. The choice to be made is the width of the field. However, some fields, such as date, have present default values. The step is to set the number of decimal places if the field is numeric. You will have to indicate whether the field is to be indexed or not.

**Exercise 2**

Complete the following paragraph by filling in the blanks with appropriate listing markers.

Computers can do wonders, but they can waste a lot of money unless careful consideration goes into buying them. Businessmen and women thinking of buying a computer system should admit they know very little about computers. They must realize that the computer sales people don't always know how their business works. It is essential that buyers should get outside advice, not necessarily from consultants but from other executives who have had recent experience in buying a computer system they should try to see systems similar to ones under consideration in operation. Because their operations will have differences that must be accommodated, they should find out what would be involved in upgrading a system. Important thing to know before buying a computer is the financial situation of the supplier because computer companies come and go and not all are financially stable. The prospective buyer should demand that every detail be covered in writing, including hardware and software if they are supplied by different companies. There's nothing wrong with computers themselves, it's how and why they are used that can cause problems.
Computers in the office

Start-up

Task 1

What aspects of computer technology are illustrated below: Make a list of any other examples used in the office.

Reading

Task 2

Read the text opposite. How many of the items you listed in Task 1 are mentioned:
Visions of Tomorrow

The paperless office is still a dream, but the basic tools are in place. We receive mail in two basic forms: on paper in an envelope, or electronically on our computer. Most of us have access to e-mail in one form or another. That's half the battle won. The other half is a bit more difficult, but it can be, and is being, done. All mail can be opened in the mail room and scanned into the computer using optical character recognition (OCR). Then a document-image-processing program takes over and lets you accomplish electronically what you would normally do with paper. Various personal computer products are available for this purpose.

Pen-based computing is coming into its own. Pen(a) input capabilities are beginning to show up in hardware, applications, and operating systems. You can't take notes that will go directly into your computer, and the technology wouldn't know what to do with your doodles, but it would know that a doodle isn't a valid word. And that's a start — a good one.

Multimedia really needs no explanation. There are many packages that help you create multimedia presentations, and the tools to create customized multimedia training programs are also plentiful. so CD-ROM disks, such as Ziff-Davis's Computer Select and Microsoft's Bookshelf, let you access mountains of information with ease. Computers are already much smaller than they used to be, and you can't go to an industry show these days without finding some company promoting its 'small footprint'. When you start talking about laptops, notebooks, and palmtops, the question becomes, 'How small is too small?' FAX capabilities are already available on boards that you can plug into your computer. When you combine the so technologies present in internal modems with voice recognition, the basics for having your computer replace your phone-voice line are in place.

Voice recognition is another technology that may appear limited in its present form, but it shows great promise for the future. Current voice-recognition systems can handle speaker-dependent continuous speech or speaker-independent discrete speech. Speaking to your computer will be a major factor in the office of the future. In some locations, it is already a major factor in the office of today. Stock is traded in some brokerage houses by verbal command from the broker to the computer. So, you ask your computer a question, and it answers you — verbally. Depending on the rate of speech sampling used and the resolution the A/D converter uses for each sample, we can already create a credible approximation of human speech with digitized sound.

Large display screens? You can get screens of up to 35 inches now, and between Barco and Mitsubishi competing for the honor of having the largest monitor, it's hard to predict just how big they will get in the future. As for color, some companies offer upwards of 16 million. Somewhere in that number must lie the perfect color for reducing eye-strain.

The real disaster that most of us still have to deal with is the traditional keyboard, which is the cause of much pain and suffering in the form of carpal tunnel syndrome and other repetitive-strain injuries. Wrist rests are available to alleviate the problem, and new designs for strange-looking keyboards, Star Trek-style, are moving from the drawing board to the factory.

Enterprise networks are proliferating almost as fast as LANs did just a year or two ago. Public data networks are ripe for the dialing up and signing on. And the Internet already exists, with several of the research and educational facilities on its membership rolls.

Worldwide connectivity is already available in the enterprise networks of some major corporations (e.g. DEC's DECnet and IBM's Systems Network Architecture). Admittedly, these are proprietary networks, but they are living proof that the concept can and does work.

Vocabulary

doodle (1. 49) — meaningless drawing
brokerage houses (1. 102) — companies that buy and sell shares for clients
carpal tunnel syndrome (1. 135) — chronic wrist-strain caused by repetitive movement, such as typing
Task 3

Using the table below, make a summary of the main points of the article in note form.

<table>
<thead>
<tr>
<th>Item</th>
<th>Current/potential use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Task 4

Each of the following sentences from the text is followed by two paraphrases. Decide which paraphrase (a or b) is closer in meaning to the original comment. Remember to look at the comments in their original context.

1 Pen-based computing is coming into its own. (line 38)
   a Pen-based computing is receiving the recognition it merits.
   b Pen-based computing is good for tasks where a conventional pen would normally be used.

2 ...you can't go to an industry show these days without finding some company promoting its 'small footprint'. (line 67)
   a At every exhibition these days, you will find at least one company advertising its own miniature computer.
   b It is impossible to get invited to a computer show these days unless you have a contact in a company manufacturing miniature computers.
3 Current voice-recognition systems can handle speaker-dependent continuous speech or speaker-independent discrete speech. (line 91)
   a Some of today's voice-recognition systems are set up to recognize continuous speech from certain people, while others can recognize specific words from anyone.
   b All of today's voice-recognition systems are set up to recognize either continuous speech from certain people or specific words from anyone.

4 Public data networks are ripe for the dialling up and signing on. (line 147)
   a There are public data networks waiting to be used.
   b Public data networks are now sufficiently developed to be used.

Task 5
1 Do you think the English in the text is:
   a very formal?
   b quite formal?
   c neutral?
   d quite informal?
   e very informal?

2 Do you think this article originally appeared in:
   a a computer magazine?
   b a general magazine for young people?
   c a general magazine for adults?
   d an online bulletin board?
   e the science page of a newspaper?

3 Do you think this article is written by:
   a a British person
   b an Australian
   c an American
   d a non-native speaker of English

   Give reasons for your choices.

Task 6
Using the line reference given, look back in the text and find the reference for the words in italics.
1 while others encase (line 7)
2 The other half is a bit more difficult (line 23)
3 but it can be (line 24)
4 but it would know (line 48)
5 in its present form (line 88)
6 it is already a major factor (line 99)
7 which is the cause (line 133)
8 on its membership (line 153)

Task 7
Using the line references given, look back in the text and find words with a similar meaning to:
1 whole (lines 5-10)
2 usually (lines 30-35)
3 acceptable (lines 45-50)
4 seem (lines 85-90)
5 believable (lines 110-115)
6 decreasing (lines 125-130)
7 spreading (lines 140-145)
8 ready (lines 145-150)
Now find words or phrases that mean the opposite of:

9 danger (lines 1-5)
10 destroy (lines 55-60)
11 rare (lines 55-60)
12 separate (lines 75-80)
13 minor (lines 95-100)
14 less than (lines 120-125)
15 enjoyment (lines 130-135)
16 aggravate (lines 135-140)

Task 8

Choose the correct word to complete each sentence. You may have to change some words slightly.

1 consider, considered, consideration, considerable, considerably
   a We'll have to using another company if they can't provide the software we need.
   b The company has invested a sum of money in ergonomic workstations.
   c The CEO has submitted this proposal for your
d  This computer is faster than the old one.

2 apply, applying, applicant, application, applicable
   a We have interviewed five for the new position.
   b The last part of the form is not to foreign students.
   c My student is thinking of for a government grant to continue his research.
   d The new book uses business to teach computer studies.

3 explain, explained, explaining, explanation, explanatory
   a The package includes an booklet.
   b The instructions are very clear and do not require any further
   c It will only take a couple of minutes to how the program works.
   d If you are new to this system, almost everything will have to be

4 depend, depending, dependent, dependence, dependable, dependably
   a The company has supplied us for over ten years.
   b We have to reduce our on imported goods.
   c This is very equipment. We have never had a serious breakdown.
   d Today, many companies more on FAXes than on mail.
a is an important concept in global communications.

b He only got that contract because he has in the government.

c Make sure the is not loose before you call a service technician.

d Once the new telephone lines are , our system should be more efficient.

'I know they said they were going to introduce new technology, but this isn’t quite what I expected.'

**Listening**

**Task 9**

Listen to this conversation in which Charles, the Information Services Manager in an American insurance company, talks about the steps involved in making a document available to users via document image-processing. Put the steps in the right order.

1. Index is stored.
    Quality of scan is checked.

3. Envelope is opened by a machine.

4. Temporary key number is generated and written on the document.

5. IMS index transaction and customer name is entered into the computer.

6. Mail arrives in the mailroom.

7. Temporary document number is entered into the computer to link it with the previously-generated index.

8. Document is scanned.

9. Document pages are removed and arranged by a clerk.

10. Document can be accessed by users.

11. Computer supplies routing and indexing data.

12. Document pages are transferred to the mail analyst.
Task 10

Now listen again and answer the following questions:

1. How long does it take:
   a. for an index to be stored and a key number issued?
   b. for a recent document to be retrieved?

2. Why does it take longer to retrieve a document processed more than a year ago?

3. Note down:
   a. the number of square feet of office space saved.
   b. the number of employees freed from file maintenance.
   c. the approximate net saving per year in pounds.

Speaking

Task 11

We have looked at some of the benefits of replacing people with computers in the office. What are the negative aspects of this policy?

Writing

Task 12

Write two paragraphs, one listing the benefits, the other listing the negative aspects of replacing people with computers.

Information systems

Reading

Task 13

Before reading the text, try to decide which of the following definitions best describes a management information system:

a. a system for supplying information to management
b. a system for managing information
c. a system which supplies information about management

Task 14

Decide whether these statements are true (T) or false (F), then read the passage to check your answers.

1. T/F All businesses are interested in more or less the same information, regardless of the nature of their operations.

2. F The managing director of a company needs a lot more detailed information about the day-to-day operations than his executives do.

3. F Functional management require up-to-the-minute information so that they can take action to control events as they happen.

4. F Information systems are usually computerized.

5. F Transaction processing systems are usually the first systems to be installed.
**Information systems**

The objective of information systems is to provide information to all levels of management at the most relevant time, at an acceptable level of accuracy, and at an economical cost.

Individual businesses require information according to the nature of their operations. A car manufacturer is particularly interested in the extent of competition from overseas manufacturers in the home market and competition from other home-based manufacturers. A tour operator is concerned about purchasing power and its effect on holiday bookings and the political situation prevailing in the various countries.

As a general guide, the detail contained in reports containing information varies according to the position of the recipient in the hierarchical management structure. The chairman and managing director of a company require details of operations which are broad in scope and which concentrate on key factors pinpointing economic and financial trends.

Functional management require information relating to the departments they are responsible for in sufficient detail to enable them to apply whatever measures are required to bring situations into line with requirements. They require information relating to events as they occur so that appropriate action can be taken to control them.

Information systems are often computerized because of the need to respond quickly and flexibly to queries. At the bottom level in the information hierarchy are the transaction processing systems, which capture and process internal information, such as sales, production, and stock data. These produce the working documents of the business, such as invoices and statements. Typically, these are the first systems which a company will install. Above the transaction-level systems are the decision support systems. These take external information — market trends and other external financial data — and processed internal information, such as sales trends, to produce strategic plans, forecasts, and budgets. Often such systems are put together with PC spreadsheets and other unconnected tools. Management information systems lie at the top of the hierarchy of information needs. The MIS takes the plans and information from the transaction-level systems to monitor the performance of the business as a whole. This provides feedback to aid strategic planning, forecasting, and/or budgeting, which in turn affects what happens at the transactional level.

**Task 15**

Draw a diagram to show how information is processed by information systems, as described in the last paragraph. Your diagram should show the hierarchy of systems and should include examples of the kind of information involved at each stage in the process. Use arrows (—-) to indicate the flow of information.

**Writing**

Using your completed diagram from Task 15, write a paragraph explaining how information is processed by information systems. Do not look back at the text itself.
**Word-play**

**Task 17**

Complete the puzzle and find the key word in 10 down.

Across
1 The T of MIS. (11)
2 Another term for a VDU. (7)
3 See 8.
4 An A/D _____ changes analog signals into digital signals. (9)
5 The ‘D’ of VDU. (7)
6 The decision _____ systems combine information from outside and inside an organization to produce strategic plans and forecasts. (7)
7 Voice_____ systems permit people to talk to computers. (11)
8 and 3 ________ systems capture and process information generated within an organization (e.g. sales and production data). (11,10)
9 Converted from an analog to a digital signal. (9)

**Down**
10 The amount of deskspace (or floorspace) taken up by a computer. (9)
The passive

Passives are very common in technical writing where we are more interested in facts, processes, and events than in people. We form the passive by using the appropriate tenses of the verb *to be* followed by the past participle of the verb we are using.

Examples:

**Active**
1. *We sell computers.* (simple present)
2. *Babbage invented The Analytical Engine.* (simple past)

**Passive**
1. *Computers are sold.* (simple present)
2. *The Analytical Engine* was invented in 1830. (simple past)

**Facts and processes**

When we write or talk about facts or processes that occur regularly, we use the present passive.

Examples:

1. *Data is transferred from the internal memory to the arithmetic-logical unit along channels known as buses.*
2. *The other users are automatically denied access to that record.*
3. *Distributed systems are built using networked computers.*

Read the text below, which describes the insurance company's procedure for dealing with PC-users' problems. Fill in the gaps using the correct form of the verb in brackets.

All calls 1 ______________________ (register) by the Help Desk staff. Each call 2 ______________________ (evaluate) and then 3 ______________________ (allocate) to the relevant support group. If a visit 4 ______________________ (require), the user 5 ______________________ (contact) by telephone, and an appointment 6 ______________________ (arrange). Most calls 7 ______________________ (deal with) within one working day. In the event of a major problem requiring the removal of a user's PC, a replacement can usually 8 ______________________ (supply).
Exercise 2 Fill in the gaps in the following sentences using the appropriate form of the verb in brackets.

1. The part of the processor which controls data transfers between the various input and output devices (call) the control unit.

2. The address bus (use) to send address details between the memory and the address register.

3. The pixel positions (pass on) to the computer's pattern recognition software.

4. An operating system (store) on disk.

5. Instructions written in a high-level language (transform) into machine code.

6. In the star configuration, all processing and control functions (perform) by the central computer.

7. When a document arrives in the mail room, the envelope (open) by a machine.

8. Once the index (generate) and (write) on the document.

Events

When we write or talk about past events, we use the past passive. Let us look at some examples.

Examples:

1. COBOL was first introduced in 1959.
2. Microsoft was founded on the basis of the development of MS/DOS.
3. The organization was created to promote the use of computers in education.

Exercise 3 Fill in the gaps in the following sentences using the appropriate form of the verb in brackets.

1. Microsoft (found) by Bill Gates.

2. C language (develop) in the 1970s.

3. During that period, enormous advances (make) in computer technology.

4. The following year, twice as many PCs (sell).
5 In the 1980s, at least 100,000 LANs (set up) in laboratories and offices around the world.

6 The first digital computer (build) by the University of Pennsylvania in 1946.

7 Last year, more software companies (launch) than ever before.

8 IBM's decision not to continue manufacturing mainframes (reverse) the year after it (take).
Computers in education

Start-up

Task 1
Make a list of the ways computers are used in education.

Speaking

Task 2
Discuss these questions:
1 How are computers used in your school?
2 What do you think the following terms mean?
   a further education
   b open learning
   c flexible learning

Reading

Task 3
Read quickly through the text opposite to find:
1 the overall purpose of NCET.
2 another expression meaning 'educational technology'.
3 whether NCET produces learning materials.
4 how many priorities NCET's Schooling Directorate has.
5 three groups of people helped by NCET's Vocational Training programme.
6 three examples of new and developing technologies that the Council gives advice about.
National Council for Educational Technology

The Council's purpose is to bring beneficial change to the processes of learning in education and training through the development and application of educational technology.

Educational technology — or learning technology, as it is sometimes known — embraces everything from the way computers, satellites, and interactive video are used in schools, colleges, and industry to issues of copyright and flexible learning. Focusing on the learner, our purpose is to support change in the ways we learn by applying the benefits of educational technology — especially the new information technologies — to the process of learning.

We design and produce learning materials in all subjects to support education and training. We carry out research and manage projects, offer consultancy on technical matters, support training for trainers and teachers, and offer expertise in areas such as open and flexible learning, resource management, and educational software. We provide a comprehensive information and enquiry service.

Information Technology in schools

Through its I.T. in Schools Programme, NCET's Schooling Directorate is pursuing four priorities:

- to identify and promote and spread good practice in the use of new technologies
- to provide professional guidance to teacher trainers so that they can help teachers and schools in managing I.T. and in applying it to all areas of study
- to develop high-quality curriculum materials and encourage other publishers to do the same
- to give particular support for those concerned with children and young adults with special educational needs, including the handicapped.

Learning after school and at work

NCET's Training Directorate focuses on the needs of those wishing to learn after the school-leaving age. Projects under the Vocational Training programme include looking into the training needs of women, older workers, and those who use information technology to work from home. In further education, lecturers and senior managers are being helped to plan for I.T. and changing client needs. For industry, our work has included language training in the run-up to 1992, and the application of artificial intelligence systems to training. This directorate also takes the lead in important trans-sectoral issues such as open and flexible learning, copyright, and the use of computers in careers guidance.

Technical expertise

Keeping abreast of developments in technology and maintaining a national expertise on standards and specifications is the work of NCET's Technical Consultancy Directorate. Through links with other organizations, it identifies issues associated with the adoption of new technologies and, where appropriate, carries out projects to assess or develop their potential in education and training. It has a watching brief and provides consultancy on new and developing technologies such as satellites, CD-ROM, and interactive video. Current projects involve the examination of the use of educational software in schools, the use of massive storage systems, and the use of satellites in education and training. The Directorate also produces guidance to users on a wide range of technology, from desk-top publishing and remote sensing to teleconferencing and audio-visual systems.
Imagine that you represent NCET and that a newspaper reporter is interviewing you. Use the information in the text to complete the dialogue in your own words.

**Reporter** What exactly does the term 'educational technology' cover?

**You**

**Reporter** I see. Apart from offering advice on technical matters, what other services do you provide?

**You**

**Reporter** Does the I.T. in Schools Programme help teachers as well as students?

**You** Yes.

**Reporter** What about those with special educational needs?

**You**

**Reporter** What responsibility does the NCET's Training Directorate have?

**You**

**Reporter** Does that include helping people in industry?

**You** Yes.

**Reporter** One last question. What kind of work is the Technical Consultancy Directorate doing in schools at the moment?

**You**

**Task 5**

Make a list of the 'new information technologies' mentioned in the text. Do you know what all the terms mean?

**Task 6**

Using the line references given, look back in the text and find words or phrases in the text which have a similar meaning to:

1. includes (lines 1-5)
2. advantages (lines 5-10)
3. covering everything (lines 10-15)
4. course (lines 20-25)
5. physically or mentally challenged (lines 25-30)
6. approach (lines 30-35)
7. up-to-date with (lines 35-40)
8. instructions to monitor (lines 40-45)

**Writing**

Translate the last paragraph of the text (beginning 'Keeping abreast of...') into your language.
Speaking

Task 8

You represent the National Council for Educational Technology. You have been asked to talk to a group of teachers about the work of the Council. Make brief notes from the text, then prepare a short presentation.

In pairs or small groups, take turns to make your presentation. If you are listening to a presentation, check that it is accurate and that it covers the main points mentioned in the text.

CALL

Listening

Task 9

Tony Longstone, an expert on educational technology, is answering questions from teachers about Computer Assisted Language Learning (CALL). Listen to the discussion and decide whether the following sentences are true (T) or false (F):

1 Most uses of computers in language education can be described as CALL.
2 There is no point in buying a computer for CALL, if there is no commercially available software for that computer or operating system.
3 The number of computers you buy will depend on two factors: the number of students there are, and the amount of physical space available.
4 It is possible to have CALL using only one computer.
5 The ideal way to organize CALL is to have one computer in each classroom.
6 The CALL resource should be free to students if possible.

Listen again. Change the sentences that are false to make them true.
Read this extract from the tapescript and try to fill in the missing words.

LONGSTONE: Well, given sufficient ________, it's a good idea to have some computers _________ for teachers in the teachers' room. Also, it's very useful to have a self-access _________ for use by students. In both cases, they — teachers and students — can gain a lot of confidence and ________ by having free access to the _________ . Finally, an excellent idea is to have one computer with a large screen functioning as an electronic _________ for messages prepared for students and staff. This should be located in a public part of the school or college, such as the hall or ________.

Now listen to the last part of the recording again and check your answers.

Discuss the following questions:
1 What do you think are CALL'S main advantages and disadvantages as a way of learning foreign languages?
2 Do you think it is possible that one day language teachers will be completely replaced by computers?

A teacher has been looking at some publicity material for the Adam & Eve program. Read the material and fill in the gaps in the teacher's notes opposite.

Choose your own texts v
ADAM & EVE allows you to create exercises based on any text you want. The text could be from the course-book you are using, from a reader, from a newspaper — whatever your students are interested in.

Analyse your texts v
ADAM & EVE will analyse the vocabulary of the text according to the database of word frequency contained within the software. From this analysis you get a precise idea of the level of difficulty of a text, you can compare one text with another text, and you can see whether it fits in with the syllabus your students are working to

Generate exercises v
ADAM & EVE will then create a wide variety of exercises based on this analysis. These exercises, which are easily and quickly generated, can be presented to your students either as printed worksheets — you will be provided with the answers on a separate sheet — or can be put on to a floppy disk so that a performance will be automatically evaluated and the score recorded.
Simple to use

No previous experience with computers is necessary. If you can type using a word processor (or know someone who can!) you will have no difficulty in putting your texts into the software. The whole program is 'menu driven' in any one of five languages so you will always know where you are and it will be obvious from the screen where you can go next. There is a full and clearly written manual to help you get started. Once you are familiar with the basic workings, don’t forget to go back to the manual to learn about the program’s finer points.

Something for the whole school ♦

Up to twenty-five different teachers can work with ADAM & EVE. The program will keep each teacher’s texts and the exercises generated on those texts in separate files which are only accessible using that teacher’s password.

Adam & Eve

1. You can create exercises from any text e.g.

2. You can _______ a text to assess its, _______ to _______ it to another text, or to determine its suitability for a given _______.

3. Exercises can be easily ________, and can be presented to students either as _______ or on _______.

4. No _______ of computers is needed. The program is _______ driven in any of _______ languages. The package comes with a comprehensive _______.

5. Up to _______ teachers can use the program. It can store all generated texts and exercises in separate _______. Each teacher has a personal _______ to _______ his or her files.
Task 13
Choose the correct word to complete each sentence. You may have to change some words slightly.

1. **create, created, creating, creation, creativity**
   a. The __________ of this database will give us a huge advantage over our competitors in the long run.
   b. The procedure for __________ a new file is very simple.
   c. The new position we are advertising is going to require someone with enormous

2. **generate, generated, generative, generation**
   a. Exercises can be quickly __________ using this program.
   b. Our company is working on a new __________ of software products.
   c. This development is sure to __________ great interest.

3. **access, accessed, accessible, accessibility**
   a. All user requests to __________ a database are handled by the database management system.
   b. __________ to the computer room is restricted to authorized personnel.
   c. Those files are not __________ unless you know the password.

4. **analyse, analysed, analysis, analyst**
   a. When a text is __________, all pronouns, prepositions, conjunctions, and verb forms are automatically identified.
   b. This __________ shows that most PC users are not aware of the full potential of the software products they buy.
   c. The DBMS first receives the request and __________ it for syntax errors.

Writing
Imagine you are in charge of language teaching in an institute. Write a short report to the principal recommending the introduction of CALL.

Organize your report as follows:
Paragraph 1 — explain what CALL is.
Paragraph 2 — describe the different options available (e.g. one computer per class; a special classroom with several networked PCs). Paragraph 3 — recommend one of the options you mentioned in paragraph 2.
**Word-play**

The clues below contain anagrams of words from this unit. Enter the words in the grid, then solve the anagram in the **bold** boxes to find the hidden word.

