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**ЗАДАНИЯ ДЛЯ ОБУЧЕНИЯ ПРОФЕССИОНАЛЬНО
ОРИЕНТИРОВАННОМУ ЧТЕНИЮ
НА АНГЛИЙСКОМ ЯЗЫКЕ**

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Задания по чтению на английском языке для студентов представляют собой оригинальные тексты, обучающие основам компьютерной грамотности. Материал способствует развитию навыков чтения и перевода, а также расширению лексического запаса студентов. После каждой главы содержатся вопросы проблемного характера.

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From mainframes to wearable computers

A mainframe is the most powerful type of computer. It can process and store large amounts of data. It supports multiple users at the same time and can support more simultaneous processes than a PC. The central system is a large server connected to hundreds of terminals over a network. Mainframes are used for large-scale computing purposes in banks, big companies and universities.

A desktop PC has its own processing unit (or CPU), monitor and keyboard. It is used as a personal computer in the home or as a workstation for group work. Typical examples are the IBM PC and the Apple Macintosh. It's designed to be placed on your desk. Some models have a vertical case called a tower.

A laptop (also called a notebook PC) is a lightweight computer that you can transport easily. It can work as fast as a desktop PC, with similar processors, memory capacity, and disk drives, but it is portable and has smaller screen. Modern notebooks have a TFT (Thin Film Transistor) screen that produces very sharp images.

Instead of a mouse, they have a touchpad built into the keyboard – a sensitive pad that you can touch to move the pointer on the screen.

They offer a lot of connectivity options: USB (Universal Serial Bus) ports for connecting peripherals, slots for memory cards, etc.

They come with battery packs, which let you use the computer when there are no electrical outlets available.

A tablet PC looks like a book, with an LCD screen on which you can write using a special digital pen. You can fold and rotate the screen 180 degrees. Your handwriting can be recognized and converted into editable text. You can also type at the detached keyboard or use voice recognition. It's mobile and versatile.

A personal digital assistant or PDA is a tiny computer which can be held in one hand. The term PDA refers to a wide variety of hand-held devices, palmtops and pocket PCs.

For input, you type at a small keyboard or use a stylus – a special pen used with a touch screen to select items, draw pictures, etc. Some models incorporate handwriting recognition, which enables a PDA to recognize characters written by hand. Some PDAs recognize spoken words by using voice recognition software.

They can be used as mobile phones or as personal organizers for storing notes, reminders and addresses. They also let you access the Internet via wireless technology, without cables.

A wearable computer runs on batteries and is worn on the user's body, e. g. on a belt, backpack or vest; it is designed for mobile or hands-free operation. Some devices are equipped with a wireless modem, a small keyboard and a screen; others are voice-activated and can access email or voice mail.

Task 1. Choose the correct adjective. Then fill in the gaps with the correct form of the adjective

1 *light/heavy* Laptops are ... than desktop computers, but ... than notebooks.

2 *large/small* The mainframe is the ... type of computer. A minicomputer is ... than a microcomputer.

3 **common/good** Personal computers are ... than mainframes but mainframes are ... than personal computers at processing very large amounts of data.

4 **powerful/expensive** Minicomputers are ... than mainframes but they are also

5 **fast/cheap** New computers are ... and sometimes ... than older machines.

6 **powerful/expensive** Laptops are often ... than PCs but they are not as

Task 2. Put the words in brackets into the correct form to make an accurate description of sizes of computers

There are different types of computer. The (*large*) and (*powerful*) are mainframe computers. Minicomputers are (*small*) than mainframes but are still very powerful. Microcomputers are small enough to sit on a desk. They are the (*common*) type of computer. They are usually (*powerful*) than minicomputers.

Portable computers are (*small*) than desktops. The (*large*) portable is a laptop. (*Small*) portables, about the size of a piece of writing paper, are called notebook computers. Subnotebooks are (*small*) than notebooks. You can hold the (*small*) computers in one hand. They are called handheld computers or palmtop computers.