1. To connect to a database. (scaces)
2. A technology which allows telephone communication between several people at the same time. (ctoenlfeergnen)
3. Describing a device connected over a WAN. (emtore)
4. A large store of computerized data. (aaaestdb)
5. Examine carefully. (easnaly)
6. Concerning the qualifications, *etc.* needed for a trade or profession. (lvaoncoait)
7. Describing a system in which the computer responds to the user's instructions. (vercaitneit)
8. A VDU and keyboard. (lnmrteia)
9. A program that manipulates tables of figures. (steerpandse)

**Hidden word clue**
Device used for relaying telephone messages or radio and TV signals. (9)
Language focus I

Giving examples

When the main aim of a text is to inform the reader about a subject, the writer will often use examples, either to explain a point or to illustrate an idea or argument. When giving examples, it is important to differentiate between the idea itself and the illustration of the idea.

Some expressions for introducing examples are shown in the table below.

<table>
<thead>
<tr>
<th>Examples of</th>
<th>Shown by</th>
</tr>
</thead>
<tbody>
<tr>
<td>for example (e.g.)</td>
<td>exemplifies</td>
</tr>
<tr>
<td>for instance</td>
<td>shows</td>
</tr>
<tr>
<td>an example (of this)</td>
<td>illustrates</td>
</tr>
<tr>
<td>as an example</td>
<td>a second/third example,</td>
</tr>
<tr>
<td>such as</td>
<td>etc.</td>
</tr>
<tr>
<td>like</td>
<td></td>
</tr>
<tr>
<td>including</td>
<td></td>
</tr>
</tbody>
</table>

Examples:

1. Office workers use many computer applications such as word processing, spreadsheets, and databases.
2. Computers have made radical changes in preparing income tax returns. For example, in some countries you can now send your income tax return on disk.
3. Students can make good use of computer technology at school. Essay writing, for instance, can be done using a word-processing program.

Note: Sometimes the markers follow the example, separated by commas, as in 3 above.

Exercise 1

The list below is made up of five groups of words, consisting of five main categories and examples of each category. Find the word groups and then write sentences to show the relationship between the groups of words. Use a different marker for each sentence. One has been done for you.

Example:

Ring, bus, and star are all examples of network configurations.
Exercise 2
Read the following sentences. Circle the marker and underline the main idea for which the example is given. The first one has been done for you.
1 Networks also allow users in one locality to share expensive resources, such as printers and disk-systems. (Unit 6)
2 There are a handful of clipboard computers now on the market, including GRIDPad, which is sold in the US; (Unit 2)
3 The PC passes the query, written in a special language (e.g. Structured Query Language — SOL), to the mainframe, which then parses the query, returning to the user only the data requested. (Unit 6)
4 Here's an example of a simple virus, the Lehigh virus. (Unit 7)
5 If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC's drives without a write-protect tab. (Unit 7)

Exercise 3
Not all texts present examples explicitly. In some cases, markers are not used. Read the paragraph below. Circle the main idea and underline the examples of that idea.

The widespread availability of computers has in all probability changed the world for ever. The microchip technology which made the PC possible has put chips not only into computers, but also into washing-machines and cars. Some books may never be published in paper form, but may only be made available as part of public databases. Networks of computers are already being used to make information available on a world-wide scale. (Unit 1)
Computers in medicine

Start-up

Task 1
Make a list of all the applications of computers you can think of which are related to medicine and patient care.

Reading

Task 2
Before reading the text opposite, try to answer the following questions:

1. The cards below contain a message. What do you think it is?
2. Why do you think the message was given in this form?
3. How could a computer help to convey messages like this?
EILEEN CARLETON has a whimsical talent for hand signals. When the 65-year-old stroke victim draws a vertical line in the air, her family knows she is referring to a very slim friend of her son.

But a lexicon of hand gestures — no matter how inventive — and the few dozen words left in Carleton's vocabulary following her stroke are inadequate for conveying even the most basic wishes, observations, or questions to her family. Through a pilot study at the School of Medicine, however, Carleton has learned to communicate using a specially designed computer program that has restored not only her ability to express herself, but also, family members and therapists say, her enthusiasm for life.

The stroke that Carleton suffered in 1985 damaged the portion of her brain where words and speech are processed, leaving her with a condition known as aphasia, or the inability to use language. While she is able to comprehend much of what people say to her, she cannot formulate her thoughts into coherent phrases or sentences.

Using the computer program, she can select from hundreds of pictures that represent people, objects, actions, and descriptive qualities and arrange them in sequence to communicate thought, obviating the need to use words.

‘When Eileen first entered the study, she depended on her husband Steve to figure out what she wanted to say from her gestures and facial expressions. All she could say was, "Come on! You know!",’ said Dr Cheryl Goodenough Trepagnier, associate professor of rehabilitation medicine.

The computer program used in the Tufts study was developed in conjunction with the Palo Alto, California, Veterans Administration Medical Center and grew out of research in the 1970s at the Boston Veterans Administration Hospital.

Researchers had found that chimpanzees, whose brains lack specialized language centers, could engage in a kind of communication using plastic tokens that represented different objects and actions, Dr Trepagnier said. ‘We wondered whether aphasics — whose language processing areas are damaged — could benefit from the same idea.’

On small cards, researchers drew symbols representing different people, objects, and actions and trained aphasic patients to select and arrange the cards to form statements or questions. By selecting cards showing a woman, a person walking, a store, and a chicken, for example, an aphasic patient could ask his wife to go to the grocery store to buy some poultry.

‘Some patients become quite adept at using the cards,’ Dr Trepagnier said. ‘But as the number of cards increased, it became awkward and time-consuming to find the right cards and then put them back in the right order. Patients found the cards too cumbersome and didn’t use them at home.’

In the mid-1980s, however, a computer program was developed that, like the cards, used pictures to represent ideas, but was easier to use. With the program, aphasic patients could select from hundreds of pictures simply by moving a computer mouse. Dr Trepagnier was 100 among the first researchers to test the new software on aphasics.

‘At first, there was a great deal of doubt over whether aphasics would be able to use computer,’ Dr Trepagnier said. ‘But we found that many took to the computer quite easily. As they became more proficient on the computer, some showed gains.'
It's hardly an exaggeration to say that the program transformed Carleton’s life. In the aftermath of her stroke, Carleton ‘was so despondent she sat on the couch all day and did nothing,’ said her speech therapist, Evelyn Chedekel. But as soon as she learned that she’s capable of communicating with the computer, her whole world changed. Now she can introduce topics, rather than hoping that people will guess what’s on her mind. When her husband passed away suddenly, she was able to carry on.’

Encouraged by the results thus far, Dr Trepagnier will study ways of expanding the computer program’s capabilities. For unknown reasons, many aphasics have more trouble conceptualizing verbs than nouns. Making the intellectual connection between a picture of a sailboat and the idea of a sailboat is easier than connecting a picture of a boy running to the idea of running. Trepagnier hopes to overcome this difficulty by designing a program that enables patients to see computer images in motion. III

**Vocabulary**

- whimsical (1. 2) — fanciful, highly imaginative
- lexicon (1. 7) — vocabulary
- dozen (1. 9) — about twelve
- stroke (1. 10) — sudden attack of illness in the brain, causing loss of speech and movement
- took to (1. 107) — developed an ability with
- passed away (1. 126) — died

**Task 3**

Decide which of these titles best sums up the content of the text.

1 A new way to communicate for stroke victims
2 Stroke victims: computers that care
3 New technology comes to the rescue of stroke victims

**Task 4**

Read this summary of the text and fill in each gap with an appropriate word.

Eileen Carleton’s life has been completely transformed by Dr Trepagnier’s computer program. Whereas she used to be entirely on her husband to deduce what she wanted to say, now she is able to her own ideas. Before, she had to hope other people would what she was thinking. Now she is of starting a conversation with others.

Dr Trepagnier’s program was from research on symbolic communication by chimpanzees, which specialized language areas in their brains. As these language-processing areas are also known to be in human aphasics, the same idea of using visual symbols to represent different people, objects, and actions was thought likely to be effective.
Using cards to show these symbols proved for most patients, but the introduction of computer technology has greatly the use of the system by aphasics, whose lives have been immeasurably since the invention of this program.

**Task 5**

Each of the following sentences from the text is followed by two paraphrases. Decide which paraphrase (a or b) is closer in meaning to the original comment. Remember to look at the comments in their original context.

1 But a lexicon of hand gestures — no matter how inventive — and the few dozen words left in Carleton’s vocabulary following her stroke are inadequate for conveying even the most basic wishes, observations, or questions to her family. (line 7)
   a Eileen Carleton’s hand gestures and words are not clear enough to allow her thoughts to be understood.
   b Eileen Carleton does not have enough hand signals and words to express her thoughts.

2 While she is able to comprehend much of what people say to her, she cannot formulate her thoughts into coherent phrases or sentences. (line 27)
   a Eileen understands quite a lot of what people are saying to her and knows what she wants to say. However, she cannot translate her thoughts into understandable messages.
   b Eileen finds it difficult to choose the right words and sentences to express herself while she is concentrating on what people are saying to her.

3 As they became more proficient on the computer, some showed gains in their overall self-confidence, as well. (line 108)
   a Some people found that their growing confidence about using the computer made them generally more self-confident.
   b The more people used their computer, the more self-confident they became.

4 It's hardly an exaggeration to say that the program transformed Carleton's life. (line 113)
   a The program changed Carleton's life in some respects.
   b The program completely changed Carleton's life.

**Task 6**

Match each word in the list on the left with the appropriate synonym on the right.

1 inventive (line 8)  
2 inadequate (line 11)  
3 select (line 33)  
4 obviating (line 37)  
5 figure out (line 41)  
6 engage in (line 59)  
7 cumbersome (line 89)  
8 proficient (line 109)  
9 transformed (line 114)  
10 despondent (line 117)  

a deduce  
b awkward  
c take part in  
d depressed  
e insufficient  
f completely changed  
g skilled  
h creative  
i choose  
j removing
Task 7

Translate paragraph 6 (beginning 'The computer program used in the Tufts study...') into your own language.

Reading

Work in pairs, A and B. Student A should read text 1 only. Student B should read text 2 only. Without looking at the text you have read, tell your partner about it. Write down what your partner tells you about his/her text, then compare it with the original. How accurate is it?

1 Robot eye for surgery

Laparoscopy is a procedure in which a camera is pushed through a small hole in the abdominal wall. It allows a surgeon to operate by television, with instruments inserted through a second hole. The small size of the incisions reduces the trauma for patients and speeds up recovery. Until recently, the procedure has required the presence of a second doctor to guide the camera for the surgeon.

A new development now facilitates this procedure. A robot manoeuvres the camera in response to the surgeon's head. Four tiny transmitters, worn on a headband, send radio signals to a base unit. As the surgeon moves his head left or right, up or down, forwards or backwards, the robot causes the camera to track his movements, enabling him to view the exact area he wishes to see.

2 Robot surgery for eye

Techniques derived from virtual reality will soon allow surgeons to feel as well as see the inside of the eye during an operation. During the operation, the surgeon manipulates a set of controls known as the master. These are connected through high-performance computer to the robot. The robot's limbs move in exactly the same way, except that the movements can be scaled down as much as a thousand times, thus eliminating hand tremor and reducing damage to the eye.

The computer also creates a three-dimensional view of the inside of the eye, which the surgeon can see wearing a virtual reality helmet and 'feel' via a sensory feedback system which emulates the forces generated by cutting with a surgical tool.
Data storage and management

Listening

Task 9

Listen to this extract from a programme called Science Made Simple, in which a hospital administrator answers questions about the hospital database. As you listen, choose the correct answer for each question.

1 How many characters of stored information are generated each year by the database at Grovemount Hospital?
   a More than 500,000.
   b More than 50,000,000.
   c More than 500,000,000.
   d More than 500,000,000,000.

2 How is the database organized?
   a Like all other databases.
   b Like any hospital database.
   c Differently from any other database.

3 How is information on patients stored?
   a Each patient has a named file.
   b Each patient has a record.
   c Each patient has a number of records within a personal file.

4 What do fixed-format records contain?
   a Types of data that cannot be changed.
   b Text only.
   c Different types of data stored separately.

5 What happens when two people try to access the same data at the same time?
   a The database management system cancels both queries.
   b One user has to wait until the other has finished.
   c The Database Manager processes both queries at the same time and updates the database accordingly.
Read this extract from the tapescript and fill in each gap with an appropriate word.

INTERVIEWER: I see. Now, can you tell us what happens when the database is

ALEX COLLINS: Yes. Each

is called a transaction.

When a transaction enters the system for processing, the computer must

related data from the database. At the end of the processing,

the computer stores updated data to reflect the changes caused by the

INTERVIEWER: Could you give an example?

ALEX COLLINS: Yes, of course. Each time a patient is admitted to the hospital,

the database must be updated to show his or her details. This is obvious.

However, the database must also be updated to show that there is one less

bed. This will, in turn, affect summary data, such as bed

for the month, and so on.

INTERVIEWER: OK. But you have lots of different people accessing the database

at the same time, don’t you?

ALEX COLLINS: It’s a

system, yes.

INTERVIEWER: Right. But what happens if two people access the same data at

the same time?

ALEX COLLINS: It can’t happen. In that situation, the database management

system would access to one of the

only.

Now listen again to the cassette and compare your answers.

**Reading**

**Task 11**

Before reading the text opposite, match the following words with their definitions:

1 logical record  
2 field  
3 physical record  
4 internal schema  
5 external schema  
6 conceptual schema  
7 the collection of data transferred as a unit  
8 the user's permitted view of the data  
9 the logical design of the database  
10 an item of data such as a number, a name, or an address  
11 the way that the data is physically held  
12 the collection of data relating to one subject

**Task 12**

Before reading the text, try to answer these questions in pairs.

1 How many medical uses of a database can you think of?
2 What is a DBMS?
3 What is its function?
Database management systems

Databases are used within a medical context for many purposes. For example, they are used to hold patient details so they can be accessed from anywhere within a hospital or network of hospitals. With the recent improvements in image compression techniques, X-rays and scan output can also be held in databases and accessed in the same way.

These multi-user databases are managed by a piece of software called a database management system (DBMS). It is this which differentiates a database from an ordinary computer file. Between the physical database itself (i.e. the data as actually stored) and the users of the system is the DBMS. All requests for access to data from users — whether people at terminals or other programs running in batch — are handled by the DBMS.

One general function of the DBMS is the shielding of database users from machine code (in much the same way that COBOL shields programmers from machine code). In other words, the DBMS provides a view of the data that is elevated above the hardware level, and supports user-requests such as 'Get the PATIENT record for patient Smith', written in a higher-level language.

The DBMS also determines the amount and type of information that each user can access from a database. For example, a surgeon and a hospital administrator will require different views of a database.

When a user wishes to access a database, he makes an access request using a particular data-manipulation language understood by the DBMS. The DBMS receives the request, and checks it for syntax errors. The DBMS then inspects, in turn, the external schema, the conceptual schema, and the mapping between the conceptual schema and the internal schema. It then performs the necessary operations on the stored data.

In general, fields may be required from several logical tables of data held in the database. Each logical record occurrence may, in turn, require data from more than one physical record held in the actual database. The DBMS must retrieve each of the required physical records and construct the logical view of the data requested by the user. In this way, users are protected from having to know anything about the physical layout of the database, which may be altered, say, for performance reasons, without the users having their logical view of the data structures altered.

Task 13

The steps below show how a DBMS deals with an access request. Find the relevant section in the text, then put the steps in the correct order.

The DBMS:
1. inspects the mapping between the conceptual schema and internal schema
2. checks for syntax errors
3. inspects the external schema
4. receives the request
5. performs operations on the stored data
6. inspects the conceptual schema
Speaking

Task 14

The diagram below represents a simplified database. In pairs, use the diagram to explain to your partner the following:

Student A: what a DBMS is and how it works
Student B: how an access request is processed

Try not to refer to the text. Use your own words.

Word-play

Complete the puzzle and find the key word in 12 down.

Task 15
Across
1 and 11 The creation of an artificial environment in the memory of a computer in which the user can apparently exist. (7,7)
2 and 3 The user's permitted view of the data in a database. (8,6)
4 The opposite of 2. (8)
5 A surgical ___ is a tool used for carrying out operations. (10)
6 and 10 A technique for reducing the amount of space that a graphics image will use when stored in computer memory. (5,11)
7 A program must be converted into this before a computer will read and process it. (7,4)
8 Programs that run ______ do not involve any terminal or user interaction. (2-5)
9 Used to describe computer systems that allow access by more than one user simultaneously. (5-4)
10 See 6.
11 See 1.

Down
12 A device for sending a radio message. (11)
Explanations and definitions

Texts containing technical terminology frequently contain definitions and explanations. This is particularly the case if the text is aimed at non-experts or students of technical subjects, or if the purpose of the text is to inform specialists about new developments.

1 Common words and expressions used in definitions or explanations are listed below.

<table>
<thead>
<tr>
<th>is/are</th>
<th>by ... we mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>means</td>
<td>by ... is meant</td>
</tr>
<tr>
<td>is taken to be</td>
<td>in other words</td>
</tr>
<tr>
<td>denotes</td>
<td>that is (to say)</td>
</tr>
<tr>
<td>is/can be defined as</td>
<td></td>
</tr>
</tbody>
</table>

Examples:

1 A computer is an electronic device.
2 Printers are output devices.
3 The term computer refers to the processor plus the internal memory.
4 A microchip can be defined as a tiny piece of silicon or similar material carrying an integrated circuit.
5 By peripherals we mean those devices attached to the computer.

2 Some definitions and explanations give further distinguishing characteristics by means of a defining relative clause.

Examples:

1 A computer is an electronic device which/that processes information.
2 Tapes and disks are memory devices which/that can be stored away for future use.
3 A programmer is a person who/that prepares programs to solve problems.
4 The arithmetic-logical unit is the part of the CPU where arithmetic and decision-making operations are done.

Note: The relative pronouns used in this type of definition or explanation will be who or that for people, when for a period of time, where for a place or location, and that or which for things.

3 Another way of defining or explaining is to use a noun, a noun phrase, or a clause separated from the rest of the sentence by commas or dashes.
Examples:
1 *Computers* — *electronic devices for processing information* — *are now used in practically every aspect of life.* (noun phrase)
2 *Turnkey systems,* *complete hardware/software products which are ready for use,* *are available from many suppliers.* (clause)

**Exercise 1**

Study the following definitions. A definition usually includes three parts: the term to be defined, the group it belongs to, and the characteristics which distinguish it from other members of the group.

<table>
<thead>
<tr>
<th>Term</th>
<th>Group</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A core</td>
<td>is a ferrite ring</td>
<td>which is capable of being either magnetized or demagnetized.</td>
</tr>
<tr>
<td>Silicon</td>
<td>is a non-metallic element</td>
<td>with semiconductor characteristics.</td>
</tr>
</tbody>
</table>

Now analyse the following definitions and identify the different parts:

- **a** by circling the term
- **b** by underlining the group once
- **c** by underlining the characteristics twice.

Example: A *computer* is a *machine with an intricate network of electronic circuits that operate switches or magnetize tiny metallic cores.*

1 Input is the information presented to the computer.
2 The term 'computer' includes those parts of hardware in which calculations and other data manipulations are performed, and the high-speed interval memory in which data and calculations are stored during actual executions of programs.
3 A 'system' is a mixture of integrated parts working together to form a useful whole.
4 Large computer systems, or mainframes, as they are referred to in the field of computer science, are those computer systems found in computer installations processing immense amounts of data.

**Exercise 2**

Now read the following sentences, which have all appeared in previous units, and analyse them in the same way as you did in Exercise 1.

1 The part of the processor which controls data transfers between the various input and output devices is called the control unit. (Unit 1)
2 A *modem* is a device which serves a dual purpose because it acts as a MOdulator (digital to analog) and a DEModulator (analog to digital) ... (Unit 3)
3 The compiler is a systems program which may be written in any language, but the compiler's operating system is a true systems program which controls the central processing unit (CPU), the input, the output, and the secondary memory devices. (Unit 4)
4 A *variable* is a quantity that is referred to by name, such as *a, b, c, d,* and *average* in the above program. (Unit 4)
6 ...a LAN is a localized network, usually in one building or in a group of buildings close together. (Unit 6)

7 A computer virus — an unwanted program that has entered your system without you knowing about it — has two parts, which I'll call the infector and the detonator. (Unit 7)

8 There are actually two kinds of antivirus programs: virus shields, which detect viruses as they are infecting your PC, and virus scanners, which detect viruses once they've infected you. (Unit 7)
Robotics

Start-up

Task 1

What function do you think each of these robots performs?
**Listening**

You are going to hear a recorded guide to an exhibition on robotics, which begins with a brief history of robotics. The table below summarizes the history, but the events are in the wrong order. As you listen, match each event with the correct year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1921</td>
<td>a 'Shakey': mobile robot at Stanford Research Institute</td>
</tr>
<tr>
<td>2 1954</td>
<td>b Perambulating vehicle: successful four-legged vehicle at Tokyo Institute of Technology</td>
</tr>
<tr>
<td>3 1967</td>
<td>c Czech playwright, Karel 'Capek, brings his play, RUR (Rossum's Universal Robots), to London</td>
</tr>
<tr>
<td>4 1967-9</td>
<td>d One-legged hopping machine at Carnegie-Mellon University</td>
</tr>
<tr>
<td>5 1980</td>
<td>e George Devol develops first programmable robot</td>
</tr>
<tr>
<td>6 1983</td>
<td>f Quadruped personnel carrier at General Electric</td>
</tr>
<tr>
<td>7 1984</td>
<td>g Odetics Inc. develop a six-legged robot</td>
</tr>
</tbody>
</table>

Listen again and decide whether the following statements are true (T) or false (F) in relation to the information in the recording. If you think a statement is false, change it to make it true.

1 I I The history of robotics begins only in the twentieth century.
2 I I In 'Capek's play, RUR, the robots become the masters and the humans become their servants.
3 I I Today's industrial robots developed out of the work done by George Devol.
4 I I 'Shakey' used bump detectors, a sonar range finder, and a video camera to avoid obstacles and move freely.
5 I I 'Shakey' had a built-in computer which controlled all of its movements.
6 I I The success of GEC's four-legged machine depended on the skill of its driver.
7 I I The robot developed at the Tokyo Institute of Technology functioned completely automatically, with no human control.
8 I I Odetics Inc.'s 'Odex I' model did not need to be connected to a separate power-source.

**Reading**

Some jobs are suitable for robots, while some must be done by people. Make two lists in the table below.

<table>
<thead>
<tr>
<th>Types of jobs suitable for robots</th>
<th>Types of jobs done by humans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The robotics revolution

Many of the robots in use today do jobs that are especially difficult for human workers. These are the types of jobs that require great strength or pose danger. For example, robots are particularly useful in the auto-manufacturing industry where parts of automobiles must be welded together. A welding tool used by a human worker weighs about 100 pounds or more and is difficult to handle. As mechanical supermen, robots may be called upon to do anything from moving heavy components between workstations on a factory floor to carrying bags of cement.

Spray painting is another task suited to robots because robots do not need to breathe. Unlike human painters, they are unaffected by the poisonous fumes. Robots are better at this task, not because they are faster or cheaper than humans, but because they work in a place where humans cannot.

Third in the list of useful jobs for robots is the assembly of electronic parts. Robots shine at installing chips in printed circuit boards because of a capability that robots have that people don't. A robot, once properly programmed, will not put a chip in the wrong place. This automatic accuracy is particularly valuable in this kind of industry because locating and fixing mistakes is costly.

Earlier robots were usually blind and deaf but newer types of robots are fitted with video cameras and other sensing devices that can detect heat, texture, size, and sound. These robots are used in space projects, nuclear reactor stations, and underwater exploration research.

In their efforts to expand the range of robotic applications, researchers are looking beyond traditional designs to examine a variety of potential models from the biological world. The industrial arm is a classic example. Scientists have been able to model robots to imitate the vertebrate spine of a snake in order to paint the interior of automobiles. They have also simulated the muscle structure and movement of an elephant's trunk in an attempt to create a robotic arm capable of lifting heavy objects. Scientists have also emulated the flexibility of an octopus where the tentacles can conform to the fragile objects of any shape and hold them with uniform, gentle pressure. A variation of this design can be used to handle animals, turn hospital patients in their beds, or lift a small child.

The challenge of equipping robots with the skills to operate independently, outside of a factory or laboratory, has taxed the ingenuity and creativity of academic, military, and industrial scientists for years. Simply put, robot hands — like robot legs, or eyes, or reasoning powers — have a long way to go before they can approach what biological evolution has achieved over the course of hundreds of millions of years. Much more will have to happen in laboratories around the world before robots can be compared to nature's handiwork.

In the meantime, the robotics revolution is already beginning to change the kind of work that people do. The boring and dangerous jobs are now assumed by robots. By the turn of the century, more and more humans will be required for tasks that machines cannot do. There are some industrialists who hope that by the year 2000 all their employees will be knowledge workers, no longer standing on assembly lines but rather sitting at desks and computer terminals to deal with information. These changes are already under way, and their pace accelerates every year.

Vocabulary
welded (1.9) — (of pieces of metal) joined together by heating
shine at (1.30) — do very well at
octopus (1.66) — sea-animal with eight arms (tentacles)
has taxed (1.77) — has made heavy demands on
Task 5
Summarize the reasons that certain jobs and environments are suitable for robots by completing the table below.

<table>
<thead>
<tr>
<th>Job or environment</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welding</td>
<td></td>
</tr>
<tr>
<td>Carrying components, etc.</td>
<td></td>
</tr>
<tr>
<td>Spray painting</td>
<td></td>
</tr>
<tr>
<td>Assembling components</td>
<td></td>
</tr>
<tr>
<td>In nuclear reactors, underwater, etc.</td>
<td></td>
</tr>
</tbody>
</table>

Task 6
These are answers to questions about the text. Write the questions.

1. About 100 pounds.
2. Because locating and fixing mistakes is costly.
3. In space projects, for example.
4. They are examining the potential of certain biological models.
5. No, they cannot be compared yet.
6. They will be doing intellectual rather than manual work.

Task 7
Fill in this table with details of the animals mentioned in the text.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Aspect being emulated</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Task 8
Using the line references given, look back in the text and find words in the text which have a similar meaning to:

1. manipulate (lines 10-15)
2. correcting (lines 35-40)
3. expensive (lines 35-40)
4. increase (lines 45-50)
5. copy (lines 55-60)
6. reproduced artificially (lines 60-65)
7. easily damaged (lines 65-70)
8. gets faster (lines 105-110)
Writing

Task 9
Translate the sixth paragraph (beginning "The challenge of equipping robots...") into your own language.

Speaking

Task 10
Look carefully at the table below showing past, present, and future applications of robotic systems, then discuss the following questions:

1. Do you agree with the predictions made?
2. What are the implications for society if these predictions become reality?

Applications of robotic systems

<table>
<thead>
<tr>
<th>Domain</th>
<th>Pre-1990</th>
<th>1990s</th>
<th>Post-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(welding, etc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assembly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Mail handler</td>
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<td></td>
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<tr>
<td>Clerk</td>
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<tr>
<td>Cleaning</td>
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<td></td>
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<tr>
<td>Professional</td>
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<tr>
<td>Home</td>
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<tr>
<td>Tutor</td>
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<td></td>
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<tr>
<td>Housekeeper</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Companion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic pilot</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scout</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soldier</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explorer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constructor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stationary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observer (on Mars)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rover (on Mars)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laborer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(space station &amp; moon)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Laboratory prototypes
= First commercial applications
= Widespread commercial applications
Classification of types of robot

One way of classifying robots is in terms of their similarity to humans. An automaton is any machine capable of operating independently, such as a clothes dryer. A flexible machine is a special case of an automaton with different capabilities, that can be programmed as the need arises. An example is a welding robot on the factory floor that can be programmed to participate in other production operations. A mobile robot is a flexible machine capable of moving freely in its own environment. It can partly select its own goals and communicates with other agents, including humans. An android or humanoid is a mobile robot whose structure approximately resembles a human structure. Finally, a cyborg is a humanoid with organic structures. Cyborgs have some physiological structures similar to those of humans.

Co-ordination of control in robots

The diagram shows a system for the force required to an object. The desired level of force is fed into the control module, which it with the actual amount of force as indicated by the feedback signal. The discrepancy enters the command generator, which
determines the and extent of adjustment necessary. The resulting command passes into an amplifier which produces power to the level of the input signal. The power drives a motor to some linkage such as a set of gears. The mechanical linkage in the robotic hand ultimately the initial command signal into displacement at the fingertips.

Speaking

**Task 13**

In pairs, design a simple robotic wrist and hand. Your device should have the three degrees of rotational freedom illustrated below and should be capable of grasping objects. Describe your invention to another pair.

Writing

**Task 14**

Label the parts of your robotic wrist with letters or numbers, then write a paragraph explaining how it works.
### Word-play

Look at the lists and circle the word that is different from the others. Then explain why. The first one has been done for you.

<table>
<thead>
<tr>
<th></th>
<th>mouse</th>
<th>keyboard</th>
<th>printer</th>
<th>OCR scanner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*A printer is an output device.*

|   | palmtop | notebook | clipboard | briefcase | laptop |
|---|---------|----------|-----------|-----------|
| 2 |         |          |           |           |        |

<table>
<thead>
<tr>
<th></th>
<th>accumulator</th>
<th>register</th>
<th>address</th>
<th>bus</th>
<th>monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>drive</th>
<th>floppy</th>
<th>hard</th>
<th>compact</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>FORTRAN</th>
<th>COBOL</th>
<th>PASCAL</th>
<th>ASSEMBLER</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ring</th>
<th>loop</th>
<th>bus switched</th>
<th>star</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>cyborg</th>
<th>automaton</th>
<th>sentry</th>
<th>android</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>virtual</th>
<th>internal</th>
<th>external</th>
<th>conceptual</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Language focus K

Compound nouns

The language of computing in English contains an ever-increasing number of compound nouns, that is, a group of two or more nouns which act as a single noun.
Examples:

- memory capacity
- information systems
- an address bus
- a bar code scanner
- an arithmetic unit

It is important to be able to recognize how such compounds are formed in order to understand what they mean.

The exact relationship between the words depends on the particular expression, but all these expressions have one thing in common: the last word in the chain says what the thing is, while the preceding word or group of words describes the thing. So when we read compound nouns, we have to start with the last word and work backwards.

Examples:

- An address bus is a bus dedicated to address information.
- The memory capacity of a computer is the capacity of its memory.

A large number of possible meanings can be expressed by compound nouns. For instance, the first noun or group of nouns can tell us what the second noun is made of, what it is for, or what it is part of.

1 Material: the first noun tells us what the second consists of.

Examples:

- a silicon chip (a chip made of silicon)
- a ferrite ring (a ring made of ferrite)

2 Function: the first noun tells us what the second noun is for.

Examples:

- an address bus (a bus dedicated to address information)
- an input device (a device for inputting)
- an arithmetic unit (a unit which performs arithmetic functions)

3 Part: the second noun refers to a part of the first noun.

Examples:

- a computer keyboard (the keyboard of a computer)
- a monitor screen (the screen of a monitor)
- a program feature (a feature of a program)
4 Activity or person: the second noun refers to an activity or person related to the first noun.

Examples:
- computer programming (the programming of computers)
- a computer programmer (a person who programs computers)
- systems analysis (the analysis of organizational systems)
- a systems analyst (a person who analyses organizational systems)

5 Multiple nouns: sometimes a compound noun will join together with one or more other nouns to give an expression that has three or four words. In such cases, it is important to examine the expression very carefully to break it into its constituent parts. The secret, as always, is to read the expression from the back towards the front.

Example:
- a document-image-processing program (a program which processes images of documents)

Note: some expressions are written separately, while others are joined by hyphens. There are no clear rules for this. Sometimes you will see the same expression written in different ways in different texts.

Example:
- document-image-processing program
- document image-processing program
- document image processing program

However, it is important to be consistent within a single text.

Exercise 1

A device that scans bar codes is called a bar code scanner.

What name is given to:
1 a unit that gives a visual display of information on a screen?
2 a device that reads magnetic cards?
3 a device that plots graphs?
4 a device that prints using a laser as the light source?
5 a unit that holds magnetic disks?
6 a device that prints using a jet of ink?
7 the rate of transmission of data?
8 a package for making presentations using multimedia?
9 a program which processes data in batches?
10 the process for the conversion of disks for computers?

Exercise 2

Using the explanations in Exercise 1 as models, write short simple explanations of the following items:

1 an input device
2 an optical character reader
3 a graphics stylus
4 a document sorter
5 a fibre optics transmission system
6 a sequence control register
7 a liquid crystal display
8 network configuration information
9 a desktop document manager
10 a multimedia editing software package
Virtual reality

Start-up

Virtual reality is still seen as a toy by most people. Can you think of any potential applications of VR other than in computer games? Make a list.

Reading

Task 2

Read the text opposite. Note down any applications that are not in your list.
Fancy a fantasy spaceflight?

Make a wish and you can go anywhere. That is the reality for a new computer invention, Chris Partridge says,

Computers are about to take people to places they have never been able to visit before, including the surface of other planets. Such a trip will be an illusion, but one that comes closer to real life than anything on stage or screen. Artificial worlds are being built up in a computer memory so that people can walk through at will, look around, and even touch objects.

The system is called virtual reality, so called from the mathematical concept of an image that has the virtues of a real object without the substance.

Virtual reality systems are being developed throughout the world for a range of uses including enabling people to walk inside nuclear power stations, while controlling a robot that actually goes into an area in which no human could live, and conducting architects through a computer-generated building before it is constructed.

British scientists have a world lead in virtual reality, despite the fortunes being poured into research by Japanese and American companies, which see it as a technology for the next century.

In Britain, Robert Stone, of the National Advanced Robotics Research Centre at Manchester University, is developing systems that could put men on Mars without shooting them into space and could plunge divers under the North Sea without taking them out of the office.

The problem with guiding a robot by looking at a picture from a video camera mounted on it and twiddling the controls is that it is not a natural system, Mr Stone says. The operator spends all his time controlling the robot and none solving the problem. The time lag between seeing the image and sending a corrective control signal is another difficulty.

A virtual reality system consists of a helmet with a colour display in front of each eye, and wide-angle lenses to cover the entire field of view and give a stereoscopic effect. The helmet contains sensors, rather like electronic compasses, to record where it is pointing. A computer calculates what the wearer should be seeing in that direction and displays it on the screen.

In more advanced systems, the operator wears an electronic glove that detects exactly what the fingers are doing and transmits the information to the computer. If the user tries to pick something, the computer will make the object follow the hand to give the illusion of carrying it.

Pads in the latest type of gloves press into the insides of the fingers and palm when an object is encountered, to create the illusion of feeling it. Complete 'exoskeletons' covering the user and allowing the computer to simulate almost anything possible in real life are still in the laboratory.

A fire-fighter in a nuclear power plant, for example, would move through a computer model wearing an exoskeleton, while a robot would move through the real thing. The computer program will be derived from the data used to design the plant in the first place.

Mr Stone has developed a data glove with air pockets that are inflated to give a sensation of touch in collaboration with Airmuscle, the supplier of the pneumatic systems that made the Spitting Image puppets really spat.

The biggest initial market is likely to lie for a new generation of video games. W Industries, of Leicester, recently launched a virtual reality system for video 0 arcades. The system, called Virtuality, consists of a cockpit in which a player sits, wearing the helmet, a set of controls that can move a bobsleigh, a spaceship, or whatever the imagination of the games programmer can devise.

The helmet has a pair of liquid-crystal displays with wide-angle lenses giving a stereoscopic image, and a set of magnetic sensors to tell the computer what the helmet is looking at as it moves.

The first game is a fighter simulation. Another is based on a sequence in the film, Return of the Jedi, in which flying motorcycles race through a forest. The computer can link and control several helmets at once for a group game.

Ivo-Vocabulary

time lag (1. 52) — time delay
Spitting Image (1. 103) — satirical British TV programme, using computer-controlled animated puppets
bobsleigh (1. 114) — large vehicle, moving on strips of wood, for travelling fast over ice and snow
Task 3

Answer the following questions about the text:

1. Where does the term 'virtual reality' come from?
2. Which country leads the field in VR research?
3. Why are robots controlled via mounted video cameras less effective than the VR solution?
4. How does Robert Stone's system allow the user to 'feel' objects?
5. What application of VR is expected to be the commonest to start with.

Task 4

Using the line reference given, look back in the text and find the reference for the words in italics.

1. one that comes closer to real life (line 6)
2. which see it as a technology for the next century (line 33)
3. without taking them out of the office (line 43)
4. it is not a natural system (line 48)
5. to record where it is pointing (line 64)
6. and displays it on the screen (line 67)
7. to give the illusion of carrying it (line 77)
8. while a robot would move through the real thing (line 92)

Task 5

Using the line references given, look back in the text and find words or phrases meaning:

1. whenever and however they like (lines 10-15)
2. qualities (lines 15-20)
3. large amounts of money (lines 30-35)
4. immerse (lines 40-45)
5. twisting (lines 45-50)
6. small pockets filled with air (lines 75-80)
7. filled with air (lines 95-100)
8. released on to the market (lines 105-110)
9. imitate (lines 110-115)
10. war plane (lines 125-130)

Task 6

Choose the appropriate form of the word to fit the meaning of the sentence. Make sure you understand the different forms of the word and their meanings. Use your dictionary to find this information.

1. correct, correctly, correction, corrective, correctness
   a. If an error occurs, it is important to take action immediately.
   b. The 'spell check' facility checks the of your spelling
   c. The data was entered , so the result must be accurate.

2. detect, detection, detectable, detective
   a. There were traces of radiation in the water sample.
   b. The analyst could not any errors in the system.
   c. She tried to escape by disguising herself.

3. sense, sensor, sensation, sensitive
   a. An infra-red detects the presence of intruders in the building.
   b. The probe is to heat and light.
   c. The new system caused a when it was launched last month.
Writing

Task 7

These two paragraphs from the article contain similar information. Write one paragraph combining the information from them to give a short but complete description of the VR visual system.

A virtual reality system consists of a helmet with a colour display in front of each eye, and wide-angle lenses to cover the entire field of view and give a stereoscopic effect. The helmet contains sensors, rather like electronic compasses, to record where it is pointing. A computer calculates what the wearer should be seeing in that direction and displays it on the screen.

The helmet has a pair of liquid-crystal displays with wide-angle lenses giving a stereoscopic image, and a set of magnetic sensors to tell the computer what the helmet is looking at as it moves.

Speaking

Task 8

We asked a number of people to answer the following question:

Do you think the use of virtual reality in computer war games is going to affect young people's attitude to violence?

Here are some responses. Read them and decide which point of view (if any) most closely matches yours. Discuss your opinions.

Rita Harper

‘Yes, I do. I think anything which portrays violence as fun is going to alter young people's perception of violence in a very dangerous way. Violent crime amongst young people is increasing. I think manufacturers of computer war games must take some of the responsibility.’

Susan Clark

‘No, not really. Kids — particularly boys — have been playing with toy guns ever since guns were invented. Surely playing with toy guns in the real world is more dangerous than playing with imaginary guns in an imaginary world.’

Mark Watts

‘It's difficult to say. Some of my friends get very aggressive when they play computer war games. But I don't really know if it makes them more violent when they're doing other things. I play a VR jet fighter game, and I don't think it has made me more violent.’
Writing

Task 9
Write a paragraph giving your answer to the question asked in Task 8.

Listening

Task 10
Listen to this interview with Michael Emsley, one of the exhibitors at an exhibition of virtual reality at Olympia in London. As you listen, answer these questions about the interview.

1 Why do people expect far more from VR than it can give them?

2 How does Michael Emsley think VR should be seen?

3 Give two examples of the potential applications mentioned.

4 What problems will VR developers have if the technology does not produce results, according to Emsley?

5 How does the best VR system compare with human vision?

6 Why are there three electromagnetic coils in the headset?

7 How long does it take the computer to calculate each new position of the headset and update the display?

8 In order to make a 'reasonable' visual system, how powerful would the computer have to be?

Task 11
Read this extract from the tapescript and try to fill in the gaps. The first letter of each missing word is given.

INTERVIEWER: How is the d_________1 created?

MICHAEL EMSLEY: Most VR vision systems are h_________2 that block out everything except two l_________3 c_________4 d_________5 screens, one for each eye. Using a technique learnt from a_________6 i_________7 work on vision, the images on each screen are d_________8 and displaced, giving the illusion of a t_________9 d_________10 view.

INTERVIEWER: What happens when the person moves his head?

MICHAEL EMSLEY: The movements are detected by three e_________11 coils – one coil for movements u_________12 and d_________13, one for l_________14 and r_________15, and one for movements f_________16 and b_________17. This information is d_________18 and passed to the computer, which then u_________19 the data it holds on the position of the headset. Once the new position of the headset has been c_________20, the visual display is updated.

INTERVIEWER: It sounds like a long p_________21.

Now listen again to the cassette and check your answers.
VR input devices

Reading

Read quickly through the text below. Does the text contradict in any way what you already know about VR systems? If so, what is the contradiction and how can it be explained?

Problems with hand-based input/output

The current hand input devices suffer from the same delays that plague the head mount display systems, but the user’s over-compensation is even more noticeable. Because there is typically some interaction with the hand and other objects, absolute position control is much more important here than it would be with head positioning, where relative motion is usually sufficient.

These devices are also extremely limited in their ability to generate any kind of tactile force or feedback to the user. Based on our research, even to perform gross manipulation tasks with a DataGlove is extremely difficult to without some kind of sensory feedback. Any kind of fine manipulation is impossible. Though tactile feedback of some kind may be possible, the quality of this will very likely be extremely low and the cost extremely high for the foreseeable future.
Perhaps the major failing of the glove-based system is that it requires the user to keep the hand and arm unsupported. This requires the user to employ both the agonist and antagonist muscle sets of the arm working against each other in order to perform any kind of complex task. The user actually is working harder at this than he would at pushing a real object because, in the case of a real object, at least one muscle group is at rest. Further, because there is no true stable surface for the arm to rest against, any kind of control requires even more force between the muscle groups. Our experience demonstrated that a user of such a system when faced with any kind of gross manipulation tasks, could only be expected to use the system for five-minute periods with a large degree of exertion. Any kind of extended activity was precluded.

As a consequence of these drawbacks, it is our expectation that the DataGlove and other similar interface devices will be replaced by more useful devices in the future.

**OP- Vocabulary**

agonist and antagonist muscle sets (1. 16) — two muscle groups which normally act in opposition to each other

---

**Task 13**

Read the text again and complete the table in note form.

<table>
<thead>
<tr>
<th>Problem of hand input device</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Task 14**

The following pairs of words are taken from the text. In each case, say whether their meanings are similar (S) or opposite (O).

1. **suffer from (1. 1) plague (1. 1)**
2. **absolute (1. 4) true (1. 20)**
3. **tactile (1. 8) sensory (1. 10)**
4. **force (1. 8) exertion (1. 24)**
5. **gross (1. 9) fine (1. 10)**
6. **impossible (1. 11) precluded (1. 25)**
7. **failing (1. 14) drawback (1. 26)**
8. **working (1. 18) at rest (1. 19)**
Task 15

Solve the crossword puzzle using the clues below.

**Across**
1. The adjectival form of maths. (12)
6. A piece of glass with a curved surface used to make things appear clearer, larger, or smaller. (4)
7. The opposite of gross. (4)
9. Short for 5 down. (3)
10. The study of robots. (8)
11. This is worn on the hand. (5)
12. This sort of reality is not real. (7)

**Down**
1. Making (goods) on a large scale using machinery. (13)
2. VR device worn on the head. (6)
3. Present VR hand input devices are capable only of gross _____ tasks. (12)
4. To work out or estimate. (9)
5. A kind of display. (6,7)
8. A device for finding direction, with a needle that points to magnetic north. (7)
Language focus L

Classifying

The term 'classifying' means arranging objects in classes or groups according to shared characteristics. For example, the Class of 'animals' includes all living things that can feel and move about, such as fish and birds. Each of these subgroups is also a class in its own right, having shared characteristics.

Classifying, then, is a process of bringing order out of confusion by organizing information in a logical fashion. There are often several ways of classifying the same information.

1 From general to specific: focusing on the large or high-level category and talking about its parts, that is from general to specific, the following expressions can be used:

<table>
<thead>
<tr>
<th>from general to specific</th>
<th>examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>is</td>
<td>is made up of</td>
</tr>
<tr>
<td>can be divided into</td>
<td>is composed of</td>
</tr>
<tr>
<td>is of</td>
<td>comprises</td>
</tr>
<tr>
<td>has</td>
<td>consists of</td>
</tr>
</tbody>
</table>

A general-to-specific classification will usually have singular main verbs, unless two or more things are being analysed simultaneously.

Examples:

1. The CPU is divided into three parts: the control unit, the arithmetic-logic unit, and memory.
2. The CPU has three parts: the control unit, the arithmetic-logic unit, and memory.
3. The CPU is made up of three parts: the control unit, the arithmetic-logic unit, and memory.
4. The CPU is composed of three parts: the control unit, the arithmetic-logic unit, and memory.
5. The CPU consists of three parts: the control unit, the arithmetic-logic unit, and memory.

2 From specific to general: what the smaller (or lower-level) components make when they are put together. This kind of classification uses the following expressions:

<table>
<thead>
<tr>
<th>from specific to general</th>
<th>examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>make up</td>
<td>may be</td>
</tr>
<tr>
<td>form</td>
<td>can be</td>
</tr>
<tr>
<td>constitute</td>
<td>are classified as</td>
</tr>
</tbody>
</table>
A specific-to-general classification will have plural verbs, because two or more lower-level categories are the focus of classification.

Examples:

1. The control unit, the arithmetic-logic unit, and memory are the three parts that **make up** the CPU.
2. The control unit, the arithmetic-logic unit, and memory are the three parts that **form** the CPU.

**Exercise 1**

Using the diagram below, complete the paragraph on the following page.
A computer has four basic components: input, processor, memory, and output. The CPU consists of two parts: the \(^1\) ____________, which directs and controls the signals and commands inside the processor, and the \(^2\) ____________ unit, which does the arithmetic operations and the decision-making operations. While the \(^3\) ____________ is made up of a \(^4\) ____________, a \(^5\) ____________, a \(^6\) ____________, and a \(^7\) ____________, the \(^8\) ____________ is composed of \(^9\) ____________, a \(^{10}\) ____________, and \(^{11}\) ____________.

In a computer, internal memory or \(^{12}\) ____________ refers to the storage locations inside the computer, whereas \(^{13}\) ____________ refers to the storage embodied in the peripherals. \(^{14}\) ____________ may be divided into \(^{15}\) ____________ (\(^{16}\) ____________) and \(^{17}\) ____________ (\(^{18}\) ____________). The \(^{19}\) ____________ devices can be either a \(^{20}\) ____________, a \(^{21}\) ____________, or a \(^{22}\) ____________.

These devices enter information into the computer. After the processor has operated on it, the \(^{23}\) ____________ devices display the results of the computations on either a \(^{24}\) ____________ or a \(^{25}\) ____________, or store them on tape or disk for future use.

**Exercise 2**

Refer back to the text on C language (Unit 4, page 46) and complete the diagram.
Task 1

1. ___ Some machine translation (MT) systems produce good translations.
2. ___ It is difficult to compare different MT systems.
3. ___ The easiest way to evaluate any machine translation of a given text is to compare it to a human translation of the same text.

Start-up

Task 1

Decide whether the following sentences are true (T) or false (F):

1. ___ Some machine translation (MT) systems produce good translations.
2. ___ It is difficult to compare different MT systems.
3. ___ The easiest way to evaluate any machine translation of a given text is to compare it to a human translation of the same text.

Reading

Task 2

Read the text on the following page and check your answers to Task 1.
You can go out right now and buy a machine translation system for anything between £100 and £100,000. But how do you know if it's going to be any good? The big problem with MT systems is that they don't actually translate: they merely help translators to translate. Yes, if you get something like Metal (very expensive) or GTS (quite cheap) to work on your latest brochure, they will churn out something in French or whatever, but it will be pretty laughable stuff.

All machine-translated texts have to be extensively post-edited (and often pre-edited) by experienced translators. To offer a useful saving, the machine must make the time the translator spends significantly less than he or she would have taken by hand.

Inevitably, the MT manufacturers’ glossies talk blithely of 'a 100 per cent increase in throughput', but scepticism remains. Potential users want to make their own evaluation, and that can tie up key members of the corporate language centre for months.