What's inside a PC system?

The nerve centre of a PC is the central processing unit or CPU. This unit is built into a single microprocessor chip – an integrated circuit – which executes program instructions and supervises the computer's overall operation. The unit consists of three main parts:

1) the control unit, which examines the instructions in the user's program, interprets each instruction and causes the circuits and the rest of the components disk drives, monitor, etc. – to be activated to execute the functions specified;

2) the arithmetic logic unit (ALU), which performs mathematical calculations (+, -, etc.) and logical operations (and; or, etc.);

3) the registers, which are high-speed units of memory used to store and control information. One of these registers is the program counter (PC) which keeps track of the next instruction to be performed in the main memory. Another is the instruction register (IR) which holds the instruction that is currently being executed.

One area where microprocessors differ is in the amount of data – the number of bits – they can work with at a time. There are 16, 32 and 64-bit processors. The computer's internal architecture is evolving so quickly that the new 64-bit processors are able to address 4 billion times more information than a 32-bit system.

The programs and data which pass through the central processor must be loaded into the main memory (also called the internal memory) in order to be processed. Thus, when the user runs an application, the microprocessor looks for it on secondary storage devices (disks) and transfers a copy of the application into the RAM area. RAM (random access memory) is temporary, i.e. its information is lost when the computer is turned off. The amount of RAM determines the number of programs you can run simultaneously and how fast they operate. It can be expanded by adding extra RAM chips. However, the ROM section (read only memory) is permanent and contains

instructions needed by the processor; the BIOS (basic input/output system) uses ROM to control communication with peripherals, e.g. disk drives.

The main circuit board is known as the mother-board. This contains the CPU, the memory chips, expansion slots and controllers for peripherals, connected by internal busses, or paths, that carry electronic signals. For example, the front side bus carries all data that passes from the CPU to other devices.

Most of today's computers have internal expansion slots that allow users to install 45 adapters or expansion boards. Popular adapters include high-resolution graphics boards, memory expansion boards, and internal modems.

The power and performance of a computer is partly determined by the speed of its microprocessor. A clock provides pulses at fixed intervals to measure and synchronize circuits and units. The clock speed is measured in MHz (megahertz) or GHz (gigahertz) and refers to the frequency at which pulses are emitted. For example, a CPU running at 1,600 MHz (1,600 million cycles per second) will enable the computer to handle the most demanding applications.

Task 1. Decide if the sentences are true (T) or false (F), and rewrite the false ones to make them true

1 The CPU directs and coordinates the activities taking place within the computer system.

2 The arithmetic logic unit performs calculations on the data.

3 32-bit processors can handle more information than 64-bit processors.

4 A chip is an electronic device composed of silicon elements containing a set of integrated circuits.

5 RAM, ROM and secondary storage are the components of the main memory.

6 Permanent storage of information is provided by RAM (random access memory).

7 The speed of the microprocessor is measured in gigahertz or megahertz. One GHz is equivalent to one thousand MHz. One MHz is equivalent to one million cycles per second.

Task 2. Look back in the text and find what the words in bold print refer to

1 ... **which** executes program instructions and supervises

2 the instruction **that** is currently being executed.

3 ... the amount of data – the number of bits – **they** can work with at a time.

4 ... the microprocessor looks for **it** on

5 **its** information is lost when the computer is turned off.

6 ... expansion slots **that** allow users to install adapters or expansion boards.

How does digital processing work?

There are three basic elements in digital processing: memory circuits to store data; logic circuits to change data; and control circuits to direct the operations of the whole

system. The various elements are linked together by wire channels called buses. Memory circuits store bits permanently or temporarily. A typical memory circuit contains thousands of capacitors arranged in rows. The capacitors hold bits either in the form of an electricity charge or the absence of a charge.