A few weeks ago, translators, system developers, academics, and others from Europe, the US, Canada, China, and Japan met for the first time in a Swiss hotel to mull over MT matters. A surprisingly large number of European governmental and corporate organizations are conducting expensive and elaborate evaluations of MT, but they may not produce 'buy or don't buy' results.

Take error analysis, a fancy name for counting the various types of errors the MT system produces. You might spend five months working out a suitable scoring scheme — is correct gender agreement more important than correct number? — and totting up figures for a suitably large sample of text, but what do those figures mean? If one system produces vastly more errors than another, it is obviously inferior. But suppose they produce different types of error in the same overall numbers: which type of error is worse? Some errors are bound to cost translators more effort to correct, but it requires a lot more work to find out which.

Properly designed and integrated MT systems really ought to enhance the translator's life, but few take this on trust. Of course, they do things differently in Japan. While Europeans are dabbling their toes and most Americans deal only in English, the Japanese have gone in at the deep end. The Tokyo area already sports two or three independent MT training schools where, as the eminent Professor Nagao casually noted in his presentation, activities are functioning with the efficiency of the Toyota production line. We're lucky they're only doing it in Japanese.

It isn't just users who have trouble with evaluation. Elliott Macklovitch, of Canada, described an evaluation of a large commercial MT system, in which he analysed, the error performance of a series of software updates only to find — as the system's suspicious development manager had feared — that not only had there been no significant improvement, but the latest release was worse.

And bugs are still common. Using a 'test suite' of sentences designed to see linguistic weaknesses, researchers in Stuttgart found that although one large system could cope happily with various complex verb-translation problems in a relative clause, it fell apart when trying to do exactly the same thing in a main clause. Developers are looking for bigger, better test suites to help to keep such bugs under control.

Good human translators produce good translations; all MT systems produce bad translations. But just what is a good translation? One traditional assessment technique involves a bunch of people scoring translations on various scales for intelligibility ("Does this translation into English make sense as a piece of English?"); accuracy ("Does this piece of English give the same information as the French original?"); style, and so on. However, such assessment is expensive, and designing the scales is something of a black art.
Task 3
Each of the sentences below (except one) summarizes an individual paragraph of the text. Order the sentences so that they form a summary of the text. One of the sentences contains information which is not in the text. Which one?

1 □ The developers of MT systems have also had problems evaluating their systems.
2 □ Many European organizations are evaluating MT, but the results may not be conclusive.
3 □ Assessing machine translations as good or bad is very difficult because such judgements cannot be made scientifically.
4 □ It is time-consuming for potential users to test the MT manufacturers’ claims that their products double productivity.
5 □ Better tests are needed to monitor linguistic weaknesses in MT systems.
6 □ All machine translations need to be edited by a human translator.
7 □ A reliable MT system is unlikely to be available this century.
8 □ The price of MT systems varies greatly and none actually translates.
9 □ The Japanese have a few independent MT training schools, which are said to be very efficient.
10 □ Analysing the errors made by MT systems is inconclusive because it may only show that different systems produce similar numbers of different error types.

Task 4
Match each of the following verbs from the text with the expression that has a similar meaning:

1 churn out (para. 1)  a add up
2 tie up (para. 3)  b think carefully about
3 mull over (para. 4)  c manage successfully
4 tot up (para. 5)  d produce large amounts of
5 cope with (para. 7)  e fail
6 fall apart (para. 7)  f occupy the time of

Task 5
Using the paragraph reference given, find words or phrases in the text which have a similar meaning to:

1 ridiculous (para. 1)  2 colour brochures (para. 3)
3 casually (para. 3)  4 sure to (para. 5)
5 group (para. 8)  6 mysterious ability (para. 8)
7 experimenting in a small way (para. 9)  8 invested heavily (para. 9)

Speaking
Look at these sentences. Discuss why a machine might find them difficult to translate.

I bought a set of six chairs.  The sun set at 9 p.m.
He set a book on the table.  We set off for London in the morning.
She had her hair set for the party.  The VCR is on the television set.

Can you think of other examples where this kind of problem occurs?
Listening

Task 7 You are going to hear a conversation in which David, a graduate student doing research in the field of artificial intelligence, explains to a friend, Kevin, what AI and expert systems are. Before you listen, try to write short definitions to explain:

1 artificial intelligence
2 expert systems

Now listen to the conversation and modify your definitions as necessary.

Task 8 Listen again to the recording and answer these questions:

1 Does visual perception require intelligence when done by humans?
2 What two categories of task are mentioned in relation to AI programs?
3 Which category of task is AI more successful at?
4 What is the relationship between AI and expert systems?
5 What examples of existing expert systems are mentioned?
6 In what way do expert systems imitate human experts?
7 Why does the Japanese system have two parallel inference engines?
8 What is the function of inference trees?

Task 9 Read this adapted extract from the tapescript and fill in the gaps with the missing words.

KEVIN: What are e _______ 1 used for?

DAVID: They're built for commercial a _______ 3. Up to now they've been used for a variety of tasks — medical d _______ 4, electronic fault finding, machine translation, and so on. But the point about them is that you can ask them about how they came to a particular c _______ 6

KEVIN: So, in that respect, they imitate human experts.
DAVID: Yes. I read recently about a Japanese system that can be used by

to draw conclusions about new legal cases. It refers to

of statutory laws and legal precedents and is able to see

similarities in the processes used to decide each case — exactly

as a lawyer would.

KEVIN: How can it do that?

DAVID: The system has two reasoning mechanisms, known as which work in . One operates on the written
laws, the other operates on the legal precedents. They draw all the possible
conclusions and then output them in the form of

Now listen again to the recording and check your answers.

Reading

Task 10

Read quickly through the text which follows and note down the answers to the
following questions:

1. What does the expert system ROI do?
2. How did Scott French 'clone' Jacqueline Susann?
3. What other applications of AI are mentioned in the text?

One tough cookie

The software division of Mrs. Fields Cookies, Fields Software Group, has sold a version of its AI-based Retail Operations Intelligence
system to fast-food giant Burger King Corp. The expert system, called ROI, assists in the
management of franchised or multiple-location retail operations
by creating work schedules, recommending marketing tactics, and assisting in personnel hiring. Fields has been successful with this
package and has started
commercializing it. Now Burger King is developing its own expert system in an attempt to outperform its hamburger competitor
McDonald's. Maybe it can clone
Ronald McDonald's expertise.

AI waxes poetic
Cloning a well-known figure is no joke. Just This Once is a new novel
making the rounds in the publishing world. It was written
by Scott French, who claims that
10% of the novel was written by him, 25% was created by an AI program he created to imitate novelist Jacqueline Susann, and
the remainder was a collaborative effort between himself and the computer. Susann, who died in 1974, wrote the definitive trash novel — Valley of the Dolls. French used Nexpert Object and took development lessons from Bechtel AI Institute to
program his system with hundreds of formulas he had developed regarding Susann's essential plots and characterizations; it created a
350-page novel, which some in the literary community are
Task 11

Answer these questions about the text.

1 What does the acronym ROI stand for?
2 Why is Burger King developing an expert system?
3 What kind of books did Susann write?
4 What percentage of his novel did French write jointly with his computer?
5 Has French's novel been well-received?
6 How does French justify his action?
7 Has French found a publisher for his book?
8 Where has AI traditionally been accepted?

Task 12

Choose the definition that best expresses the meaning of the word or phrase.

1 franchised (1. 8)       a licensed to sell another company's products
                          b individual
                          c specially selected

2 hiring (1. 12)         a managing
                          b employing
                          c training

3 outperform (1. 17)     a do better than
                          b remove from the top position
                          c survive longer than

4 clone (1.19)           a copy
                          b use to one's own advantage
                          c make people laugh at

5 making the rounds (1. 23)   a circulating
                               b making no progress
                               c making a bad impression

6 trash (1. 34)           a printed on cheap paper
                          b popular
                          c of poor quality

7 ghost-writing (1. 47)    a writing under someone else's name
                           b writing stories intended to frighten
                           c writing for someone who is dead

8 mundane (1. 60)         a ordinary
                           b simple
                           c world-wide
Writing

Task 13  
Read this summary of the first paragraph of the text on page 149, then compare it to the original.

The software division of Mrs. Field's Cookies has sold a version of its AI-based system for assisting in the management of retail operations to Burger King, who are now developing their own system in an attempt to outperform McDonald's.

1 Note the information that has been omitted from the summary.
2 Look carefully at how the remaining information has been re-ordered and condensed.
3 Now complete the summary of the text, keeping it as concise as possible.

Word-play

Task 14  
The clues below contain anagrams of words from this unit. Enter the words in the grid, then solve the anagram in the **bold** boxes to find the hidden word.

1  Expert systems have been used in medical ____ . (ossadiing)
2  A set of instructions for making something. (lamurof)
3  Modernize. (dapetu)
4  A rival company. (torpetimoc)
5  Used of lines which are the same distance apart at any point. (alerlapl)
6  Assessment. (tualiaveno)
7  Having formal permission to sell another company's goods in a particular geographical area. (danrifcesh)
8  An exact copy. (ecnol)
9  Machines are still not very good at doing this. (nartgslanti)

**Hidden word clue**
This kind of engine is one of two reasoning mechanisms in an expert system.
Cause and effect

Understanding the different ways of expressing the relationship between the causes and the effects of an action is very important when you are reading English. This cause—effect relationship is commonly used in texts about computing.

Before we look at some of the ways of expressing cause and effect, note carefully this important distinction.

We can mention the cause before the effect.

Example:

(cause) (effect)
Dust often causes the recording condition of disks to deteriorate.

We can mention the effect before the cause.

Example:

(effect) (cause)
Deterioration in the recording condition of disks is often due to dust.

There are many different ways of expressing cause and effect.

1 Verbs linking cause and effect:

<table>
<thead>
<tr>
<th>result</th>
<th>cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>produce</td>
<td>result in</td>
</tr>
<tr>
<td>allow</td>
<td>result from</td>
</tr>
<tr>
<td>prevent</td>
<td>bring about</td>
</tr>
<tr>
<td>enable</td>
<td></td>
</tr>
</tbody>
</table>

Examples:

1 The introduction of computer technology brought about significant changes in office routines. (cause —> effect)

2 Computers can create artificial objects in their memories. This allows developers to test product design without actually creating a real prototype. (cause —> effect)

3 The extensive use of computers in schools is resulting in a new generation of computer-literate students. (cause —> effect)

4 The problems were caused by the volume of network traffic. *(effect 4—cause)*

Note: * See Language focus H for an explanation of the passive used in example 4.
2 Connectives introducing cause:

due to
as the/a result of
since
because
in response to
as

Examples:
1 *Early computers developed quickly as a result of their use in military applications.* (effect - cause)
2 *Teachers must rethink their roles as computer technology is creating a revolution in the classroom.* (effect - cause)
3 *Because off-the-shelf programs do not always fit a company's needs, software often has to be specially developed.* (effect - cause)

3 Connectives introducing result:

with the result that
so that
thus
therefore
consequently
hence
for this reason
thereby

Examples:
1 *Computers can remove many of the routine and boring tasks, thereby leaving us with more time for interesting, creative work.* (cause —* effect)
2 *Carpel tunnel syndrome is a serious medical condition. For this reason, computer users should be careful of their posture and take frequent breaks.* (cause effect)
3 *When using an online database service, you must pay for the time you use. Consequently, you should have a good idea of what you want before you log on.* (cause — effect)

4 Another way of showing causal relationship is by introducing the cause with *if*. Both the cause clause and the effect clause verbs are in the present tense.

Examples:
1 *If your company has a LAN, you can share the use of a printer with your colleagues.* (cause — effect)
2 *It is easy to transport your data to another location if it is stored on a disk.* (effect — cause)

Exercise 1 Read the following sentences and underline the part which expresses the cause.

1 *Because a modem can be used for inter-computer communication, many people can now do their office work on their computer at home and transfer the files to a computer at the office.*
2 Many people do not explore new software because they are comfortable with what they already have.
3 When robots malfunction, it is usually due to mistakes in the programming or the design.
4 Laser printers can be quite expensive and are therefore often shared through networks.
5 Voice-recognition systems are becoming more sophisticated. Thus, keyboards may be unnecessary in the future.

**Exercise 2**

Read the following sentences and underline that part which expresses the *effect/result*.

1 Computers can remove many of the routine and boring tasks from our lives, thereby leaving us with more time for interesting and creative work.
2 Because there are many different types of printers, you must analyse your needs before making a purchase.
3 Since anyone can consult your files on a computer, it is a good idea to protect sensitive files with a password.
4 Fax boards are available to plug into your computer, so you do not have to buy a fax machine.
5 Computers have been reduced in both size and cost as a result of advances in design and technology.

**Exercise 3**

The sentences below have appeared in previous units. Read them again and circle the marker showing a cause—effect relationship and underline the part of the sentence that expresses the cause. The first one has been done for you.

1 By 1980, IBM decided there was a **market** for 250,000 PCs, so they set up a special team to develop the first IBM PC. (Unit 1)
2 Because of these and so many other different judgements, there can be no absolute. (Unit 3)
3 Global communication and computer networks will become more and more a part of professional and personal lives as the price of microcomputers and network access drops. (Unit 6)
4 One of the features of a computer virus that separates it from other kinds of computer program is that it replicates itself, so that it can spread to other computers. (Unit 7)
5 ...Lehigh is waiting to infect other unsuspecting computers if you boot from one of those four infected floppies. (Unit 7)
6 As they became more proficient on the computer, some showed gains in their overall self-confidence, as well. (Unit 10)
7 Robots are better at this task, not because they are faster or cheaper than humans, but because they work in a place where humans cannot. (Unit 11)
8 This automatic accuracy is particularly valuable in this kind of industry because locating and fixing mistakes is costly. (Unit 11)
9 Artificial worlds are being built up in a computer memory so that people can walk through at will, look around, and even touch objects. (Unit 12)
Multimedia

Start-up

Task 1
Discuss these questions.

1. Can you think of any actual or potential applications of multimedia in industry?
2. Do you think multimedia systems will ever become as popular as conventional audio-visual systems?

Listening

Task 2
You are going to hear Nathan Ward, a multimedia applications developer, answering questions on various aspects of multimedia. Before you listen, try to predict the answers to these questions:

1. Why is multimedia similar to graphics?
2. How does Nathan Ward define multimedia?
3. Which types of data are involved?
4. Is it easy to adapt most PCs for multimedia applications?
5. What does the term ‘full-motion video’ refer to?
6. Are there industry standards for multimedia?
7. What is the best platform for multimedia, according to Ward?
8. What is the most popular application of multimedia?

Now listen to the recording and check your guesses.
Listen again to the conversation and complete the table below.

<table>
<thead>
<tr>
<th>Hardware requirements for multimedia</th>
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<td></td>
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</tbody>
</table>

Read this extract from the tapescript and try to fill in the gaps. The first letter of each missing word is given.

NATHAN WARD: Tull-motion video' refers to the impression the v ________ has that he or she is watching f ________ television. The idea is to c ________ full-motion video in r ________ and digitize and c ________ information so that the system can treat it like any other digital data s ________ . Some systems do it better than others.

INTERVIEWER: I see. Getting back to h ________ requirements, apart from the e ________ cards that you mentioned, is there anything else that is needed?

NATHAN WARD: Yes. The machine must have i ________ for a variety of input and output d ________

INTERVIEWER: Such as?

NATHAN WARD: Such as a CD-ROM d ________ VCR, d ________ tape...

INTERVIEWER: Isn't there a problem of c ________

NATHAN WARD: There is, but that situation is changing. Microsoft's b ________ MPC specification has some support, but it's only a start. The lack of s ________ is the main reason that multimedia is not bigger than it is. Once these are in place, users will have easy p ________ and p ________ compatibility, and developers will be able to develop a ________ that can run on a variety of p ________ .

Now listen again to the cassette and check your answers.
A jet aircraft technician peers into the bowels of a malfunctioning engine searching for the source of the problem.

5 Finally, he spots it. Buried deep within the engine is the troublesome part. He will have to replace it. A complicated procedure, to say the least.

10 The technician goes to his high-powered workstation attached to a network and calls up the information on the part and the replacement procedure. An image of the part seated in the engine appears. In another window, an instructor demonstrates the repair procedure in full-motion video while the technician listens through the audio channel as the instructor explains the process. Diagrams pop up to further clarify key points. In a text window, he reviews lists of necessary parts and tools he will need to complete the repair.

25 Still confused about an irregularity in this situation, the technician presses the help key and a real-time image of a live supervisor pops up in another window. Using the attached microphone, the technician discusses the particular problem with the supervisor, who directs more information onto the technician's screen. The technician points a video camera at the part in question to show the supervisor the specific situation.

35 Welcome to the world of high-end multimedia. The situation described above is not quite here yet, but most of the pieces already exist to make this scenario become a reality using a networked RS/6000 or other high-powered workstation.

Or take this example of a scenario that is more likely today. A manager creates a detailed business presentation involving text, graphics, digitized photographic still images, and tables of spreadsheet data all combined in a single compound document. Before sending the document across the network to a colleague, the manager picks up the microphone and attaches an audio note to one of the tables, reminding the colleague about something unusual or potentially confusing in the accompanying figures.

65 Using a networked RS/6000 equipped with the necessary audio boards and Bolt Baranek & Newman's (Cambridge, Mass.) BBN/Slate, a compound document/office automation application, this scenario is possible today. High-end multimedia is only in its infancy, but it is here. And over the next few years, industry observers expect multimedia development to accelerate as current barriers are overcome.

75 Multimedia is not a new phenomenon, although it is new to business computing. We live in a multimedia world. At home, we experience a variety of media through our television: full-motion video, still images, graphics, sound, and animation.
At school, we learn through systematic exposure to different media: the instructor's words, text, audio tapes, graphics, and a variety of visuals and video.

Computers, however, have tended to be uni-medium. Traditionally, computers were text-based, and this continues to be the primary format for business information. A few systems have provided sound or graphics, but until recently, the efforts were rudimentary compared to the seamlessly integrated, high-quality visuals, video and audio we experience every evening at home.

**Vocabulary**

peers into the bowels of (1. 1) — looks down into

**Task 6**

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you think a statement is false, change it to make it true.

1 T 1 The jet aircraft technician first locates the faulty part and makes a mark on it.
2 T The technician calls up his supervisor from his workstation to get information about the faulty part and the replacement procedure.
3 T The technician can display a computer-generated graphical representation of a supervisor on his screen.
4 T This kind of repair procedure could well be possible before long.
5 T You can already buy multimedia business presentation applications.
6 T Industrial experts expect multimedia development to get faster and faster.
7 T Multimedia existed long before the invention of the computer.
8 T In terms of quality, multimedia computer systems have only recently become comparable with the media we already use.

**Task 7**

Using the line references given, find the words in the text which mean:

1 catches sight of (lines 1-5)
2 order of doing things (lines 5-10)
3 instruments (lines 20-25)
4 appears (lines 30-35)
5 top quality (lines 40-45)
6 made up of two or more parts (lines 55-60)
7 early stages of development (lines 70-75)
8 obstacles (lines 75-80)
9 undeveloped (lines 95-100)
10 smoothly (lines 100-104)
Speaking

Task 8

Work in pairs using the information in the advertisement below.

Student A: You are interested in upgrading your PC to use multimedia. Describe your machine to the salesperson and ask about the various options available, prices, etc.

PC specifications
386 25MHz
4 MB RAM
105MB hard disk
VGA colour monitor
3 expansion slots

Student B: You work for a company that sells hardware and software. Find out what your customer wants and check that his/her PC can be upgraded, by referring back to the list you made in Task 3. Explain the options that are available and try to persuade the customer to buy one of the products advertised.

Low cost hardware and software is now available to transform your Personal Computer into a MultiMedia workshop.

TEMPRA PRO is a fully functional 24 bit colour image editor which can be used to create, import and edit colour pictures. Images can be scanned from a variety of scanners or captured directly from a video camera.

TEMPRA SHOW is a MultiMedia development system and a menu-driven storyboard editor for presentations. This exciting new medium has been built to give you the power to express your thoughts in a simple and flexible manner.

CREATIVE LABS MULTI-MEDIA UPGRADE KIT includes the Sound Blaster Pro stereo card, MIDI Kit, a high-performance CD-ROM drive, Microsoft Windows® version 3.0 graphical environment with Multimedia extensions 1.0, Sound Blaster Pro software and additional CD-ROM titles.

MICROKEY/DIGIVIEW is an AT compatible expansion board that captures near photo quality images from still or motion video sources and displays full-colour motion video in a window on standard VGA monitors.

For more information contact us on
TEL (0923) 240272 FAX (0923) 228796
26 GREENHILL CRESCENT, WATFORD BUSINESS PARK, WATFORD, HERTFORDSHIRE, WD1 8XG
Writing

Task 9
Work in pairs. You manage a company specializing in multimedia hardware and software. Prepare a leaflet to inform companies of the potential benefits of using multimedia. Invite them to contact you for a free consultation.

Computer-to-video conversion

Reading

Task 10
Read the text opposite and answer these questions.
1 What are the main differences in the way images are produced on a TV screen and on a computer screen.
2 Why did the developers of the PAL system invent interlaced video? What are its advantages and disadvantages?
3 Which of the two suggested ways of getting a signal from a computer to record on a VCR do you think is preferable? Why?
How they work

A (though the computer screen has the standard characteristics of a TV display, images are produced in a very different way. If you want to record anything from your computer to video for play-back on a TV monitor, you need a print-to-tape device.

In a TV display, a tight beam of io electrons scans the screen in much the same way you read a page of text—from the upper-left corner, it moves line by line to the lower right. Usually, one pass writes the entire image once. The number of passes the beam writes per second is called the vertical refresh rate and is measured in kiloHertz. Most computer systems follow the American TV standard and use a vertical refresh rate of 60kHz whereas PAL, the European TV standard, requires 50kHz.

Another difference is with bandwidth. When PAL was defined, the bandwidth available for a TV signal was very narrow. While the TV image had to be refreshed at least 50 times a second for flicker to remain unnoticeable, there was not enough bandwidth to transmit all 625 lines of one TV image in a fiftieth of a second. The developers of PAL, therefore, employed a clever trick called interlaced video. They split each frame of the image into two fields of 312.5 lines, the odd lines into field A, the even ones into field B. The fields are transmitted at a rate of 50 per second, leaving us with an effective frame rate of 25 per second while eliminating most of the flicker. This is fine for viewing from several yards, but should you move as close to your TV as you would to your computer screen, you’d end up with a headache after half an hour. Also, if any parts of the displayed image occupy only one horizontal scan line, that scan line will flicker quite noticeably at 25kHz.

All video equipment works with PAL-standard, 50kHz interlaced video. Computers tend to use 60kHz (or more), non-interlaced video and look more stable. To get a signal from your computer to record on a VCR, there are two possibilities:
1 Use a display adaptor that can produce PAL-standard video. You would not be able to connect such a card to a standard computer monitor, however. A video monitor or a multi-sync monitor is needed. You wouldn’t want to look at such a screen for hours on end — interlaced video is not suitable for word processing.
2 Put up with the standard display signal from your computer (probably 60kHz) and use a scan converter. It can take a video signal with one refresh or scan rate, and convert it to the other. A scan converter is actually a small digital frame-grabber with asynchronous video output.

Vocabulary

yard (1. 45) — measure of length (1 yard = 0.914m)

Task 11

Match the sentence halves to form complete sentences.

1 If you want to play back anything from your computer on a TV monitor, it will have a vertical refresh rate of 60kHz.
2 If your computer system follows the American TV standard, you must use a scan converter.
3 If you use a monitor with interlaced video for word processing, you need a print-to-tape device.
4 If you use a display adaptor that can produce PAL-standard video, you cannot use a standard computer monitor, but must use a video or multi-sync monitor instead.
5 If you want to use the standard display signal from your computer, you will get a headache!
Task 12
Which of the two configurations for computer-to-video conversion suggested in the text does this diagram show?

Word-play
Task 13
Find the hidden words in this square. Some appear vertically, some horizontally, and some diagonally. They may be upside-down or back to front. Use the clues on the opposite page to help you. The number of letters in each word and the first letter of the word appear in brackets after the clue.

N O N E M O N E H P E
E A D A P T O R E M S
N T R O U B E S O U L
O A C C E P L E P R O
H E S P A N D E T A T
P E C I F I R C A T I
O M R F E V O B N U O
R A F L I C K E R O N
C L E S C A N T R I S
I C O M P O U N D N G
M R N O I T A M I N A
Find words which mean:

1 A strange thing or event. (10, P)
2 An instrument that changes soundwaves into electrical current. (10, M)
3 A display ______ is one device used in computer-to-video conversion. (7, A)
4 Mend. (6, R)
5 A person who monitors the way people work to check that things are done properly. (10, S)
6 An opening on a computer into which fits an expansion board. (4, S)
7 To shine unsteadily. (7, F)
8 A ______ document is made up of two or more documents combined together. (8, C)
9 A ______ converter is another device used in computer-to-video conversion. (4, S)
10 The technique whereby still drawings are given the appearance of movement. (9, A)
Language focus N

Making predictions

A prediction is a statement about a particular subject in which we say what we think will happen in the future. Predictions are not always absolute, but can be expressed with different levels of certainty, according to the context in which they are made.

1 Certainty can be expressed by:

- will (definitely, certainly)
- certain, sure
- without a doubt, without question

2 Probability can be expressed by:

- probable, probably, likely
- most/highly probable, most probably
- most/highly likely

3 Possibility can be expressed by:

- may (not), might (not), can, could
- possible, possibly, perhaps

4 Improbability can be expressed by:

- improbable, unlikely
- doubtful, questionable
- probably not
- most/highly improbable/unlikely
- most/highly doubtful/questionable
- most probably not

5 Impossibility can be expressed by:

<table>
<thead>
<tr>
<th>Present or future</th>
<th>Past</th>
</tr>
</thead>
<tbody>
<tr>
<td>cannot, could not</td>
<td>could not</td>
</tr>
<tr>
<td>not possible, impossible</td>
<td>not possible, impossible</td>
</tr>
</tbody>
</table>
These expressions are used in sentences in different ways:

Examples:

1 *Notebook computers will definitely* be cheaper next year.
2 *It is (highly) probable/likely that* notebook computers will be cheaper next year.
3 *Notebook computers may/might* be cheaper next year.
4 *Perhaps* notebook computers will be cheaper next year.
5 *It is unlikely/doubtful that* notebook computers will be cheaper next year.
6 *Notebook computers will most probably not* be cheaper next year.
7 *Notebook computers will definitely not* be cheaper next year.
8 *It is impossible that* notebook computers will be cheaper next year.

Sometimes, predictions are made subject to certain conditions. In such cases, sentences typically have two parts: the *if-clause* and the *main clause*.

Examples:

1 *If the price of notebooks fall next year, I will buy one.*
2 *If the system crashes, we will lose all our latest data.*

When the *if-clause* comes second, there is no comma between the two clauses.

Examples:

1 *I will buy a notebook if the price of notebooks fall next year.*
2 *We will lose all our latest data if the system crashes.*

As with the simple predictions listed above, it is possible to express different levels of certainty about the likelihood of the condition (in the *if-clause*) by changing the tense of the verbs from the future and present forms to the more ‘remote’ past and conditional forms.

Examples:

1 *If the price of notebooks falls next year, I will buy one.* (The speaker thinks it is possible that the price of notebooks will fall next year and, if it does, he will buy one.)
2 *If the price of notebooks fell next year, I would buy one.* (The speaker thinks it is unlikely that the price of notebooks will fall next year but, if it does, he will buy one.)
3 *If the system crashes, we will lose all our latest data.* (The speaker thinks it is possible that the system will crash and, if it does, we will lose all our data.)
4 *If the system crashed, we would lose all our latest data.* (The speaker thinks it is unlikely that the system will crash but, if it did, we would lose all our data.)

The first form, as in sentences 1 and 3 — *(If + present) + will* — is known as the first conditional. The second form, as in sentences 2 and 4 — *(If + past) + would* — is known as the second conditional.
Exercise 1
Match the if-clauses (1 to 6) to the main clauses (a to I) to make complete sentences.

1. If you never read computer magazines...
   a. ...you would be able to access our bulletin board.

2. If you never back up your hard disk...
   b. ...it is unlikely that you will have a problem with computer viruses.

3. If you had a modem...
   c. ...we would have a bigger range of typefaces and fonts to choose from.

4. If you don't copy pirated software...
   d. ...you will miss important new products.

5. If I knew more programming languages...
   e. ...I would get a better job.

6. If we bought a better printer...
   f. ...you will probably lose some important files.

Exercise 2
Complete the sentences with the words below. Are the sentences first (F) or second (S) conditionals?

1. If you look at your VDU in direct sunlight, it will be damaged.
2. If you look at your screen for too long, you will get a headache.
3. If you want to link your PCs with a mainframe, you will need to install a network.
4. If the market for portable computers grows, prices will be reduced next year.
5. If we want a fax machine and e-mail facility, we would need to leave many letters each day.

Now make up three first conditional and three second conditional sentences of your own.
Computer graphics

Start-up

Task 1

Work in pairs. Look at the photograph below and discuss these questions.

1. What do you think the photograph was used for?
2. How was the image achieved?
Listening

Task 2

Listen to these descriptions of the images below. Match each description with the appropriate image.

1  2  3  4  5

a

b
d
e
Reading

Task 3

Match each of the following words with the appropriate definition:

1 capture  
2 poster  
3 retouch  
4 airbrush  
5 emulsion

a light-sensitive substance on the surface of film  
b device that uses compressed air to spray paint  
c succeed in representing on film  
d alter by making minor changes  
e large printed picture used for advertising purposes

Task 4

Compare the two photographs below.

1 How many differences can you find?
2 Why do you think the changes were made?
Tunnel vision

You're at Heathrow but your plane is at Gatwick. This was just one of the problems facing the agency producing this ad.

5 Capturing this image was never going to be easy, not least because Virgin Atlantic wasn't flying out of Heathrow when this poster and press campaign was being put together during May and June. Also, while the road tunnel does indeed pass under one of the Heathrow runways, a plane would never appear this big from the photographer's standpoint (or if it did, it would be taxiing along the A4 Bath Road, which in real life runs just above the tunnel mouth). Another inherent difficulty was that you can't really see any light at the end of the tunnel because the road dips in the middle.

From the outset, therefore, Moira Gaskin O'Malley of London ad agency Woollams knew some kind of electronic jiggery pokery would be necessary, and for this art director John Jessup turned to 'conventional retouching house Acorn Studios, which offers use of Apex Graphics' electronic Dalim Litho colour design system as part of its service.

The ad, which launches the new Virgin Atlantic flights from Heathrow, is made up of two shots taken by photographer Max Forsythe: one of the jumbo taken at Gatwick, and another of the Heathrow tunnel taken on a typical day (which must rank as every photographer's most unfavourable location).

Considerable retouching took place to create just the right scene. The vehicles coming out of the tunnel were removed, and on the opposite side the white cars and the traffic in the tunnel were extracted, while the taxi cab and the estate car were added.

The Toshiba ad was replaced with a Welcome to Heathrow poster, and the ad on the right and the neighbouring steps were conveniently taken out. The bush on the left, which seems out of character with the rest of the resident shrubbery, was considered too spikey and was therefore redrawn.

With the airliner in position, the 60 streetlights needed to be extended, and highlights were also added to them. Given the presence of the light on the right, a shadow had to be appropriately positioned on the jumbo.

To create that elusive patch of light at the end of the tunnel (which was crucial to copywriter Paul Quarry's words), Acorn used the Dalim's electronic airbrush facilities.

The lorry disappearing into the patch of light was painted conventionally onto the final output transparency by retoucher John Stammers, who is also managing director of Acorn. Stammers put this addition on to the base side of the film so it could be easily washed away if the art director didn't like it (conventional retouching is normally done on the emulsion side). It also meant that no time or money was wasted going back to the system.

► Vocabulary

Heathrow (1. 1)/Gatwick (1. 2) — London's main airports
taxiing (1. 15) — moving slowly along the runway before take-off or after landing
jiggery pokery (1. 25) — trickery
bush (1. 53) — thickly-growing plant
shrubbery (1. 56) — area planted with bushes
Task 5

Use the table below to note down the steps taken to produce the final poster and the reason for each alteration.

<table>
<thead>
<tr>
<th>Alteration</th>
<th>Reason</th>
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Task 6

These are answers to questions about the text. Write the questions.

1 During May and June.
2 Woollams' Moira Gaskin O'Malley.
3 Apex Graphics.
4 To launch the new Virgin Atlantic flights from Heathrow.
5 No, the shot of the tunnel was taken at Heathrow, but the shot of the jumbo was taken at Gatwick.
6 To create just the right scene.
7 A Welcome to Heathrow poster.
8 Because it fitted in with the chosen slogan: 'Now there's light at the end of the tunnel'.

Task 7

Using the line references given, look back in the text and find words that have a similar meaning to:

1 built-in (lines 15-20)
2 goes down and then up again (lines 20-25)
3 traditional (lines 25-30)
4 be rated (lines 35-40)
5 nearby (lines 50-55)
6 dark patch (lines 60-65)
7 difficult to represent (lines 65-70)
8 used unnecessarily (lines 80-85)
24-bit colour

Reading

Task 8

Before you read the text, try to answer these questions.

1. How many distinct shades of colour can the human eye see?
2. What is:
   a. a pixel?
   b. a bit?
   c. a byte?
   d. a greyscale display?
3. Roughly how many different colour shades can be generated from 24-bit colour?
4. If your machine has 24-bit colour and a one million-pixel display, how much memory will you need to drive the screen?

Now read the text and check your answers.

Baffled by computer-speak? Take Buzz, the instant remedy to jargon

24-bit colour

Short explanation:
If your computer has 24-bit colour, then it can display photographic images in colour on its screen that have natural-looking tones.

Long, long explanation:
In principle, there is an infinite number of shades available between a solid colour and pure white. In practice, the human eye can detect somewhere between 150-200 distinct shades, so as long as you've got more than this, you can produce an undetectably smooth progression of shades (there are exceptions, but they're not worth going into here).

Cheapo computer monitors can't display shades — you get solid black or white and nothing else (in many cases you get black or green). It is possible to fake shades on one of these monitors by a sort of poor man's halftone process called dithering, but this is useless for serious image viewing and retouching.

What you need is a computer that can show true shades on its screen.

A computer builds up a picture from a series of building blocks called pixels. Each pixel is a square (normally) of a single colour.

The more pixels you can divide the picture into, the higher the resolution of the complete image. The computer organizes itself by describing each pixel that it wants to display as a code in the binary mathematical set (numbers built up from a series of Os or 1s). Each 0 or 1 is called a bit. Computers are generally structured to work in groups of eight bits (called a byte). These eight numbers can be used to count up to 256, and so can describe 256 shades of grey from black to white, which is more than enough to satisfy the eye.

A computer which can assign eight bits to describe...
5 Each pixel will produce perfect black and white photographs on its monitor. A monitor that can show all these shades is called a greyscale display.

Now your eye can detect those 150-200 shades in all three of the colours it can see: red, green, and blue. If you use eight bits to describe colour, you only get 256 colours, which isn’t enough — you get a mildly posterized effect, although the dithering process can simulate more colours at the expense of quality.

To get the full colour photographic effect on a computer monitor, you need 24-bit colour: the spare eight bits can be used to control transparent overlays of colour — you get 256 levels of transparency.

You only really need 24-bit colour if you are going to do colour photographic retouching on-screen or similar ‘painting’ on-screen. For linework and picture placing, an 8-bit colour monitor is perfectly adequate, as you can still define colours for print even if you can’t show them on the screen.

Naturally, there’s a bottom line in all this, or everyone would be using 24-bit colour.

To start with, you need special circuit boards which plug into your computer and drive the monitor. An 8-bit board is cheaper than a 32-bit one. You also need plenty of memory. A typical high resolution colour monitor can display about a million pixels.

The 24 bits that your computer uses to describe each pixel can also be described as three bytes. To describe a million pixels takes three million bytes. In other words, a hefty three megabytes of your computer’s memory is assigned to driving the screen. With 8-bit colour, you only need one Mb.

Generally, 24-bit colour boards include extra memory and processors to speed up the display performance.

Your opinion: It’s cheaper to be colour-blind.

0- Vocabulary

detect (1.12) — recognize
dithering (1.29) — a process which makes the transition between shades seem smoother
retouching (1.31) — making minor changes in a photograph
a mildly posterized effect (1.73) — a slightly crude image
there’s a bottom line (1.108) — it is expensive
hefty (1.126) — large

Task 9

Decide whether the following statements are true (T) or false (F) in relation to the information in the text. If you think a statement is false, change it to make it true.

1 ❑ If a computer can generate more than 200 distinct shades of colour, the human eye will see a perfectly smooth progression of shades.

2 Everybody should have a computer that can show true shades on its screen.

3 ❑ A group of eight binary numbers is called a byte.

4 ❑ Under certain circumstances, 8-bit colour can provide more than 256 colours.

5 32-bit colour offers 256 times as many shades of colour as 24-bit colour.
Task 10
Use the information in the text to complete the dialogue in your own words.

A

B Yes, I'd like to find out a little about 24-bit colour.

A

B Well, first of all, I'd like to know what sort of quality it will give me on my monitor.

A

B As many as that? What add-ons do I need?

A

B How much memory will I need to drive the screen?

A

B It's a high-resolution screen.

A

B That's a lot! I use colour mainly for linework and picture-placing. Do you think it's worth buying 24-bit colour?

A

Writing
Write a summary of the text. You should aim to limit your summary to about 150 words. Start by underlining the important ideas in the text. Try, where possible, to combine more than one idea in each sentence.

Word-play
Solve the crossword puzzle using the clues below. The words are taken from all fifteen units.

Across
2 A device for converting digital data into a sound signal that can be transmitted by a telephone network. (8,7)
4 One kind of printer. (6)
5 and 6 An __________ is a smoothly varying electrical pulse that was the basis for all telephone communication until recently. (6,6)
6 See 5 across.
7 Someone who is extremely knowledgeable about a particular subject. (6)
8 The lack of an industry_____ for operating systems means that programs have to be specifically written for each existing system. (8)
9 A million floating point instructions per second. (8)
11 A robot with some physiological structures similar to those of humans. (6)
12 To transmit a virus to a computer. (6)
13 To go into a computer file. (6)
14 Erase or omit. (6)
15 An operation performed by the control unit. (7,8)
Down

1 To jumble up a string of characters so that it can be read only after decoding. (8)
2 This unit forms part of the CPU. (10-5)
3 A device fitted over a computer screen to stop dangerous emissions. (9,6)
10 Another way of saying 'logs off'. (5,3)
Appendix 1
Letter writing

1 Presentation and structure   p. 176
2 Enquiries and replies        p. 178
3 Quotations and orders       p. 182
4 Letters of complaint and replies p. 188
5 Employment                  p. 192

The aim of this section is to help students of computer science and those already working in computing-related jobs to improve their letter-writing skills. All the most common types of work-related letters are covered, and special attention is given to presentation and structure.

1 Presentation and structure

The layout of business letters often varies slightly from company to company. All the letters in this appendix follow a style which is acceptable for all kinds of business letter and may safely be used as models for your future correspondence.

Task

Decide whether the following statements are true (T) or false (F). Then read the text which follows to check your answers.

1 On unheaded notepaper, you should always write your name above your address.
2 On unheaded notepaper, the address of the sender is on the right.
3 Our ref. refers to the writer's filing system.
4 In the UK, the date 2/4/93 means February 4th, 1993.
5 You should always write the name and position of the person you are writing to above his/her company address.
6 You use the salutation Dear Sir or Dear Madam when you know that the person you are writing to is older or more senior than you.
7 If you begin with Dear Sir, you end with Yours faithfully.
8 The initials p.p. indicate that the person signing the letter is doing so on behalf of someone else.
9 It is unusual for the writer to put his/her company position at the end of the letter.
10 In business letters, dates should appear as numbers separated by full points (.) or obliques (/).
The abbreviation Ms can refer to both married and unmarried women. If you are writing to Mrs Anne Swanson, you open with Dear Anne Swanson.

Short business letters are regarded as impolite. Americans may begin a business letter with the salutation Gentlemen, followed by a colon.

The letters Enc. mean that something else has been sent with the letter.

Points to note

- Most company notepaper is headed. However, if you are writing on unheaded paper, put your address (but not your name) in the top right-hand corner. The address of the company you are writing to should appear on the left so that it can be seen through an envelope with a window. If you are writing to a specific individual in the company, his/her name and position goes above the address.

- Dates can cause some confusion. 2/3/9_ means 'the second of March' in English letters, but 'February third' in American ones. Confusion can be avoided by writing dates as follows: 2 March (or March 2 in the USA) 199_. The names of the months should not be abbreviated in formal letters.

a When you receive a business letter, there is usually a reference number at the top following the words Our ref. This is designed to help the sender to file related correspondence, and you should quote this reference when you reply.

a. If you do not know the name of the person you are writing to, or you are not sure if you are writing to a man or woman, you should begin Dear Sir or Madam (Gentlemen: in the USA) and end Yours faithfully (Yours truly: in the USA). If you know the person's surname, begin (for example) Dear Mrs Jones and end Yours sincerely. If the person is more of a friend, begin (for example) Dear Peter, and end Best wishes. In opening and closing salutations and in addresses, it is common not to use full stops and commas.

a Refer to men as Mr. Refer to women as Ms, unless in previous correspondence from them they have indicated that they use the title Mrs (for married women) or Miss (for unmarried women). Women will often indicate their preferred title by writing it in brackets after their signature, for example: Catherine Honey (Mrs). Most correspondents will assume you are a man unless told otherwise, so if you sign a letter H Jones, most people will reply beginning Dear Mr Jones.

- When you sign your name, it is common practice to type it out as well and to put your position in the company below it. If someone in a company signs a letter on behalf of someone else, the initials p.p. (per pro) should be used before the name to indicate this.

- If something is being sent with a letter, Enc, or Encl. (enclosure) should appear in the bottom left-hand corner of the page.

a State your message clearly, concisely, and politely.
2 Enquiries and replies

The content of a letter of enquiry will depend on how well you know the person or company you are writing to. If you are writing to a company for the first time — whether asking for a catalogue or requesting details about a particular product or service — you should start your letter by giving information about your own company. Then state your reason for writing and make your request.

Task 1, when completed, provides a model for a letter of enquiry. Task 2, when completed, provides a model for a reply to an enquiry.

Read the following letter. Fill in each gap with the letter corresponding to the appropriate word.

**Physiologica**

17 Princes Street
London
EC1 7DQ

Telephone 071 982 7111
Telex 988153
Fax 071 982 7712

Our ref: AN/JS
Your ref:

1 July 19___

Discpro SA
251, rue des Ramonieres
F-86256 POITIERS CEDEX
France

For the 1 of the Sales Manager

Dear Sir or 2

We are a software company 3 in London and are currently developing a Windows-based scientific 4 package for use in universities and research laboratories. We are interested in 5 the programs we 6 from unauthorized copying and duplication.

Could you please 7 us more technical information about your RSP-11 software protection system 8 at your current brochure and price list?

We look 9 to hearing from you.

Yours 10

Anne Newson

Anne Newson
11 Director
Complete this reply to the letter of enquiry in Task 1 using the prepositions given. You will have to use some prepositions more than once.

for  from  in  to
on  of  with

251, rue des Ramonières F-86256 POITIERS CEDEX

Discpro SA

Tel (33) 99681031
Telecopie (33) 102163

Ref PV/KH

5 July 19___

Ms Anne Newson
Project Director
Physiologica
17 Princes Street
London EC1 7D0
UK

Dear Ms Newson

Thank you for your letter of 1 July which you expressed an interest in the RSP 11 software protection system. Please find enclosed our latest brochure and price list.

Having the information in your letter, I can confirm that the range of products we supply would be ideal for your needs. In particular, I would like to draw your attention on page 3 which is designed for software protection in both Windows and O/S 2 environments.

As you will see, our protection systems are tailored for individual programs. Please let me know whether you would like to arrange a meeting with our Technical Director, Mr Michel Gerard, to prepare a more detailed report on your program and particular requirements. He will be in London during the week beginning 15 July.

I look forward to hearing from you.

Yours sincerely

P Varene
Sales Manager

Enc.
Task 3

In each of the following sentences, choose the correct word to fill the gap.

1. I would be __________ if you could send me details of your PS/2 range.
   a) thankful    b) please     c) content     d) grateful

2. You were __________ to us by our associates.
   a) advised    b) suggest     c) recommended     d) informed

3. We were given your __________ by The Chamber of Commerce.
   a) identity    b) company     c) name     d) placing

4. Thank you for your letter __________ 19 June.
   a) in    b) on     c) of     d) from

5. Please __________ enclosed our current catalogue and price list.
   a) find    b) look     c) receive     d) examine

6. We would appreciate __________ you could send us further information on
   your range of non-impact printers.
   a) it that    b) this     c) when     d) it if

7. I would be grateful if you could arrange for your Technical Director __________ on me.
   a) will call    b) is calling     c) to call     d) calls

8. We look forward __________ from you.
   a) hear    b) to hear     c) hearing     d) to hearing

9. We would be grateful __________ an early reply.
   a) to    b) of     c) for     d) with

10. Should you require anything further at this time, please do not contact me.
    a) void    b) hesitate     c) delay     d) prevent

Task 4

Match each section of the letter of enquiry on the following page with the appropriate gap on the blank below.
1 We are currently using 15 Procom 211 Premier PCs in our mail-order department. We have been pleased with their performance, but now require machines that will run faster.

2 M H Jansen
Publicity Manager

3 I look forward to hearing from you.

4 Could you please let me know whether it is possible to upgrade the PCs to 486s and what the likely cost would be?

5 Dear Mr Barnard

---

Task 5

You are Mr Barnard. Reply to the letter of enquiry in Task 4.

Paragraph 1: Refer to the customer's letter. Say you are happy that the PCs have given satisfaction.

Paragraph 2: Explain that the Procom 211 Premiers cannot be upgraded because that particular model has been discontinued. Say that you are enclosing the latest catalogue and draw attention to the Procom 400 PC, which would be ideal for the customer's needs. Suggest that you call soon to arrange a time and date when a representative can visit to give a demonstration of the PC.

Paragraph 3: Conclude the letter appropriately.

---

Task 6

Follow the instructions on the memo below. Write out the letter of enquiry in full, including names, addresses, etc.

Mark Walton is the Senior Programmer of Inlogic, Morley House, 18-22 Wolves Road, London SW1 7ND.

---

Memorandum

To Laura Hayward  Date 27 March 19
From Mark Walton Ref

Please send a letter to ASD Computer Products who advertised in the March 23 edition of 'Info Globe'. Say where you saw the advertisement and ask them for their catalogue.
3 Quotations and orders

In reply to an enquiry you may want to provide a potential customer with a quotation. This will, of course, quote the price for the requested goods or services, but it will also give some or all of the following information:

1 details of any applicable discounts (a trade discount may be offered to companies in the same line of business while a quantity discount may apply to orders over a certain amount).
2 details of what costs (if any) are included in the price, such as transport and insurance*.
3 the preferred method and terms of payment (for example, a letter of credit payable within 30 days*).
4 some indication of how long it will take for the goods to reach the customer.

Task 1, when completed, provides a model for this type of letter.

The order itself is likely to be written on an official order form, but it will normally be accompanied by a covering letter confirming the terms that have been agreed. The letter in Task 2, when corrected, provides a model for a covering letter to an order.

Task 1

The following letter gives a quotation. Read it and choose the best word from the options in brackets.

Dear Mr Gianelli

Thank you for your fax of 18 May in which you request a quotation for 5 EMC180 flat-bed scanners.

We can offer a gross price of £3,425.00 — unit price: £685.00 — c.i.f. Genoa. This includes a (batch, quantity, multiple) discount of 10%.

Payment may be (done, made, spent) by irrevocable letter of credit or by banker's draft. On all (starting, initial, prime) orders we usually require payment (on by, of) delivery, and for all subsequent orders we (make, let, allow) a 30-day credit period. Please let us know how you would like to arrange payment.

We have the items in stock and can (persuade, assure, console) you that your order will be dealt with promptly. Please allow six weeks for delivery.

We look forward to hearing from you again soon.

Yours sincerely

P. J. Wilson

P J Wilson
Sales Manager
The following letter was written to accompany an order. There are 8 mistakes (grammar, style, EMC18Order, vocabulary, spelling, etc.). Can you find and correct them?

Dear Mr P J Wilson

Thank you for your fax of 19 May. Please find enclosed our 30-dayno 88694 for five EMC180 Scanners.