Each capacitor is connected to the system by a metal conductor, with transistors or diodes acting as switches. When a signal opens a switch, bits can travel along the conductor. Other circuits then restore the bits by recharging the capacitors with the same sequence of charges. There are two basic kinds of memory circuits—read-only memory (ROM) and random-access memory (RAM). A ROM circuit can be neither erased nor added to. It is a permanent store of information and normally contains instructions or programs, for operating the system. By contrast, the information in RAM can be added to or erased. It is used to store information for short periods. Data is stored only when the power is on. When the power is turned off, all the stored charges are erased.

Logic circuits, in CPU, manipulate data according to instructions. The bits go through a sequence of switches that changes them in some way, for example by adding two of them together. During this processing, bits are stored temporarily in areas called registers, while they wait for the next instruction.

Switches can also be used to compare two bits in order to generate a particular output based on precise logical rules. In this case binary digits represent the ideas «true» or «false», instead of 1 or 0. The process is carried out through small groups of circuits called logic gates. Large combinations of these gates can solve complex mathematical or logical problems.

Control circuits direct and coordinate the work of all other parts of the system according to instructions stored in the memory. In particular, the control circuits organize the movement of bits through the system. This is done by means of an oscillator, called the clock, which generates continuous pulses. The bits through the circuit, following the rhythm of the clock, at frequencies of millions of cycles per second.

Task 1. Fill in the gaps with the following words: activate, analogue, brain, decode, digital, erase, RAM, ROM

1 Information required only for short periods is held in the ... memory.

2 When you switch off the computer you ... all the data in the short-term memory.

3 Sophisticated software is needed to ... secret messages.

4 You have to press buttons ... the control.

5 Messages from the ... are carried by the body's nervous system.

6 An ... computer makes calculations by measuring and comparing changing quantities.

7 A ... computer performs calculations and logical operations by transforming information into a numerical code.

8 A ... memory is used as a permanent store of information since it can be neither erased nor added to.

Task 2. Match each word (1–10) with the correct definition (a–j)

1 binary	a. a computer switching circuit that performs specific problem-solving functions.
2 bit	b. a device or program for connecting two items of hardware or software so that they can communicate with each other.
3 bus	c. a group of bits, typically 16 or 32, forming a basic unit of data in a computer.
4 byte	d. a method of representing numbers in which only the digits 0 and 1 are used.
5 cache	e. a part of microprocessor where groups of binary digits are stored momentarily as the computer is processing them.
6 clock	f. a set of conductors carrying data and control signals within a computer system.
7 interface	g. a single character of a language having just two characters, the binary digits 0 or 1.
8 logic gate	h. a source of regularly occurring pulses used to measure the passage of time in a microprocessor.
9 register	i. a unit of computer information equal to 8 bits.
10 word	j. an auxiliary memory from which it is possible to retrieve data at high speed.

Bits – basic units of memory

Information is processed and stored in computers as electrical signals. A computer contains thousands of electronic circuits connected by switches that can only be in one of two possible states: ON (the current is flowing through the wire) or OFF (the current is not flowing through the wire). To represent these two conditions we use binary notation in which 1 means ON and 0 means OFF. This is the only way a computer can 'understand' anything. Everything about computers is based upon this binary process. Each 1 or 0 is called a binary digit or bit.

Bytes and characters.

1s and 0s are grouped into eight-digit codes that typically represent characters (letters, numbers and symbols). Eight bits together are called a byte. Thus, each character in a keyboard has its own arrangement of eight bits. For example, 01000001 for the letter A, 01000010 for B and 01000011 for C.

The ASCII code.

The majority of computers use a standard system for the binary representation of characters. This is the American Standard Code for Information Interchange, known popularly as 'ASCII' (pronounced 'ask-key'). There are 256 different ways of combining 0 and 1 bits in a byte. So they can give us 256 different signals. However, the ASCII code only uses 128 bytes to represent characters. The rest of the bytes are used for other purposes.

The first 32 codes are reserved for characters such as the Return key, Tab, Escape, etc. Each letter of the alphabet, and many symbols (such as punctuation marks), as well as the ten numbers, have ASCII representations. What makes this system powerful is that these codes are standard.

Kilobytes, megabytes and gigabytes.

In order to avoid astronomical figures and sums in the calculation of bytes, we use units such as kilobytes, megabytes and gigabytes. One kilobyte is 1,024 bytes (2^{10}) and it is represented as KB, or more informally as K. One megabyte is equivalent to 1,024 KB, and one gigabyte is 1,024 MB.

We use these units (KB, MB, GB) to describe the RAM memory, the storage capacity of disks and the size of any application or document.

Task 1. Fill in the blanks with the correct unit of memory

One ... represents one character.

One ... represents 1,024 characters (about a small page of text).

One ... represents 1,000,000 characters (about the text of the book).

One ... represents 1,000,000,000 characters (about 1,000 books in a library).

Bits for pictures

Each tiny dot on the screen of a computer is called a picture element or pixel. Images and text are formed by combining a large number of pixels.

In a bit-mapped display, the dots displayed on the screen correspond, pixel by pixel, with bits in the main memory of the computer. The bits are held in an area of the memory called the 'refresh buffer' and are stored in groups that represent the horizontal and vertical position of the pixels on the screen and whether the pixels are on or off.

On monochrome systems, one bit in this 'map' represents one pixel on the screen and can be either 'on' or 'off' (black or white).

On colour systems, each pixel is a certain combination of the three primary colours: red, green and blue. The total number of colours which can be shown on the screen is called the colour palette. The size of this palette depends on the graphics adaptor, a separate video card that converts the bits into visual signals. A graphics adaptor with 1 bit per primary colour can generate up to 8, or 2^3 , colours, as you can see from the table on page 19. A graphics adaptor with 8 bits per primary colour can generate 16.7 million or $(2^3)^8$ colours.

Colour	Red	Green	Blue
Black	0	0	0
Blue	0	0	1
Green	0	1	0
Cyan	0	1	1
Red	1	0	0
Magenta	1	0	1
Yellow	1	1	0
White	1	1	1

(One bit per primary colour)

Task 1. Using the information in the passage and the illustrations, match the terms in the box with the appropriate explanation or definition: *pixel, bit, bit-mapped, display, primary colours, palette*

1 The menu of colours available on a graphics system; its size depends on the hardware.

2 Red, green and blue (RGB) in computers.

3 The smallest element of a display surface.

4 A display on the screen stored in memory cells.

5 The acronym for 'binary digit'; one of the digits (0 and 1) used in binary notation.

Task 2. Translate these sentences into English

1 Все числа внутри компьютера представляются с помощью нулей и единиц.

2 Иными словами, компьютеры обычно работают в двоичной системе.

3 Единицей информации в компьютере является один бит, т. е. двоичный разряд, который может принимать значение 0 и 1.

4 Восемь последовательных битов составляют байт.

About the keyboard

A standard PC keyboard has various groups of keys.

1 Alphanumeric keys represent letters and numbers in the same order as a typewriter.

2 Function keys are at the top of the keyboard and can be programmed to do special jobs.

3 Numeric keypad is a set of numeric or editing keys, which are to the right of the main keyboard. The Num Lock key is used to switch from numbers to editing functions.

4 Editing (or cursor) keys are cursor and other keys used within word processors to page up and down in a long document or to edit text.

5 Special (dedicated) keys are used to issue commands or to produce alternative characters in key combinations, for example, the Alt key.