We would like confirming that payment for this initial order will be made by banker's draft on delivery. We will take advantage of the 30-day credit period for any subsequent orders.

We would appreciate if you could arrange for the scanners to be shipped as soon as possible.

I look forward to hear from you in short.

Yours faithfully

[Signature]

S Gianelli
Chief Buyer

Enc.

Task 3

Match the beginnings and ends of these sentences.

1. Please find enclosed our current price
2. Please fill in the order
3. The prices quoted are subject to
4. Payment can be made by
5. We offer free overnight delivery on
6. We would like to place an order
7. Please could you let us know what trade
8. If the product sells well, we will
9. Please find enclosed a cheque
10. Please let us know when

a. cheque or credit card.
 b. with you for 2,000 units.
 c. we can expect delivery.
 d. discounts you can offer.
 e. for £395.95.
 f. place further orders with you.
 g. list and order form.
 h. form on Page 26.
 i. orders of over £50.00.
 j. VAT at 17.5%.
Due to a malfunctioning word processor, the following two letters have been mixed up. One is from Discpro SA providing a quotation for a further order of software plugs. The other is from Physiologica to confirm the order. Match each missing section with the appropriate gap on the blank letters.

1 We would like to place an initial order with you for 500 RSP 11W plugs and enclose your official order form. We normally make payments by banker's draft. Could you please confirm that this is acceptable to you?

2 Further to your letter of 1 July and your meeting with Mr Gerard in London on 18 July, I am pleased to be able to give you a quotation for the software protection plugs you discussed.

3 P Varenne
Sales Manager

4 Thank you for your letter of 23 July.

5 We hope that this highly competitive price will meet with your approval, and I look forward to receiving your order.

6 Dear Mr Varenne

7 Anne Newson
Project Director
Enc.

8 Mr P Varenne
Discpro SA
251, rue des Ramonieres
F-86256 POITIERS CEDEX
France

9 I would like to point out that delivery before the end of November, as agreed with Mr Gerard, is a firm condition of this order as we hope to have the program ready for sale by then.

10 Dear Ms Newson

11 Ms Anne Newson
Project Director
Physiologica
17 Princes Street
London EC1 7D0
UK

12 We would be able to supply 500 RSP 11W plugs at a unit cost of £17.86, including transportation costs. On any additional orders, we would be able to offer a 20% discount on the unit price.
Discpro SA

Tel (33) 99681031
Télécopie (33) 102163

Ref: PV/KH
23 July 19

a

b
c
d
e

Yours sincerely

Physiologica

17 Princes Street
London
EC1 7DU

Telephone 071 982 7111
Telex 988153
Fax 071 982 7712

Our ref: AN/JS
Your ref: PV/KH

27 July 19

f

g

h

i

j

k

I look forward to hearing from you.

Yours sincerely

l
Task 5

When writing formal letters, we often precede questions which ask for information with phrases like *Could you please let us know...* and *Kindly inform us...*

Look at the examples below and note how the original questions change when they become part of a longer question or statement. Then change the questions which follow in the same way.

1. When/Where/How will the consignment arrive?
   Could you please let us know *when/where/how the consignment will arrive?*

2. Do you offer discounts on large orders?
   Could you tell us *whether you offer discounts on large orders?*

3. Are you interested in this offer?
   Please let us know *whether you are interested in this offer.*

1. How would you like us to pay?
   Could you please let us know -

2. How many items would you like to order?
   Please let us know

3. Do you have the items in stock?
   Could you please tell us

4. Are these terms acceptable to you?
   Please let us know

5. Do you anticipate any delays with delivery?
   Please let us know

6. When would you be able to ship the order?
   *Kindly inform us__________

7. Where would you like us to send the order?
   Please let us know

8. Would you be prepared to offer us a quantity discount?
   Could you please tell us

9. When would you like to receive payment?
   Please let us know

10. Would you like us to arrange a maintenance contract?
    Kindly inform us

Task 6

Follow the instructions from George Ramsden, Senior Project Engineer at Bespoke Assemblers, 22 Clarendon Street, Cambridge CB4 8RP.
Memorandum

To Sally Parker

From George Ramsden

Date 24 July 19_ 

Please write a letter to Frith Components, 139 Giles Kemp Road, London N1 2RR.

1 Say we saw the advertisement for their company in the latest issue of Electronic Engineer.

2 Ask if they are able to supply the following:
   20 486DX-33 motherboards
   12 4Mb SIMM 60NS
   8 Intel Ether Express 8/16-bit switchable cards.

3 Find out what discounts they give and what their terms of payment are.

Methods of payment

Common methods of payment include:

**bank transfer:** payment can be made by ordering a home bank to transfer money to an overseas account. If telegraphed, the transfer is known as a telegraphic transfer (TT), and if mailed, a mail transfer (MT). The Society for Worldwide Interbank Financial Communications (SWIFT) offers facilities for a 24-hour transfer of money to a beneficiary on its computer systems.

**international banker's draft:** a banker's cheque which the bank draws on itself and sells to the customer, who then sends it to his supplier as he would an ordinary inland cheque. So if you have to pay your supplier £2,000, you purchase the cheque for that amount, plus charges. Usually the receiver's bank should either have an account with the sender's bank, or an agreement.

**bill of exchange:** the seller prepares a bill of exchange in the name of the buyer. The bill states that the buyer will pay the seller an amount within a stated time, e.g. 30 days. The bill is sent to the buyer either by post, or through a bank, and the buyer signs (accepts) the bill before the goods are sent. Shipping documents usually accompany bills when the bank acts as an intermediary in overseas transactions.

**letter of credit (L/C):** letters of credit (or documentary credits, as banks refer to them) have to be applied for from the buyer's bank, by filling out a form giving details of the type of credit (i.e. revocable, which can be cancelled, or irrevocable, which cannot be cancelled), the beneficiary (the person receiving the money), the amount, how long the credit will be available for (i.e. valid until...), the documents involved (bill of lading, insurance, invoice, etc.), and a description of the goods. The money will be credited to the supplier's account as soon as confirmation of shipment is made. This is done when the documents are lodged with the customer's bank.

Transport and insurance costs

There are a number of abbreviations that explain the price quoted to the customer. These include:

**exworks:** the buyer pays all costs once the goods leave the factory/warehouse.

**f.o.r.** (free on rail): includes cost of delivery to the nearest railway station.

**f.a.s.** (free alongside ship): includes cost of taking goods to the side of the ship, but not loading.

**f.o.b.** (free on board): as for f.a.s., but includes cost of loading goods.

**c.& f.** (cost and freight): includes cost of shipping goods to the named destination, but not insurance.

**c.i.f.** (cost, insurance, and freight): includes all costs to the named destination.
Letters of complaint and replies

The purpose of a letter of complaint is to get a problem solved so avoid emotional language (e.g. I am absolutely furious...). In any case, the person reading your letter is probably not the person who caused the problem. When replying to letters of complaint, avoid blaming a member of staff by name. Instead use a passive structure. Compare the following examples:

1 Mrs Smith, in our accounts department, sent the wrong invoice.
2 The wrong invoice was sent due to an error in the accounts department.

A letter of complaint should be structured as follows:

1 Begin with a clear reference.
2 State clearly what the nature of the complaint is.
3 Suggest a course of action that should be followed.
4 End the letter politely.

Task 1 shows a typical letter of complaint.

A reply to a letter of complaint should be structured as follows:

1 Begin with a reference to the letter.
2 If appropriate, apologize for the error and explain what happened.
3 Say what action you will take.
4 Apologize again and end the letter politely.

Task 2, when completed, provides a model for a reply to a letter of complaint.

Task 1

Read this letter of complaint and answer the questions at the top of the following page.

PRINCES MARKETING
Vesson House, Newell Street, Birmingham, B3 3EL

14 May 19

Mr P R Smith
Sales Manager
Wildman Office Equipment
18 Station Lane
London N8 4HB

Dear Mr Smith,

I am (complaining, writing, referring) regarding the consignment of 14 Olivetti 486 PCs, order no. 3982/JKS which was delivered on 12 May.

It was clearly stated on the order form that these machines should be pre-loaded with the latest version of DOS. Unfortunately, they have all been loaded with DOS version 3.1, and we are therefore unable to run a number of programs. In addition, you agreed to supply all the necessary cables, but three of these are missing.

Could you please send one of your representatives to load the machines with the correct version of DOS as soon as possible. In addition, please send the three cables (part number CN-H97/K) as soon as possible.

Yours sincerely,

G O Panting
Operations Manager
1 Does the letter begin with a clear reference to the particular consignment?
2 What is Mr Panting's complaint?
3 What does he want the supplier to do?
4 Do you think the letter is polite enough?

Task 2

Here is the reply to Mr Panting's letter. Fill in the missing prepositions.

Wildman Office Equipment

18 Station Lane
London N8 4HE
Telephone 071 996 6431/2/3
Telex 485881
Fax 071 996 6444

Your Ref
Our Ref

17 May 19_

Mr G O Panting
Operations Manager
Princes Marketing
Newell Street
Birmingham B3 3EL

Dear Mr Panting

Thank you for your letter of 14 May regarding problems with a consignment that was recently sent to you.

The difficulty appears to have arisen from a misunderstanding in our ordering department, and the matter has now been put right.

I have asked our Corporate Computing Consultant, Mr R Marley, to call on Friday 21 May at 9 a.m. to ensure that the PCs are correctly loaded and to supply the three cables that were left out of the order.

I will telephone you to check that this meeting is convenient, and in the meantime, I would like to apologize for the inconvenience that has been caused.

Yours sincerely

PR Smith
Sales Manager
Task 3
Rewrite these sentences using the passive, beginning with the words indicated.

1. You have sent us the wrong items again.
   The wrong ____________________

2. You should have delivered this consignment last week.
   This consignment __________________________

3. Someone broke two of the VDUs during transportation.
   Two __________________________

4. Someone sent the order by sea mail instead of air mail.
   The order __________________________

5. Please let me know when you think you can sort this matter out.
   Please let me know when you think this matter

6. You should have sent the documents by registered post.
   The documents __________________________

7. A faulty connection could have caused the problems with the hard disk.
   The problems with the hard disk __________________________

8. You omitted the manuals from the order.
   The manuals __________________________

9. You delivered the printers over three weeks late.
   The printers __________________________

10. We will not pay the invoice until this problem is rectified.
    The invoice __________________________

Task 4
Match the beginnings and ends of these sentences:

1. I am writing to complain about the late __________________________
   a collected from the factory.

2. I am writing with reference __________________________
   b on the invoice.

3. We are returning the goods to you because __________________________
   c a fault in the manufacturing process.

4. Please arrange for the goods to be __________________________
   d we are not satisfied with them.

5. Please send us a refund for __________________________
   e delivery of items I ordered last week.

6. Please accept my apologies __________________________
   f to order UH-879/94.

7. The problem arose due to __________________________
   g the full amount.

8. We would like to apologize for the error __________________________
   h for the inconvenience.
Task 5

Look at the following letter of complaint from Physiologica to their suppliers.

1 In pairs or small groups, decide:
   a how effective the letter is.
   b how it could be improved.

2 Rewrite the letter in a more concise and appropriate manner (in about 80 words). Use the spaces provided.

Dear Mr Varenne

When we began this association, I had great hopes that everything would run smoothly, and there was little reason to suppose that your organization was in fact a TOTAL SHAMBLES; and to be quite frank with you, it astonishes me that you have managed to stay in business for as long as you have. You've made a complete mess of our order.

We made it clear that we wanted the software protection plugs by the end of NOVEMBER because we were going to start selling our program. Time and time again, you said that there was no problem, and yet here we are, two weeks from the launch of the program, and there isn't a plug in sight. I am absolutely furious, and so is everyone else here.

Now listen: this is your very last chance. Get those plugs here within five days or the deal is off, and we'll go to someone else. OK? And if that means that you lose your development costs, that's your problem.

I advise you to contact me immediately because I'm finding this situation an incredible strain, and I can't take much more of this.

Yours sincerely

Anne Newson

Anne Newson
Task 6

You are Mr Varenne. Write a reply to the letter from Ms Newson.

I Thank her for her letter.
2 Apologize for the difficulties the late delivery is causing. Explain that a small number of the plugs had a technical fault caused by a problem in the manufacturing process. You have now sorted the problem out.
3 Say you have now sent the full consignment of plugs and they will arrive within the next few days.
4 Apologize for the delay and end your letter politely.

5 Employment

When you apply for a job, you may need to fill in a company application form which asks for personal details, your qualifications, and your work history. Alternatively, you may be asked to supply a curriculum vitae, which gives similar information, but which you write yourself.

In either case, you will need to write a covering letter to go with the application form or CV. Most jobs will have been advertised in the papers or specialist publications, and before you write your covering letter you should study the wording of the advertisement carefully. Find out exactly what the employer is looking for (for example, a certain amount of experience, familiarity with particular languages, etc.). Then, in your covering letter, try to show that you have all the qualities, qualifications, and experience that the employer is looking for. You should not simply repeat all the information in the CV, you should highlight the most important parts.

Task 1

Read this advertisement and answer the questions that follow.

**Systems Programmers to £20,000 - London**

Our client is a major UK clearing bank whose range of activities is as impressive as the growth of its profits. A bank that is dedicated to a long-term programme of systems development.

With IBM RS/6000, System 38, and VAX hardware driving user-interface PC networks using C, UNIX, FOXPRO, and SYBASE, there's no doubting our client's commitment to systems innovation and investment.

We are looking for SYSTEMS PROGRAMMERS with C and UNIX skills, who can show us 2 years' experience of delivering advanced banking and online information systems. Above all, we need flexible thinkers who appreciate the commercial realities and priorities of the banking industry.

Show us these qualities, and our client can offer you a competitive salary plus many banking benefits. If your talents and ambitions are ready for such a move, please send your CV, quoting Ref. 349, to:

Harriet Bradman at Compro Recruitment Services,
318 Leadhill Street, London EC1 1DR.

1 Who placed the advertisement?
2 What software does the current system use?
3 What specific characteristics or qualities are required?
4 What benefits come with the job?
David Manning has applied for the job advertised in Task 1. Before reading his letter, tick the items you think he should mention in replying to the advertisement.

Do you think he should:

1. begin with a reference to where he saw the job advertised?
2. give details of the subjects he studied at school?
3. list briefly all previous jobs?
4. be honest and admit that he lacks exactly the required experience?
5. indicate his current level of responsibility?
6. explain why the company would benefit if they employed him?
7. say when he will be available for interview?
8. request that they reply as soon as is reasonably possible?

Now read the letter and compare your predictions. Do you think it is a good letter? Discuss the reasons for your opinion.

22 Carlyle Crescent
London WC1H 9BH
18 June 19___
Yr Ref: 349

Ms H Bradman
Compro Recruitment Services
318 Leadhill Street
London EC1 IDR

Dear Miss Bradman

I wish to apply for the post of Systems Programmer, which was advertised in this month's edition of IT World.

I am currently a Systems Programmer at GCG Merchant Bank where I have two years' experience of specialized programming for the financial sector. I am familiar with C/UNIX, LAN/WAN technology, and relational databases.

Prior to taking over my current post, I worked for Data International as a Trainee Systems Programmer, where I was involved in the development of a new online information system for a financial services company.

My experience in the fields of both banking and online information services has given me the necessary commercial and technical awareness to be able to make a valuable contribution to the systems development programme of your client.

Please let me know if there is any further information you require.

I look forward to hearing from you.
Yours sincerely

David Manning

David Manning
Task 3

The advertisement mentioned three specific requirements for the job. Write down the phrases that David Manning used when referring to those requirements.

1

2

3

Task 4

Using the information from the letter, complete the following CV that David Manning sent with the covering letter.

CURRICULUM VITAE

Name: David William MANNING
Age: 21
Date of Birth: 29 May 19
Marital Status: Single
Address:

Tel: Status 6925

Personal details

Position applied for:

Education 19__

St Godric's School, Buckingham
General Certificate of Education
Mathematics

19__

Physics
English
German

Work experience

19__ to present

Aston Technical College, Birmingham
OND in Computing

Company: GCG Merchant Bank
Post

Responsibilities:

Other information

Company:
Post:

Responsibilities: assisting in the development of a new online information system for a financial services company.

Clean driving licence

Referees
Mr Joseph Morse
Systems Manager
GCG Merchant Bank
Threadneedle Street
London EC1 7GH

Mr J H Holloway
Data Processing Manager
Data International
106 Sidmouth Street
London WC1H 4GJ

Current Salary £16,500 p.a.
Task 5

In each of the following sentences, choose the most appropriate word from the options in brackets.

1. I am writing to **apply, request, ask** for the post of Sales Consultant advertised in today's edition of 'The Independent'.
2. I enclose my curriculum vitae for the **job, position, work** of Program Manager.
3. As you will **see** from the enclosed **CV, covering letter, application**, I have had several years' experience of Export Sales.
4. I **qualified, left, graduated** from Manchester Technical College with an HND in Electronic Engineering.
5. At present, I am **worked, employed, taken** by Unisys, where I work in the Customer Services Department.
6. I would be grateful if you could send me an application **form, formula, card**.
7. While I was at Dell, I was **liable, responsible, charged** for the day-to-day running of the Technical Services Department.
8. At ICL my duties **included, added, completed** installing and testing new computer systems.
9. I look **forward, ahead, on** to hearing from you.

Task 6

Complete the CV with all the relevant information about yourself.
Compro Recruitment Services are advertising a number of jobs. Choose a job and write a covering letter to send with your completed CV.

Begin by saying which post in particular you are applying for.
Give relevant details about yourself and your experience/qualifications.
Say why you would be useful to the company.
Close your letter politely.

Sales and support
£12,000 to £15,000
A growing company requires an experienced PC Consultant to provide technical support for both specialist systems and general packages including word processors, spreadsheets, and databases. Additional responsibilities will include dealing with sales enquiries, both at exhibitions and on the telephone. Full training in this area will be provided.

Ref. S/167

Programmers/Analyst programmers
To £20,000
A London-based financial organization requires an experienced person with a thorough knowledge of UNIX and ‘C’. You will need excellent communication skills and be able to work effectively as a member of a team. This company offers excellent benefits and prospects to its employees.

Ref. P/256

Network manager
£16,000 to £20,000
Well-known manufacturers seek ambitious candidate with one to two years’ experience of using Lotus, Paradox, WordPerfect, and Harvard Graphics. A knowledge of Windows will be a definite advantage. Working within a small team, you will be solely responsible for the support and management of forty to fifty PCs running on a network.

Ref. N/80

Junior support
£15,000 + benefits
A specific requirement has arisen in an international bank. A vacancy exists for a PC support professional to work within a small team. You will be the first point of contact for dealing with problems relating to software, hardware, and networks. Candidates should have a minimum of 18 months experience. Further training will be given on the job. Knowledge of mainstream PC software is essential, i.e. Windows, Excel, Lotus, WordPerfect. You should be well presented with excellent interpersonal skills. Very attractive position with much scope for career progression.

Ref. S/168

Analyst programmers
£ negotiable
Analyst programmers with at least two years’ C’ or OS/2 experience looking to move into a truly dynamic development environment should call us NOW! The package is negotiable and promotion prospects are excellent for those prepared to work hard.

Ref. P/257

If you are interested in any of the above vacancies, contact Valerie Stevenson at:

FASTRECRUIT
18 Wolvercote Avenue
Bolton
BC12 6CT

Telephone
0204-112340
Appendix 2
Glossary of technical terms and abbreviations

The definitions in this glossary refer to words only as they are used in this book. The meanings of certain words will vary according to context. As the texts in this book are authentic and come from a variety of sources, some inconsistency in hyphenation and spelling is inevitable.

How to use the Glossary

artificial intelligence /ˌɑːtɪˈfɪʃəl/ ɪˈntrɪdʒəns/ [4, 13] the discipline concerned with the building of computer programs that perform tasks requiring intelligence when done by humans

operator /ˈɒpərətə(r)/ 1 [C] someone responsible for running a computer (usually a mainframe) 2 [4] see relational operator

Abbreviations used in the text

n = noun
v = verb
adj = adjective

7-bit code /ˈsevn bit ˈkɑud/ [3] a coding system which uses seven bits to represent a character, giving a possible 128 different patterns. See ASCII.
8-bit code /ˈeɪt bit ˈkɑud/ [3] a coding system which uses eight bits to represent a character, giving a possible 256 different patterns. See EBCDIC.
8-bit colour /ˈeɪt bit ˈkʌlə(r)/ [15] describing colour monitors which use eight bits to control 256 possible shades of grey or 256 colours

24-bit colour /ˌtwɛnti ˈfɔːtɪt bit ˈkʌlə(r)/ [15] describing colour monitors which use eight bits to control each of the red, green, and blue electron guns. This gives 256 shades for each of the three colours, allowing a total of 16.7 million colour shades.
32-bit colour /ˈθɜːti tuːt bit ˈkʌlə(r)/ [15] describing colour monitors which have 24-bit colour with an additional 256 possible transparent colour overlays
access /ə'kwɪkz/ v [10] connect to, or get (information) from, a system or a database
access control /ə'kwɪks kən'trɔul/ [7] a feature of a computer security system which prevents unauthorized users from accessing a system
access request /ɪə'kwɪks ri'kwɛst/ [10] a user request for data from a database
accumulator /ə'kju:leɪtə(r)/ [1] a register that holds the results of operations performed by the arithmetic portion of the CPU
acoustic coupler /ə'kʊstɪk ˈkeɪplə(r)/ [3] a device that converts the digital data of the computer into a sound signal that can be understood and transmitted by a telephone network. The connection is usually made by placing the handset of a telephone into rubber cups containing a microphone and a loudspeaker.
adaptor board /oʊd'wɪptoʊ, bɔːd/ [1] a circuit board put in a spare slot in a microcomputer to control an external device
A/D converter /eɪˈdiː kənˈvɜːtoʊ(r)/ [81] analog-to-digital converter: an electronic circuit that changes analog signals to digital signals
address /ˈædres/ [11] a location within the memory of a computer
address bus /ˈædres ˈbʌs/ [1] a signal route within a computer dedicated to sending address information. This may be a subset of the system bus.
address register /ə'dres _red3ista(r)/ [1] a register which stores an address in memory
AI /eɪˈal/ [13] artificial intelligence
ALGOL /ə'gləʊl/ [4] algorithmic language: a language developed for mathematical and scientific purposes
algorithm /ə'lɔːrhythm/ a prescribed set of well-defined rules or instructions for the solution to a problem
 alphanumeric /,wɪfonjuːˈmɛrɪk/ adj used to describe data that contains numbers and letters
analog /ˈænələɡ/ adj [3] describing a smoothly varying signal that has no discontinuities
analogue /ɪnəˈlog/ see analog
analyst /ə'nælist/ [4] someone responsible for understanding a problem in a business environment and designing a computer system to solve it
android /əmdmiːl/ [11] a mobile robot whose structure approximately resembles that of a human
ANSI /ænˈziː/ American National Standards Institute: an industry-supported standards organization founded in 1918 that establishes US industrial standards and their correspondence to those established by the International Standards Organization (ISO)
anti-glare shield /ˌæntiˌɡlɛrˌʃeld/ [B] a protective screen over the front of a computer screen to reduce the amount of reflected light
APL /ˌeɪ piˈɛl/ [4] a programming language: originally devised as a mathematical notation and later turned into a language
application(s) program /ˌæplɪkeɪʃn(ə)ˈprɔɡræm/ [2, 4] a program written in a high-level language, designed to perform a specific function such as calculate a company's payroll
application software /ˌæplɪkeɪʃn ˈswɔrɪtʃ/ applications programs (i.e. programs that directly meet the needs of the computer user). In contrast, systems software (part of the operating system), although essential, does not directly meet any specific user needs.
arithmetic-logic unit /ˌærɪθməˈlɒgɪkjuːn/ the component of the CPU which performs the actual arithmetic and logic functions asked for by a program
arithmetic unit /ə'rɪθmətɪkˌjuːnɪt/ [1] see arithmetic-logic unit
artificial intelligence /ˌɔːtɪfiʃəl ɪnˈtelɪdʒəns/ [4, 13] the discipline concerned with the building of computer programs that perform tasks requiring intelligence when done by humans
Assembler /əsˈmɛlbə(r)/ [4] a program that takes as input a program written in assembly language and translates it into machine code
assignment statement /ə'seɪməntˈstæmt/ [4] a fundamental statement of most programming languages that assigns a new value to variables
asynchronous /ə'sɪŋkroʊnəs/ [14] describing a form of computer control timing in which a specific operation is begun as soon as a signal is received to indicate that the preceding operation has been completed
AT-compatible /eɪtiːˈkæmpwətər/ [14] describing a computer which can run the same software as the IBM PC model AT
audio board /ˈædʒuˌboʊd/ [14] a computer expansion board that allows sound to be recorded and played back by the computer
audio note /ˈθouˌnaut/ [14] in multimedia, a digitized audio message that can be attached to text or graphics

auto kerning /ˈɔ:tu,kɛrnɪŋ/ [5] a word-processing feature that automatically adjusts the space between the characters of a typeface to give the best-looking lit

automate /ˈɔ:tmɪt/ v [11] use automatic equipment and machines to perform an activity previously done by people

automaton /ˌɔːtməˈteɪn/ [11] a machine capable of operating independently, such as a clothes drier

auto numbering /ˈɔːtnərɪnɪŋ/ [5] a feature that automatically numbers diagrams, paragraphs, etc., in a document

text:  

B /biː/ [4] a programming language derived from BCPL

background /ˈbekgrəʊnd/ [2] describing processing which does not involve computer—user interaction. Such processes use spare computer resources to perform low-priority tasks.

backing storage /ˈbeɪkiŋ streɪdʒ/ see secondary memory

backup /ˈbʌkəp/ n a copy of a piece of data or a program taken in case something happens to the data or to the disk on which the original data is stored

back up /ˈbæk əp/ v [2] take a backup

bandwidth /ˈbændwɪdθ/ [14] the difference between the lowest and highest frequency in a group of frequencies

bar code /ˈbɑː kəd/ [K] a machine-readable printed code that consists of parallel bars of varied width and spacing, usually used to code goods

bar code scanner /ˈbɑː kəsænər/ ibukæd, sɪn3(r)/ [1K] a scanning device that can read bar codes as input

BASIC /ˈbeɪsɪk/ [4] beginners’ all-purpose symbolic instruction code: a programming language developed in the mid-1960s to exploit the capability (new at that time) of the interactive use of a computer from a terminal

batch program /ˈbætʃ prəʊgrəm/ ibwtr5ˌprɔʊgnəm/ [121] a program that runs without any terminal or user interaction. Typically such programs perform large scale updates, produce reports, or handle housekeeping functions. A high priority batch job may be run in foreground.