Task 1. Match these descriptions with the names of keys: *arrow keys, return, caps lock, shift, tab, escape, space bar, backspace, alt*

1 A long key at the bottom of the keyboard. Each time it is pressed, it produces a blank space.

2 It moves the cursor to the beginning of a new line. It is also used to confirm command.

3 It stops a program without losing the information from the main memory. Sometimes its use depends on the applications.

4 It works in combination with the other keys to produce special characters or specific actions.

5 It removes the character on the left of the cursor or any selected text.

6 It produces upper-case characters (or the upper-case character of the key).

Task 2. Fill in the gaps in these sentences. Use the correct word from the list: *shift key, alt key, control key, escape key, delete key, tab key, caps lock key, backspace key, standard keyboard, key in (or type in), enter, data input*

1 To go back one space, hit the

2 To change to capital letters, press the

3 To change the capital letters permanently, hit the

4 To insert a tabulation, press the

5 To activate the 'Ctrl' functions, press the

6 To activate the 'alt' functions, hit the

7 To stop the computer doing something, you can press the

8 Select the text you want remove, and hit the

9 Please ... your password.

10 It took me two hours to... all the text.

11 A keyboard is a ... device.

12 Do you have a ...?

Plug-in Boards

If you take a look inside your PC, you will see various printed circuit boards anchored in connector strips on the main board.

These circuit boards are known as plug-in boards and the connector strips as slots.

The slots play an important part when equipping your PC with various additional functions. Their function and mechanical design are therefore described in more detail below, so that you can install the system and is therefore also known as an expansion boards with which to expand your system without difficulty in future.

To put it simply, a plug-in board expands the functions to the system and is therefore also known as an expansion board.

Many expansion boards belong to peripheral devices which cannot be connected

to one of the normal ports (serial/parallel). When connecting a scanner, for instance, a special plug-in board must be installed in the system and the scanner connected directly to the board.

Modem boards, ISDN boards, telefax boards, sound boards and boards for connecting a backup drive (streamer) are common examples of such expansion boards.

One of the advantages of plug-in boards is that they allow the system to be expanded on a modular basis; another is that boards can be replaced by more modern technology in the course of time.

This also explains why a number of plug-in boards are already installed in your Highscreen PC. The components and functions of these plug-in boards could just as easily have been installed on the main board, but then you would be restricted, throughout the lifetime of your PC, to using only the technology that happened to be in line with the state of the art when you bought your PC.

If your requirements grow or technology advances, you **WOULD HAVE** to replace the entire system. Thanks to the plug-in boards, however, you need only replace a single board if applicable.

The mechanical design and functions of the plug-in boards which have already been installed are described in more detail first.

Task 1. Explain the following compound nouns using suitable prepositions or phrases:

- 1) plug-in board;
- 2) printed circuit boards;
- 3) connector strips;
- 4) backup drive;
- 5) expansion board;
- 6) 16-bit-bus;
- 7) sound board;
- 8) peripheral devices.

Task 2. Fill in the gaps with the following words: *replace, connect, install, belong, plug, equip*

- 1 A board is ... on a PC to expand its functions.
- 2 A new software release can be ... with the old one.
- 3 This new PC model is ... with a lot of additional devices.
- 4 It is not very difficult ... a board in a system.
- 5 A scanner must be ... to a PC to store images.
- 6 Some expansion boards can ... to peripheral devices.

Types of printers

Printing is the final stage in creating a document. That is the purpose of the printers. Printers vary in cost, speed, print quality and other factors such as noise or compatibility. In fact, printing technology is developing so quickly that there is always

a printer for every application or personal requirement.

Dot-matrix printers use pins to print the dots required to shape a character. They print text and graphics and some of them can print up to 500 characters per second, however, they produce relatively low resolution output – 72 or 144 dots per inch. This level of quality is not recommended for reports or books. They are slower than laser printers but much cheaper.

Ink-jet printer operates by projecting small ink droplets onto paper to form the required image. This type of printer is quite fast, silent and so expensive as a laser printer. Their resolution is 720 dpi.

Laser printers produce output at great speed and with a very high resolution of 600/2,400 dpi. They scan the image with a laser beam and transfer it to paper with a special ink powder. They are constantly being improved.

We must not forget to mention *thermal* printers. They use heat, a special kind of paper and electrosensitive methods. They are silent and considered to be inexpensive. However, some colour models emulate HP (Hewlett Packard) plotters cost too much to be included in the same category.

Imagesetters can be regarded as an attractive alternative. They produce very high-resolution output (up to 3, 540 dpi) on paper and microfilm. They are extremely fast. They are used in desktop publishing. Although they produce the highest quality output they are expensive for homes and offices. Finally, plotters are a special kind of printer.

Plotters use ink and fine pens held in a carriage to draw very detailed designs on paper. They are used for construction plans, engineering drawings and other technical illustrations.

Task 1. Choose the most appropriate type of printer for these situations

- 1 A home user who wants to print text documents and family photographs.
- 2 Business people who need to print in large quantities at high quality in an office.
- 3 Engineers who want to make detailed line drawings.
- 4 Professional typesetters in desktop publishing.
- 5 A company that wants to print carbon copies of bills and receipts.

Task 2. Agree or disagree with the following statements

- 1 Ink-jet printers are quieter than dot-matrix printers.
- 2 Ink-jet printers are cheaper than dot-matrix printers.
- 3 Ink-jet printers are not real competition for laser printers.
- 4 Ink-jet printers can easily print on envelopes, labels and transparencies.
- 5 Ink-jet colour printers use four inks: magenta, yellow, cyan and black.
- 6 Ink-jet printers are ideal for workgroups and large businesses.

Technical details

Floppy disks are so called because they consist of flexible plastic material which has a magnetizable surface.

The surface of a disk is divided into concentric circles or «tracks», which are then divided into 'sectors'. When you insert a blank disk into a disk drive, it must be 'initialized, or formatted, before information can be recorded onto it.

This means that magnetic areas are created for each track and sector, along with a catalogue or 'directory' which will record the specific location of files.

When you save a file the operating system moves the read/write heads of the disk drive towards empty sectors, records the data and writes an entry for the directory. Later on, when you open that file, the OS looks for its entry in the directory, moves the read/write heads to the correct sectors, and reads the file into the RAM area.

Hard disks work in the same way as floppies. But they have important advantages: they can hold much more data and spin at higher speed, so you can store and retrieve information much faster than with floppies. The speed at which a hard drive finds data is called 'access time' – or seek time. The average access time is measured in milliseconds (ms). Most hard drives have an access time of 8 to 14 ms.

You have to distinguish between access time (e. g. 9 ms) and 'data transferrate' (the average speed required to transmit data from a disk system to the RAM, e. g. at 10 megabits per second). Remember that the transfer rate depends also on the power of your PC.

If you only use word-processing programs, you will need less storage capacity than if you use CAD, sound and animation programs. If you need an extra hard drive, you should consider the type of mechanism. There are «internal» and «external» drives which are both rigid disks sealed into the drive unit, either within or attached to the computer.

Another type of hard drive, known as «removable», allows you to record data on «cartridges», which can be removed and stored off-line for security purposes. Some systems allow you to back up your entire PC on one disk.

Laptops use pocket-sized drives. Digital cameras and music players use microdrives with special cards.

Task 1. Now read these sentences and decide if they are true (T) or false (F)

- 1 Hard drives are faster than floppy drives.
- 2 'Access time' refers to the average time required for the recording heads to move and access data.
- 3 'Access time' and 'data transfer rate' mean the same.
- 4 Hard disks use rigid rotating disks.
- 5 A hard drive is about 20 times faster than a floppy disk drive.
- 6 If you use multimedia applications you need the same storage capacity as required for word processors.
- 7 Removable cartridges are not transportable.

Task 2. Translate the following sentences into English

- 1 Затем поверхность диска разделяется на «секторы».
- 2 Гибкие диски состоят из гибкого пластического материала.
- 3 Операционная система считывает файл на ЗУПВ.
- 4 Жесткие диски вращаются на более высокой скорости.
- 5 Время выборки (из ЗУ) измеряется в миллисекундах.