BCPL /ˈbiː siː pliˈeɪ/ [4] a programming language used for systems programming

binary adder /ˈbaɪnəri ˈdɔːrɪŋ/ [LL] the portion of the arithmetic-logic unit which performs binary addition and subtraction

binary arithmetic /ˌbaɪmərɪˈɛθmætɪk/ [4] arithmetic done to the base 2 using only 0 and 1 as its basic digits

binary number /ˌmaɪnərəˌnʌmbə(r)/ [15] a number (0 or 1) used in binary arithmetic

bistable /ˌbɪstəbl/ [1] an electronic circuit whose output can have one of two stable states, i.e. on or off

bit /bit/ binary digit holding the value 0 or 1: the smallest unit of information in a computer system

bitmap /ˈbɪtmæpt/ [6] describing the image displayed on a computer screen whereby each pixel corresponds to one or more bits in memory


block /blɒk/ a physical group of records on a tape or disk. A number of blocks form a file. Records are blocked together to improve 1/0 throughput.

Boolean algebra /ˌbʊliən ˈɛldʒəbrə/ an algebra closely related to logic in which the symbols do not represent arithmetic quantities

boot /bɔt/ v [2,7] reload the operating system of a computer

broadcast /ˈbreɪkstrist/ [61] a message-routing algorithm in which a message is transmitted to all nodes in a network

bug /bʌɡ/ n an error in a program

bulletin board /ˈbʊlɪtən, ˈbʌdɪŋ/ [31] a teleconferencing system that allows users to read messages left by previous users on a variety of topics. All users can see all messages, unlike e-mail where the message is private.

bus /bʌs/ [11] a signal route within a computer to which several items may be connected so that signals may be passed between them

bus network /ˈbʌs nɜːtərɪ/ [161] a network topology which is non-cyclic, with all nodes connected. Traffic travels in both directions and some kind of arbitration is needed to determine which terminal can use the network at any one time.

byte /bæt/ [2] a character consisting of 8 binary digits or bits

C /siː/ [4] a highly portable programming language originally developed for the UNIX operating system, derived from BCPL via a short-lived predecessor B

C++ /siː pəˈleɪst/ [141] a programming language combining the power of object-oriented programming with the efficiency and notational convenience of C

cabling /ˈkeɪblɪŋ/ [6] the wiring used to carry the signals for a network

CAL /ˈkæl/ Computer Assisted Learning: one of several terms used to describe the use of computers in training and education
CALL /kwl, ko:1/ [91 Computer Assisted Language Learning: the use of computers in the teaching of languages

capacity /ka'pwsati/ [2] the amount of free unused space left on a disk

CBT /'ti:/ [9] computer-based training: see CAL

CD-ROM /'ti: 'nm/ [8] the predominant form of ROM optical disk. Both disk and drive are based on the product used for commercial music systems. The disk is 120mm in diameter, single-sided, and holds up to 600Mb of data.

cell /sel/ [A] a location in a spreadsheet capable of holding text, numeric data, or a formula

central processing unit /'sentral 'pratisen3, junit/ [1] the principal operating part of a computer, consisting of the arithmetic unit and the control unit

channel /t'xal/ [1] a specialized processor that consists of an information route and associated circuitry to control input/output operations. More than one I/O device may be attached to a channel for fast accessing and updating of information.

check point /t'point/ [2] a point in a series of programs at which a backup is taken, and the point at which the series of programs will be restarted

chip /t'fip/ [F] see microchip

circuit is3:1city/ [11 a combination of electrical devices and conductors that form a conducting path

circuit board is3:lot,113:d/ [1] a board containing integrated circuits which make up the processor, memory, and electronic controls for the peripheral equipment of microcomputers

click /'kik/ v [1] press the button on a mouse to initiate some action or mark a point on the screen

clipboard /klipbp:d/ [2] see portable computer

clock /'klk/ [1] an electronic device that generates a repetitive series of pulses, used to control and synchronize the internal workings of a computer

cluster controller /Asta kan,traula(r)/ [3] a device that controls a number of similar peripheral devices such as terminals and links them up to the main computer

coaxial cable /1cou'wksial, kethl/ [6] a type of network cable consisting of two wires, one of which is contained totally within the other


code /kaut/ n [7] the representation of information data in symbolic language or in a secret fashion

code /kautd/ v write a computer program

cold-boot /kautd but/ v [71 load the operating system of a computer from 'cold' (i.e. when the computer has to be switched on first)

command-based /ka'man' ,bust/ [11 a computer system which interacts with the user by commands entered at a prompt on the screen. See command line interface.

COMMAND.COM /ka,ma:nd 'knm/ [7] the main part of DOS

command line interface /ka,ma:nd 'laun 'intafes/ a method of interaction with a computer whereby the user types specific commands in order to achieve his requirements. This is generally regarded as not very user-friendly, although it is often the most efficient way of communicating with the computer.

comment /'knm~ent/ [4] part of a program text included for the benefit of the human reader and ignored by the compiler

compile /kam'pail/ v [4] interpret a source program or a list of instructions in symbolic language

compiler /kam'paila(r)/ n [41 a program which converts source programs into machine code. Each high-level language has its own compiler.

compound document /,knapaund 'dokjitment/ [141 an electronic document which may contain text, photographs, spreadsheets, audio, or graphics

compress /kam'pres/ v [141 in multimedia, to force digitized data into a smaller space for handling by the system

CompuServe /1nmpju:s3:v/ [3] an online service

computational psychology /,knapju:,teif and sailnlad31/ [131 a discipline lying across the border of artificial intelligence and psychology concerned with building computer models of human cognitive processes. It is based on an analogy between the human mind and computer programs.

computer /kam'pjuta(r)/ [1] put simply, a system that is capable of carrying out a sequence of operations in a distinctly and explicitly defined manner

computer centre /kam'pjuta ,senta/ [7] a place where there is a central computer facility usually containing mainframes

computer game /kam'pjuta germ/ [1] an interactive game played against a computer

computerize /kam'pju:ta raiiz/ v [1] provide a computer to do the work of/for something

computer language /kam'pjuta jwangwid3/ [5] see programming language

conceptual schema /kan,sepS ual 'skirma/ [10] the logical design of a database
conference /ikonfrans/ [3] a computer-based system enabling users to participate in a joint activity despite being separated in space or time
configuration /kan,figu'reqn/ [6] the particular hardware elements and how they are interconnected in a computer system or network
consultant /kan'sAltant/ [6] a (computer) expert brought in to give advice
control bus /kan'traul _bAs/ [1] a signal route within a computer dedicated to the sending of control signals
control flow construct /kan'traul _flu 'konstrAkt/ [4] a syntactic form in a programming language to express the flow of control. Common structures are ‘if... then... else...', ‘while... do...', ‘repeat... until...', and ‘case'.
control function /kan'traul fADkIn/ a function performed by the control unit of a computer co-ordinating the internal functions and passing commands to the processor
control signal /kan'traul _signal/ [2,12] an electronic signal sending a control message to another part of the computer or to a robot
control unit /kan'traul _junit/ [1] one of the two main components of the CPU. It transmits co-ordinating control signals and commands to the computer.
counter ikaunte(r)/ [L] a component of the control unit which selects instructions one at a time from memory
CPU /si:pi: 'ju:/ [1] central processing unit
debug /di:'bAg/ v remove bugs from a program
decision support system /_th,si3n sa'po:t ,sIstam/ [8] (computerized) system designed to aid managers in day-to-day operational decisions
declaration statement /,dekla'reif n ,steitmant/ [4] in C, the element of the program that introduces an entity, giving it a name and establishing its properties
deleted idedikeitid/ [1] used exclusively for something
delete key /,ki:/ [2] the key on a keyboard which, when the cursor is placed over a character, deletes it
desktop publishing /_desktop tij/ [5] the use of a computer system to perform many of the functions of a printing shop, including page layout and design, choice of fonts, and the inclusion of illustrations. The output may be sent to a printer or to a high quality typesetter.
detonator Tdetaneita(r)/ [7] a device used to set off another process or event
device /di'vais/ [1] a piece of hardware that is attached to a computer and is not part of the main central processor (CPU)
device control /dvais kantraul/ [3] the use of control characters to control external devices
dialling up /,daialnj 'Ap/ [8] using a modem to connect a terminal or PC to a remote computer
digit /fdid3it/ a number which has only one character: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9
Digital Research disk operating system

disk drive /disk draiv/ [2] a device which is capable of transmitting magnetic impulses representing data from the disk to the computer memory and vice versa
disk error /disk ,er(o)6/ [2] a detected (or otherwise) error in the way that data is stored on the surface of a magnetic disk. Such errors are usually detected when reading from or writing to the disk.
diskette /di'sket/ see floppy disk
display /dis'plei/ [8] see VDU
distributed (computer) system /'th,stri:bi:ud kom'pjuto) 'sistom/ [6] the organization of processing whereby each process is free to process local data. The processes exchange information with each other over a network.
document Alokjumont/ v [4] produce the material that serves to describe a program and make it more readily understandable
document image-processing /'dokjamont ,promu:si/] [8] a system which takes scanned images of documents and stores them on computer for access, rather than filing the paper copies of the document
document processing idokjumont ,promu:si/ [14] the machine-processing, reading, sorting, etc., of documents that are generally readable both by humans and computers, e.g. bank cheques
DOS /dos/ [2] disk operating system: the generic term for the operating system developed for IBM PCs and their clones
download /dlaunloud/ v [3] send programs or data from a central computer to a remote terminal or PC
dump /dum/ v [2] in a system handling large numbers of users' files stored on magnetic disk, to take a periodic record of the state of the disks that are made on magnetic tape, in order to protect against accidental overwriting or mechanical failure of the disks

EBCDIC /'ebsidik/ [3] extended binary coded decimal interchange code: a proprietary IBM character encoding scheme based on eight bits allowing 256 characters
electronic circuit /,elektronik 'sa:lut/ [1] a combination of electrical devices and semiconductors that form a conducting path
electronic mail /,elektronik 'meil/ [3,8] messages sent between users of computer systems, where the system is used to hold and transport messages. Sender and receiver need not be online at the same time.
electronic publishing /,elektronik 'paBlif iq/ [E] the publishing of text in an electronic format
e-mail [3,8] electronic mail
ergonomic /,3:go'nomik/ adj [8] describing something which is designed to take into account the human who is to use it
evaluate /'eksikju:t/ v [2] run a program in a computer
expansion /ik'spwnfn/ [6] the addition of extra facilities or features
expansion board /ik'spwri.jn ,bad/ [6] a printed circuit board that may be inserted into a computer to give it extra functionality
expansion slot /ik'spwnfn ,slot/ [2] a spare space on the system board of a computer to which expansion boards can be fitted
expert system /'eks:pæt,sistom/ [13] a system built for problem solving which tries to emulate the skills of a human expert. The result of study in the field of artificial intelligence.
external schema /ik,sta:nol 'ski:mo/ [10] a user's permitted view of data in a database

Facsimile machine /fwk'simoli mo,fi:n/ a machine which will provide electronic transmission of documents over telephone lines
fault-tolerant ifo:It 'toloront/ [6] of a computer system, having the ability to recover from an error without crashing
an adaptor board which can be put into a computer and linked to a telephone line to replicate the functions of a facsimile machine directly from the computer.

**FDD** /′ɛf diː ′dɪː/ [12] floppy disk drive

**feature** /′fɪtər/ [1] facility provided by an application.

**fibre optics** /′faɪbr ,ˌɒptɪks/ [6] data transmission using cable made of optical fibres instead of copper wire.

**field** /′fɪld/ [10] an item of data consisting of a number of characters or bytes to form a number, a name, or an address.

**firmware** /′fɜrmər/ [1] system software (part of the operating system) that is held in ROM.

**file** /′faɪli/ [2] information held on disk or tape in order for it to exist beyond the time of execution of a program. Files may hold data, programs, text, or any other information.

**file encryption** /′fæksɪmɪl ,ˌeŋ,kriːpfn/ [7] a security method whereby an algorithm is used to scramble the data before it is written to disk to prevent unauthorized users reading the data directly from the disk.

**fixed-format record** /′fɪksɪ ′rɔrkəd/ [10] a record whose data items are fixed in nature, in contrast to records whose layout may change according to the data being held.

**flicker** /′flɪkə(r)/ [14] on a screen, the rapid increase and decrease of brightness.

**floppy (disk)** /′fləpi (′dɪsk)/ [2] a flexible magnetic disk which can be removed from the computer. The two most common sizes are 3-inch and 5-inch.

**flowchart** /′flɔʊtʃɑrt/ [110] a diagram or a sequence of steps which represent the solution to a problem. Arrows are used to show the sequence of events.

**footprint** /′fʊtprɪnt/ [8] the amount of desk or floor space taken up by a computer.

**foreground** /′fɔrgreɪnd/ [2] describing high-priority processing involving interaction with the user, in an environment that allows background tasks.

**format** /′fɔrmət/ [2] prepare a disk for use by a computer whereby the structure of the pattern of information to be held on the disk is written to the disk surface.

**FORTRAN** (77) /′fɔrtɛn/ [15] a functional language widely used for scientific computation. The '77' defines the year in which the official standard (to which the language conforms) was issued.

**frame-grabber** /′frɛim ′ɡræbba(r)/ [14] a device for capturing a still video image and converting it into a digital form that can be viewed on a computer screen. By capturing a sequence of still images, it can effectively create a moving picture.

**free-format** /′friː ,ˌɒmət/ [10] describing data whose structure is not pre-defined.

**full-motion video** /′fʊl ,ˌɒmət/ [14] captured and digitized video images displayed on a computer screen giving the viewer the impression of watching a television picture.

**functional language** /′fɪŋkʃənl ˌlɑŋɡwɪdʒ/ [4] a programming language whose programs consist typically of sets of unordered equations that characterize functions and values. The values that are characterized by the equations include the desired results, and these values are calculated by executing the program.

**function register** /′fʌŋkʃən ˈrɛɡɪstr/ [1] a register used to control the processing of a function.

**gateway** /′geitweɪ/ [3] a device that links two networks in a way that is usually visible to the network users (as opposed to a bridge which is not visible). Gateways may deal with differences of protocol and naming convention when converting between the two networks.

**grammar check** /′ɡræmər ˌtʃek/ [5] software that attempts to correct the grammar of a piece of text, or offer advice on its structure.

**graphical (user) interface** /′ɡræfɪkəl (′juːsər) ′ɪntɛfɪəs/ [1] a style of interaction between the user and the computer involving a graphics screen, icons, and some form of pointing device such as a mouse. See command line interface and window.

**graphics** /′ɡræfɪks/ [3, 15] a non-character based method of displaying information on a screen, usually used for displaying pictures. The basic unit from which the display is built up is the pixel.

**grid** /′ɡrid/ [2] used for touch-screen and pen-based computers. Voltage is sent across the glass in horizontal and vertical lines forming a grid.

**GUI** /ˈdʒuːi/ [1] graphical user interface.

**hacker** /′hækə(r)/ [7] a person who attempts to breach the security of a computer system by access from a remote point. This may be for amusement or for a more sinister purpose.

**hard disk** /′hɑrd ′dɪsk/ [2] a fixed disk inside a computer which may not be removed.
hardware /'hærweɪ/ [1] the computer equipment and its peripherals

hardware interrupt /'hærweɪr/ Inte'rupt/ [2] see interrupt

HDD Læt 'di:/ [2] hard disk drive

hexadecimal Lahk'seod'eestmal/ [B] arithmetic to the base 16

high-level language /hæl 'levl 'hew-
1/7.03/ [4] a language in which each instruction represents several machine code instructions, making the notation more easily readable by the programmer

home-shopping service /hουm
'sk3vis/ [3] an online service that allows one to purchase items by placing an order over the network, usually by credit card

IAL /'ai ei 'cl/ [4] international algebraic language: former name for ALGOL.

IBM /'ai bi: 'em/ [1] International Business Machines

IBM-compatibility /'ai bi: 'em kom,pwta'bilatt/ [1] describing computers that conform to the hardware specification of the IBM PC and will run all the hardware that an IBM PC will run

icon aden'n/ [1] a visual symbol or picture used in a menu to represent a program or a file. The program is usually initiated by using a mouse and clicking the mouse's button when the cursor is over the icon.

image compression /'Imt3 kom,pref n/ [10] a technique for reducing the amount of space that a graphics image will take to store in computer storage

index /'Indeks/ [n8] [8] a set of links that can be used to locate records in a data file

index generation /'mdeks d3eno,recn/ [5] the facility to automatically generate a sorted alphabetical index for a document

'Infected /In'fektil/ [7] of a computer, being inhabited by a computer virus

infector /In'fektə(r)/ [7] something that transmits a computer virus

inference engine /Inforns ,end3m/ [13] within the context of expert systems, the part of the expert system that operates on the knowledge base and produces inferences

information technology Linfo,mef n tek'nulæc131/ [9] any form of technology, incorporating computing, telecommunications, electronics, and broadcasting, used by people to handle information

inference tree /Inforns ,tri:/ [13] the structure of a set of inferences which show how a conclusion was reached

information separators /Inf'a'meitSn ,separettaz/ [3] control characters used to delimit the boundaries of pieces of information

Information Services Manager /,Infa'meif n s 3:viss mand3o(r)/ [8] the head of the computer department

information system /,Infa'meif n sistann/ [8] a computer-based system with the defining characteristic that it provides information to users in one or more organizations

ink jet printer /'113k d3et ,printa(r)/ [1] a printer that produces an image by squirting a fine jet of ink onto specially absorbent paper

input /'input/ [n] [1] the information which is presented to the computer

input /Input/ v put information to a computer for storage or processing

input device /Input duals/ [1] any device that allows data to be passed into the computer

input-output /,Input 'autput / [12] the part of a computer system or the activity that is primarily dedicated to the passing of data into or out of the central processing unit

input port /Input ,p3:t/ [1] the socket into which an input device may be plugged on a computer

input tagging /'input ,twgn3/ [5] a feature of word-processing software that allows text to be pre-coded with tags so that the correct format can be applied automatically

instruction An'strAkfn/ [2] part of a computer program which tells the computer what to do at that stage

integrated circuit /'nəntgrætɪd 's3:krt/ an implementation of a particular electronic-circuit function in which all the individual devices required to realize the function are fabricated on a single chip of semiconductor

interactive mnta'rktw/ [D] describing a system or a mode of working in which there is a direct response to the user's instructions as they are input

interactive video /,Intar,ektv 'Inc113u/ [9] a computerized video system used for learning or play, in which the user interacts with the video.

interface fintafets/ [B] a common boundary between two systems, devices, or programs

interface cable fin'tale's [B] the logic cable between the computer and a device. Signals and data are passed over this link.

interlaced video /,Intaleis't vichau/ [14] in narrow-band PAL systems, a method of transmitting all 625 lines of a single TV image in a fiftieth of a second, whereby each frame of the image is split into two fields of 312.5 lines
internal memory /mˌtɜːnˈmɛmər/ [1] memory held within the CPU. The main storage or primary memory of the computer.

internal modem /mˌtɜːnˈməʊdəm/ [8] a modem which can be fitted inside a computer rather than a separate piece of equipment

internal schema /mˌtɜːnˈskɛma/ [10] the way that the data is physically held in a database

internal storage /mˌtɜːnˈstɔːrɪŋ/ see internal memory

Internet /ˈɪntərnet/ [8] an informal shared public network linking UNIX and other computers worldwide using the Internet protocol (IP)

interrupt /ɪnˈtəræpt/ [2] a signal to the processor that a higher priority event has occurred and must be serviced, causing the current sequence of events to be temporarily suspended

I/O /ˈaɪ/ input/output

I/O device /ˈaɪ ˈdiːvərs/ any device that allows input or output to a computer

IP /ˈɛəp/ [8] Internet protocol

ISDN /ˈɪntɪɡrətɪd ˈsɜːrvɪs ˈdɪɡɪtəl ˈnɛtwork/ [3] Integrated Services Digital Network: a concept developed by PTTs providing one network to transmit all forms of signal traffic, e.g. voice and data over the same lines

ISO /ˈɪntərnesˈɔːrti/ International Standards Organisation

IT /ˈɪt/ [9] information technology

joy stick /ˈdʒɔɪ ʃtɪsk/ [1] an input device used in computer games for controlling the cursor or some other symbol in its movement around a screen

junction box /ˈdʒʌŋkʃən ˈbox/ [6] a box attached to a network which attaches a device to the network

K /ˈkeɪ/ [1] kilobyte: unit of measure of memory or disk space in thousands of bytes. 1 kilobyte is 1024 bytes.

keyboard /ˈkeɪbəʊ/ [1] an input device like a typewriter for entering characters. The depression of a key causes a signal to be transmitted to the computer.

keyboard lock /ˈkeɪbəʊd ˈloʊk/ [7] a security method whereby the screen is cleared and the keyboard is locked after a pre-set period of inactivity to prevent unauthorized use

key number /ˈkiː ˈnəmbər/ [8] a unique number generated to identify a record

knowledge base /ˈnəʊd3 ˈbɛs/ within the context of expert systems, a collection of knowledge that has been formalized into the appropriate representation with which to perform reasoning, usually a set of rules about the subject

LAN /ˈleɪn/ local area network

laptop /ˈlæptop/ see portable computer

laser printer /ˈlærzə ˈprɪntər/ [1] a non-impact printer in which the paper is charged electrostatically with an image of the whole page to be printed. This attracts dry ink powder which is then baked on to the paper.


LCD /ˈlɛksɪd/ liquid crystal display

linkage editor /ˈlɪŋkwədʒ ˈɛdɪtər/ [4] a systems program which fetches required systems routines and links them to the application program object module

liquid crystal display /ˈlɜrkwaɪd ˈkrɪstəl ˈdɪskrɪpʃən/ [2] one type of technology that is used to produce flat monochrome computer screens. Such screens do not have their own internal illumination.