Task 3. Look at the groups of words and decide what class each word belongs to: *noun, verb, adjective or adverb*. Complete the sentences

magnet magnetic magnetically
magnetism magnetize magnetized

- 1 ... is the science of magnetic phenomena and properties.
- 2 Floppy and hard disks are considered as ... storage devices.
- 3 Data is recorded on a disk in the form of ... spots called bits.

record [ri'kO:d] recorder recording recorded

- 4 All disks must be initialized before information can be ... onto them.
- 5 The ... heads follow the tracks and magnetize the coating along each track.
- 6 A disk drive works very much like a tape ... that can both play and record.

fragment fragmentation fragmented defragmenter

7 After you create, delete and modify a lot of files, the hard disk becomes ..., with bits and pieces spread all over the disk.

8 ... slows down the speed at which data is accessed because the diskdrive has to work harder to find the parts of a file stored in many different locations.

9 To reorganize your hard disk, you can use a disk optimizer or ...; this will reorder your files into contiguous clusters.

Graphics and design

Types of graphics software:

Computer graphics are pictures created, changed or processed by computers.

There are different types of graphics software.

Image manipulation programs let you edit your favourite images. For example, you can scan a picture into your PC or transfer a photo from your camera and then add different effects, or filters.

Painting and drawing programs, also called illustration packages, offer facilities for freehand drawing, with a wide choice of pens and brushes, colours and patterns. One example is **Windows Paint**.

Business graphics programs, also called presentation software, let you create pie charts, bar charts and line graphs of all kinds for slide shows and reports. You can import data from a database or spreadsheet to generate the graphs.

Computer-aided design (CAD) is used by engineers and architects to design

everything from cars and planes to buildings and furniture. First they make a wireframe, a drawing with edges and contour lines. Then if they want to colour the objects and add texture, they create a surface for the object; this is called “filling the surface”. Finally, the design is rendered to make the object look realistic. Rendering is a process that adds realism to graphics by using shading, light sources and reflections.

Desktop publishing (DTP) is based around a page layout program, which lets you import text from a word processor, clip-art (ready-made pictures) from graphics packages, and images from scanners or cameras, and arrange them all on a page. It is used to design and publish books, newspapers, posters, advertisements, etc ...

Digital art, or computer art, is done with applets that use mathematics formulae to create beautiful bright shapes called fractals. A fractal is a geometrical figure with special properties, e.g. the Koch snowflake or the Mandelbrot set. Fractals can also be used to model real objects like clouds, coastlines or landscapes.

Computer animation uses graphics programs (e.g. digital cartooning systems) to create or edit moving pictures. Each image in a sequence of images is called a 'frame'.

Geographic information systems (GIS) allow cartographers to create detailed maps.

Task 1. Look through the text and decide which type of graphics software is best for the users

- 1 a person who wants to edit photos at home.
- 2 an economist who wants to present statistics in a form that can be easily understood.
- 3 engineers who need to design the interior and exterior of a new aeroplane.
- 4 a company which needs to design and publish a magazine.
- 5 an artist who wants to produce illustrations and freehand drawings for a book.
- 6 an organization that needs to make maps and 3D virtual models of the surface of the Earth.
- 7 computer animators who make movies like Toy Story and Shrek
- 8 a mathematician who wants to make fractal shapes of natural phenomena.

Task 2. Fill in the gaps with the following words: *wireframe, rendering, bitmap, filters, fractals, clip-art*

1 Painting programs work by giving a colour to each pixel in an image, creating a Unlike vector graphics, the image is a single layer, so once something is painted, it becomes part of the whole picture.

2 In painting programs and image editors, ... are special effects that can be applied to a picture, including drop shadows, textures, distortions, etc.

3 The ... model is the simplest: interpretation of a true three-dimensional object. Here the object is represented by its edges and contours and is therefore similar in form to a normal engineering drawing or sketch.

4 ... adds textures to each surface, and generates realistic reflections, shadows

and highlights.

5 Most illustration packages come with a bundle of resources that include ready-made ... images and a selection of fonts.

Programming languages

Unfortunately, computers cannot understand ordinary spoken English or any other natural language. The only language they can understand directly is called machine code. This consists of the 1s and 0s (binary codes) that are processed by the CPU.