LISP /ˈlɪsp/ [4] list processing: a programming language designed for the manipulation of non-numeric data. It is commonly used in artificial intelligence research.

load module /ˈloʊd ˈmodjʊl/ [4] the program which is directly executable by the computer

local area network /ˈloʊkəl ˈɛərə ˈnetwɜːk/ [5, 6] a network linking a number of nodes in the same area, limited usually to a building or sites up to a kilometre apart

logical operation /ˈlɔrɪʤɪkəl ˈɑpərərʃən/ [1] an operation on logical values producing a Boolean result of true or false

logical record /ˈlɔrɪʤɪkəl ˈrekɔrd/ [10] the collection of data in a database relating to one subject

logical unit /ˈlɔrɪʤɪkəl ˈjuːnɪt/ [1] see arithmetic logic unit

LOGO /ˈlɒgəʊ/ [4] a programming language developed for use in teaching young children

log on /ˈlɑɡ ˈɑn/ [2] identify oneself to a computer system in order to gain access to it

loop /ˈluːp/ [4] a sequence of instructions that is repeated until a certain condition is reached

low-level language /ˈləʊw ˈlɛvl/ [1] a language such as assembly language in which each instruction has one corresponding instruction in machine code
Describing a program that obtains input by

**menu** /menu/ [4] a device for displaying a list of options (the menu) from which the user indicates his choice

**message-base posting** /mesidʒb3:st3ŋ/ [3] another form of e-mail

**MHz** /miɡeɪˈhɛ茨/ [1] MegaHertz: a measure of the speed of a computer's CPU. In millions it measures the number of processing cycles performed by the CPU.

**micro** /maikroʊ/ [4] see microcomputer

**microchip** /ˈmaɪkroʊtʃ/ [1] a semiconductor device used to build the hardware of a computer

**microcomputer** /ˌmaɪkroʊkʌmˈpjuːtə(r)/ [2] a computer whose CPU is a microprocessor semiconductor chip

**microprocessor** /ˌmaɪkroʊprəˈsɛsə(r)/ [1] a semiconductor chip that forms the central processor of a computer

**Microsoft** /ˈmaɪkroʊsɒft/ [4] a computer software company

**minicomputer** /ˌmaɪnɪkʌmˈpjuːtə(r)/ [B] originally a computer contained within a single equipment cabinet. Compared with mainframes they are usually smaller and slower. The word is no longer used very specifically since the advent of microcomputers.

**Minitel** /miˈnimətl/ 131 a French online system originally provided by the PTT to provide access to French telephone directories. The service has been expanded since its original introduction.

**modem** /ˈməʊdəm/ [3] modulator and demodulator: a device that converts the digital bit stream used by the computer into an analog signal suitable for transmission over a telephone line (modulation), and then converts it back to digital (demodulation)

**monitor** /ˈmɒnɪtə(r)/ [8] see VDU

**monochrome** /ˌmɒnəkraʊm/ FBI describing a screen with a single-colour display

**mouse** /maʊs/ [1] a device used to point at a location on a computer screen. It is moved around by hand on a flat surface. The movements on the surface correspond to movements on the screen. The mouse has one or more buttons to initiate an action on the screen.

**MPC** /ˈmiːpiːsiː/ [14] multimedia personal computer: Microsoft's minimum specifications for hardware to be used for multimedia purposes

**MS/DOS** /ˌmiːɛsˈdəʊs/ [1] Microsoft disk operating system

**MT** /ˈmiːtiː/ [13] machine translation

**multimedia** /ˈmʌltɪmiːdʒə/ [5,14] an application of computer technology that allows the capture, manipulation, and presentation of different types of data, e.g. text, graphics, video, animation, sound, etc.
multiple rulers /,mAlt3ekt 'ru:loz/ [5] rules to define margins and tab settings
multiplexor imAlt3ekt,pleks0(r)/ [3] a device that merges information from several communications channels into one channel. It is a two-way device and is also used to separate out the combined signal into the individual channels.
multiprogramming /,inAlt3e prougrwm/ [2] see multi-tasking
multisync monitor /,mAlt3 'sinsk ,montfo(r)/ [14] a video monitor that can synchronize a range of video devices to a common time-base
multi tasking /Junin 'taslag/ [2] used of computers capable of running more than one program at the same time, although on most only one program has control and is executing at any given moment
multi user imAlt3,ju:za(r)/ [1,10] describing computer systems which allow access by more than one user simultaneously

NCR /en si: 'w/ [2] National Cash Register, now a computer company
network inew'BÎ± [1,6] a system which connects up a number of computers and communications devices to enable messages and data to be passed between those devices
network compatible /,netw3:k kom'pwtobl/ [5] describing software that can be run on a network with shared files rather than as a stand alone piece of PC software
network traffic /'netw3:k ,twifik/ [6] the data transmitted around a network
node /nou'd/ either a point in a network where communications lines are interconnected, or where a workstation or a mainframe computer is attached
notation /nou'teug/ a system of symbols
notebook /'noutbuk/ [2] see portable computer
numeric /'niu:'mertk/ adj [1] describing data which only contains numbers

object module rad3ekt ,mudjuol/ [4] see object program
objectoriented /'obd3ekt '3:rientid/ [4] describing a computer architecture in which all processes, files, I/O operations, etc., are represented as objects (i.e. data structures in memory that may be manipulated by hardware and software). The IBM System 38 is an example of an object-oriented architecture system.
object program /'obd3ekt ,prougrwm/ [4] the result of converting source code into machine code using a compiler
OCR /,au si: 'w/ [8] optical character recognition: a process in which a machine scans, recognizes, and encodes information printed or typed in alphanumeric characters
octal /'uktol/ [B] arithmetic to the base 8
offline /'autl£m/ describing any part of a computer system which operates independently of the central processing unit
online, online /,Dn'lain/ [3] used of computer services that are accessed from a terminal interactively
online service Lonlatn's: ViS/ [3] a public database or bulletin board which can be accessed over a computer or telephone network
operating environment /' uporeMD in,vatoronmant/ [5] the hardware and operating system being used
operating system roporetoio ,sistom/ [1,2] the set of programs that jointly control the system resources and the processes using those resources on a computer
operator / oporetto(r)/ 1 [C] someone responsible for running a computer (usually a mainframe) 2 [4] see relational operator
optical character reader roprtikol 'kEeroko(t) ,roldo(t)/ [K] a device which scans, recognizes, and encodes information printed or typed in alphanumeric characters
OS /'ou 'es/ [2] operating system
OS/2 /'au es 'tu:/ [4] an operating system for IBM PCs
outliner faultlaino(r)/ [5] a writing aid to enable the structure of a document to be worked out in advance and used as a guide when writing the detailed document
output /output/ J1 [1] the result of performing arithmetic and logical operations on data. It can be displayed on screen or transmitted by the computer.
output /,aut'put/ v transmit processed data to a physical medium such as a printer or disk drive
output device /'autput di,vais/ [1] a device which transmits or displays processed data, e.g. a printer, disk drive, or VDU screen
output port /'autput ,pout/ [1] the socket into which an output device may be plugged

package frowlod3/ [4] see software package
paint software ipeint ,suftweo(r)/ [5] software that allows the user to create graphics images using techniques that emulate painting and drawing
PAL /plɔːl/ [1 4] the European standard for television and video systems requiring a vertical refresh rate of 50kHz

palmtop /ˈpælmtnp/ [8] see portable computer

parallel /ˈpærələl/ 1 [1] describing the transfer of data across the interface by having one connection per bit of a data word, e.g. for 8 bits there would be 8 connections in parallel. The control signals are also carried on individual connections in parallel. See serial and bit. 2 [12] describing computers with more than one central processing unit which work in parallel to solve a problem simultaneously

parameter /ˈpærəmətər/ [4] information which is passed to a program subroutine

parse /pəz/ [6] analyse the syntax of an input string

PASCAL /ˌpæsˈkæzl/ [4] a programming language designed as a tool to assist the teaching of programming as a systematic discipline

password /ˈpaːswəd/ [7] a method of security in which the user has to enter a unique character string before gaining access to a computer system

PC /pɪ:s/ personal computer

PDP II /piː diː piː ˈtjuː/ a DEC minicomputer

pen-based computer /ˈpɛn bɛst/ komˈpjɛfnʊ(o)(r)/ [2, 8] a computer which uses a pointing device like a pen as an input device

performance /ˈpɜːrfɔrnəns/ [10] the speed of a computer or computer system

peripheral /ˈpɜːrəfɪərəl/ [1] an input or output device attached to a computer

peripheral bus /ˈpɜːrəfɪərəl ˈbæs/ [1] the communications link to which peripherals are attached

physical record /ˈfɪzɪkəl rɪˈkɔrd/ [10] the collection of data transferred as a unit

pirate /ˈpərətər/ v [7] use software that has been copied in breach of copyright

pixel /ˈpɪksəl/ [2] an individual dot on a computer screen. The computer controls the colour and brightness of each pixel.

PL/I /piː ˈɛln/ [4] programming language I. A programming language developed by the US IBM users' group, implementing the best features of COBOL, FORTRAN, and ALGOL.

platform /ˈplætməʊt/ [1 4] a generic term for different types of computer system (e.g. PC, Mac, workstation, etc.)

plotter /ˈplətər/ [14] an output device for translating information from a computer into pictorial or graphical form on paper or a similar medium

plug-(and-play) compatibility /ˈpʌɡ and ˈkɒmpjuətə,ˌbɪlət/ [1 4] the ability to connect one manufacturer's hardware directly to another manufacturer's hardware

port /pɔːt/ [1] a connection point that allows I/O devices to be connected to the internal bus of a microprocessor

portable /ˈpɔːtəbl/ [4] describing programs which can run on a variety of hardware or under a variety of operating systems

portable (computer) /ˌpɔːtəbl komˈpjɛfnʊ(o)(r)/ [1] the generic term for any microcomputer that is designed to be carried around 2 [2] the largest type of computer designed to be carried around. It must be connected to the mains electricity supply. Other smaller types include laptops, notebooks, clipboards, and palmtops (or personal organizers). These have an internal power source.

primary memory /prəˈmɛrəmi ˈmɛmərɪ/ [1] see internal memory

printer /ˈprɪntr/ [1] an output device which changes output data into printed form

printout /ˈprɪntɔut/ the printed pages which are output from a computer

print-to-tape device /ˌprɪnt təˈteɪp dʒiˌveɪs/ [1 4] a device which allows computer-generated images to be recorded to video for play-back on a TV monitor

processing /ˈprəsərɪŋ/ [1] the performing of arithmetic or logical operations on information which has been input to a computer

processor /ˈprəsərɪsə(r)/ [1] see CPU

program /ˈprəʊgrəm/ [1] a list of instructions which are used by the computer to perform the user's requirements

programmer /ˈprəʊgrəma(r)/ [4] someone who writes computer programs

programming /ˈprəʊgrəm.ɪŋ/ [4] the act of writing a computer program

programming language /ˈprəʊgræm ˈlaŋɡwɪdʒ/ [1 4] a notation for the precise description of computer programs proprietary /ˈprɒpərətiərɪ/ [8] describing a protocol or standard developed and owned by a particular manufacturer

protocol /ˈprəʊtəʊkl/ [3] an agreement that covers the procedures used to exchange information between cooperating entities

PTT /piː tiː/ [3] Postal, Telegraph, and Telephone Administration, the national government communications organization of many countries

public database /ˈpʌblɪk ˈdɛtəbəts/ [1] a database which is accessible over a public network

query /ˈkwɪri/ [6] a request for information from a database
radiation screen /ˈreɪdiəl ˈɛf ɪ nˌskrɪn/ [8] a screen placed in front of a VDU to protect a user from possibly harmful radiation from the screen.

RAM /ˈreɪm/ [1] random-access memory: this is memory which can be read and written to. The basic element is a single cell capable of storing one bit of information. Each cell has a unique address in memory and can be accessed in random order.

raw data /ˈroʊˈdeɪtl/ [2] data which has not been interpreted.

real-time program /ˈrɛəltɪm/ prəˈgræm/ [2] a program that interacts with the users in such a way that the timing of the interaction is significant. This is usually because the input corresponds to some movement in the physical world and the output has to relate to the same movement.

record /ˈrekɔrd/ [10] a collection of data handled together in movements to and from storage. Files held in storage are frequently treated as sequences of records.

refresh rate /ˈreɪfɜr ˈrɛst/ [14] see vertical refresh rate.

register /ˈredɪstrɪt/ [1] a group of devices that are used to store information within a computer for high-speed access. Some registers may be used as counters.

relational operator /ˈreləʃənl ˈɔpərətər/ [4] a symbol representing an operation that compares two values and returns a truth value. Operators include 'greater than...', 'equal to...', and 'less than...'.

remote device /ˈrɛmrət dɪˈvaɪs/ [6] a device connected over a WAN.

repetitive-strain injury /ˌrɪˈpɛtɪtɪv-ˈstrɛɪn ɪnˈʃəri/ inˈpetɪtɪv /ˈstreeɪt ˌɪndʒuəri/ [8] a medical condition apparently caused by using a keyboard in an inappropriate position. The symptoms are that the muscles in the lower arm and fingers may seize up.

response /rɪˈspɒns/ [6]1 the elapsed time between an action by a computer system and the receipt of some form of response from the system.

ring network /ˈrɪŋ ˈnɜːtərɪsk/ [6] a network constructed as a loop of unidirectional links between nodes.

robot /ˈrəʊbɒt/ [10] a programmable device consisting of mechanical manipulators and sensory organs. The main goal of robotics research is to provide the robot with an artificial eye and to use visual perception to guide a mechanical arm in a flexible manner.

robotics /rəˈbotɪks/ [11] a discipline (lying across the border between artificial intelligence and mechanical engineering) which is concerned with building robots.

ROM /ˈrɔm/ [1] read-only memory: this is memory used for storage of data that can never be modified. The memory contents are permanently built into the device when it is manufactured.

RS/6600 /ˈreɪ ezɪks ˈɔʊzuənd/ [14] a model of IBM computer which is UNIX based.

RSI /ˈreɪ əzɪ 'repetɪtɪv-straɪn ɪnˈʃəri/
**sequential device** /səkwiˈnɛnl ˌdiːvəlz/ a device such as a magnetic tape drive which permits information to be written to or read from in a fixed sequence only

**serial** isfariall describing the transfer of data one bit at a time. Control signals are also passed in sequence with the data.

**service technician** /səvɪs ˈtekˌniʃən/ [8] an engineer who repairs computers

**session** /ˈsɛʃən/ [6] a period during which two computers are linked

**shared-line** /ˈʃeərdˌlaɪn/ [3] describing the use of a telephone line to transmit more than one set of data at a time

**shield** /ʃɪld/ n [7] see virus shield

**shield** /ʃɪld/ v [10] protect

**signal lines** /ˈsɜːɡnəl ˈlaɪnz/ [1] cables over which a computer control signal and data may be passed

**signature** /ˈsɪɡnətʃər/ o(r)/ [7] see virus signature

**sign off** /sain ˈɒf/ log off a computer system

**sign up** /sain ˈʌp/ [8] log on to a computer system

**silicon** /ˈsaɪlɪkən/ [J] a non-metallic element with semiconductor characteristics

Silicon Valley /ˌsaɪlɪkən ˈvɛəli/ [E] area of California where there are many computer technology companies

**slot** /slɔt/ [14] see expansion slot

**Smalltalk ismo:1to:k** /[4] an object-oriented language, an object-oriented environment, and a library of objects first developed at the Xerox Palo Alto Research Centre

**smart card** /smɑːrtkɑːd/ [3] a card containing a microchip which can be used to store large amounts of information

**software** /ˈsɜːftweə(r)/ [4] a general term for any computer programs

**software base** /ˈsɜːftweə ˌbiːs/ [2] the collection of applications written for a particular hardware and software environment

**software developer** isifthwea di,velopa(r)/ [5] someone who writes software

**software house** /ˈsɜːftweə ˌhɔʊs/ [2] a company that specializes in writing application software

**software package** /ˈsɜːftweə ˈpækɪdʒ/ [5] a series of programs written for a generic application, e.g. a payroll package, which can be adapted by the user to meet individual needs

**source file** /ˈsoʊs ˈfætəl/ [4] see source program

**source program** /ˈsoʊs ˈprɔʊgrəm/ [4] the original high-level language program which has to be converted to machine code before it may be executed

**spell check dictionary** /ˈspɛl tʃ ˈdɪkʃənəri/ [5] a list of correctly spelt words used by word-processing software to validate the spelling in a document

**spooling** /ˈspuːlɪŋ/ [C] the process of storing output temporarily on disk or tape until it is ready to be printed

**spreadsheet** /ˈspredʃɛt/ [2] a program that manipulates tables consisting of rows and columns of cells and displays them on a screen. The value in a numerical cell is either typed in or is calculated from values in other cells. Each time the value of a cell is changed the values of dependent cells are recalculated.

**SQL** /es kjuːˈel/ [6] structured query language

**standard** /ˈstændəd/ [5] a publicly available definition of a hardware or software component resulting from national, international, or industry agreement

**star network** /ˈstɑːr netwɜːk/ [6] a simple network topology with all links connected directly to a single central node

**statement terminator** /stɛrəˈmɑːnt/ [4] a special character which indicates the end of a statement in a programming language

**string** /strɪŋ/ [2] a sequence of bytes

**structured programming** /ˈstrɔrktʃəd ˈprəʊgræmɪŋ/ [4] a method of programming development that makes extensive use of abstraction in order to factorize the problem and give increased confidence that the resulting program is correct

**structured query language** /ˈstrɔrktʃəd ˈkwɪəri ˈleɪŋvɪdʒ/ [6] a high-level language for writing routines to query relational databases. Originally developed by IBM in 1973, it is now an ANSI standard.

**style sheet** istatəl fɪt/ [5] a word-processing software feature that ensures a uniform style within a document

**stylus** /ˈstɑːləs/ [1] an electronic I/O device that is used to draw or write on the screen

**subprogram** /ˈsʌbˌprəʊgræm/ [4] a small program called by another program to perform a specific function

**support group** /ˈsəpərt ˈgruːp/ [8] a group of staff who are specialists in a particular piece of software

**switched network** /ˈswɪtʃt ˈnetwɜːk/ [6] a network topology in which a central switching device is used to connect devices directly

**synchronous** istɔkrənəs/ [6] taking place at precisely the same time 2 involving a type of computer control whereby sequential events take place at fixed times
synchronous orbit satellite
/siokonas 'D:bit ,sEetalait/ [6] a satellite that orbits the Earth at a controlled speed so that it maintains its position in relation to the Earth

system board /' sistom boxd/ [2] the main circuit board of a computer containing the microprocessor chip. Other devices will be attached to this board.

systems analysis isistamz a,ru \lasss/ [K] the activity performed by an analyst

systems analyst isistomz ,Lenalist/ see analyst

systems manager isistomz ,rmenid3o(r)/ [7] a person responsible for the management and administration of a computer system

systems program isistomz ,prougrwm/ [4] a program written for a particular type of hardware. Examples are operating systems and compilers. They are usually provided by the manufacturer.

systems routine isistomz ru,;ti:n/ [4] utility programs provided by the computer operating system. These might be used for converting numerical data into different formats, or performing operations on dates.

systems software /' sistomz ,suftware(r)/ [J] see systems program

table itelb1/ [10] used to refer to data held in a database in a conceptual schema which is a flat two-dimensional table

table of contents Ltlob1 ov 'kuntents/ [5] a word-processing software feature which can automatically generate a table of contents for a document

tag /'tLeg/ [5] a code used in word processing or DTP to denote a feature of a document, such as bold type, the start of a paragraph, or an index word

tape drive / teip dra/ [L] a device on which a magnetic tape is mounted in order that information may be transmitted from the tape to the memory of the computer or vice versa

template itemple-et/ [2] a pre shaped pattern used as a guide

terminal itc'minal/ [2] a VDU screen and keyboard used to interact with a computer, usually with no computing capacity of its own

test suite /test swi:t/ [13] a set of sentences or phrases in a given language designed to test the effectiveness of a machine translation system

token /' toukn/ [6] a unique sequence of bits granting permission to a user to send on a network

trackball inekeb3:11 [J] an upside down mouse. It consists of a ball supported on bearings so that it is free to rotate in any direction. The ball is rotated by the operator to control the cursor and, as with a mouse, there are buttons to click to initiate an action.

transaction /trEen'zkwkf/ [10] a logical unit of work for a database

transaction processing system /tnenz,ikkn 'prouresin ,sistom/ [8] a system which processes the operational transactions of an organization

transistor /trEen'zosto(r)/ [F] a semiconductor device having three terminals that are attached to electrode regions within the device

transmission /tnenz'mqn/ [6] the sending of a message

transmitter /traenz'mito(r)/ [10] a device for sending a radio message

trigger itmg(a)/ v [7] set a process in motion

turnkey /'t3:nki:/ [J] describing a system in which hardware and software have been delivered by the supplier so that the whole system can be put to immediate use

type declaration statement /Amp dekla'reiSn ,steitmont/ [4] see declaration statement

UNIX /'ju:niks/ [4] an operating system originally developed by Bell laboratories in 1971 for DEC PDP I I minicomputers. UNIX has become very popular and is now implemented on a wide range of hardware.

update /Ap'dert/ v [2] modify data held by a computer system

upgrade /Ap'gre/ n [5] a later version of software

upgrade /Ap'gre/ v [1] replace or modernize software with a later version of the same software

user fjuzo(r)/ [6] an individual or group making use of the output of a computer system

userfriendly /fjuzo 'frendli/ [E] describing interactive systems that are designed to make the user's task as easy as possible by providing feedback

user interface /ju:zar 'intofeis/ [6] the means of communicating between a human being and a computer

utility program nu'tiloi ,prougrEem/ the collection of programs that form part of every computer system and provide a variety of generally useful functions

variable /' veonobl/ a [4] a string of characters used to denote a value stored within a computer which may be changed during execution
VDU /ˌviː djuː/ [1] visual display unit: the screen of a computer terminal or PC.

vertical refresh rate /ˌvɜːrɪkəl ˈrɛfri ɹet/ [14] the number of times per second that an image is written on a TV or computer screen, measured in kiloHertz.

VGA /ˌviː dʒiː/ [14] video graphics array: a standard for colour monitors developed by IBM for their PS/2 range of PCs.

virtual reality /ˌvɜːrɪkəl rɪˈwɔːlət/ [10, 12] an attempt to create an artificial world within a computer in which the user can (apparently) move about. This is usually achieved by the user wearing a helmet which covers the eyes and ears and sends visual and oral signals to the user. Special gloves allow the user to manipulate computer-generated items.

virtual storage /ˌvɜːrɪkəl ˈstoʊndʒ/ when disks are connected to a computer and used as an extension of internal memory in order to increase the capacity of primary storage.

virus /ˈvɜːrəs/ [7] a self-replicating program, usually designed to damage the system on which it lands.

virus checking program /ˈvɜːrəs ˈtʃɛkiŋ pɹoˈɡræm/ [7] a program that is used to detect the presence of a virus in memory or on disk.

virus scanner /ˈvɜːrəs ˈskwənə(r)/ [7] a program that detects viruses which have already infected a computer.

virus shield /ˈvɜːrəs ʃild/ [7] a program that detects viruses as they attempt to infect the computer.

virus signature /ˈvɜːrəs ˈsɪɡnətʃuə(r)/ [7] the particular features of each computer virus that enable it to be recognized.

voice recognition /ˈvɔɪs rɪˈkɒɡnɪʃn/ [8] the technology that allows a computer to interpret human speech. This is a part of artificial intelligence studies.


war game /ˈwɔːr ɡeɪm/ [12] a computer game which emulates warfare.


window /ˈwɪndəʊ/ [1] a type of graphical user interface. Separate tasks are represented by a rectangular portion of the screen called a window. A window may display a menu, and an option on the menu is selected by use of a mouse.

word processing /ˈwɜːrd ˈprɔsərɪŋ/ [5] the use of a computer to compose documents with facilities to edit, re-format, store, and print documents with maximum flexibility.

work scheduling /ˈwɜːk ˈseɪdʒuəlɪŋ/ [2] the process of allocating computer resources between different programs running on a multi-tasking computer.

workstation /ˈwɜːkstætʃən/ [14] a powerful single-user computer, usually attached to a network.

worm /ˈwɜːm/ [7] an entirely self-replicating virus which is not hardware dependent.

write-protect tab /ˈraɪt prəˈtekst twb/ [7] a notch on a floppy disk which may be covered to prevent the disk being written to.