However, machine code as a means of communication is very difficult to write. For this reason, we use symbolic languages that are easier to understand. Then, by using a special program, these languages can be translated into machine code. For example, the so-called assembly languages use abbreviations such as ADD, SUB, MPY to represent instructions. These mnemonic codes are like labels easily associated with the items to which they refer.

Basic languages, where the program is similar to the machine code version, are known as low-level languages. In these languages, each instruction is equivalent to a single machine code instruction, and the program is converted into machine code by a special program called an assembler. These languages are still quite complex and restricted to particular machines.

To make the programs easier to write and to overcome the problem of intercommunication between different types of machines, higher-level languages were designed such as BASIC, COBOL, FORTRAN or PASCAL. These are all problem-oriented rather than machine-oriented. Programs written in one of these languages (known as source programs) are converted into a lower-level language by means of a compiler (generating the object program). On compilation, each statement in a high-level language is generally translated into many machine code instructions.

People communicate instructions to the computer in symbolic languages and the easier this communication can be made, the wider the application of computers will be. Scientists are already working on Artificial Intelligence and the next generation of computers may be able to understand human languages.

Task 1. Look at the groups of words and decide what part of speech each word is. Then complete the sentences with the correct word: *compile, compiler, compilation*

1 Programs written in a high-level language require ..., or translation into machine code.

2 A ... generates several low-level instructions for each source language statement.

3 Programmers usually ... their programs to create an object program and diagnose possible errors.

program, programmers, programming, programmable

4 Most computer ... make a plan of the program before they write it. This plan is called a flowchart.

5 A computer ... is a set of instructions that tells the computer what to do.

6 Converting an algorithm into a sequence of instructions in a programming language is called

bug, debug, debugger, debugging

7 New programs need ... to make them work properly.

8 Any error or malfunction of a computer program is known as a

9 The best compilers usually include an integrated ... which detects syntax errors.

Task 2. Make sentences as in the example

Example Not easy/ write instructions in Pascal
 It is not easy to write instructions in Pascal.

Some grammar to know!

The infinitive is used:

a) after adjectives

– It is **difficult** *to use* machine code.

b) after modal verbs with to: **ought to, used to.**

– I **ought to** *make* a back-up copy.

– Using a computer is much easier than it **used to be.**

c) after modal and auxiliary verbs without to: **can, could, may, might, shall, should, will, would, would rather, would sooner.**

– Unfortunately, computers *can't understand* English.

– **I'd rather** *buy* a game than a spreadsheet.

1 advisable/ test the program under different conditions.

2 expensive/ set up a data-processing area.

3 unusual for a program/ work correctly the first time it is tested.

4 difficult for students/ learn FORTRAN.

5 important/ consider the capabilities of the programming language.

6 quite easy/ write instructions in BASIC.

What is Java?

Java is a programming language developed by Sun Microsystems. When you see a web page that uses Java, a small program called 'applet' is done automatically. Java applets let you watch animated characters and moving text, play music and interact with information on the screen.

Characteristics of the Java language.

Java is an object-oriented language similar to C++, but it is more dynamic and simplified to eliminate possible programming errors.

A Java program is both compiled and interpreted. First the source code is compiled and converted into a format called bytecode, which can then be executed by a Java interpreter. Compiled Java code runs on most computers, because there are Java interpreters, known as Java Virtual Machines.

Java is a multi-threaded. A Java program can have multiple threads (parts), i. e. many different things processing independently and continuously.

Why is Java cool?

Java lets you create moving images and animated drawings. You can also create graphical objects (e.g. bar charts, graphs, diagrams) and new ‘controls’ (e.g. buttons, check boxes, pushbuttons with special properties). A web page that uses Java can have inline sounds that play in real-time, music that plays in the background, cartoon style animations, real-time video and interactive games.

Alternatives to Java.

One alternative technology is ActiveX, the Microsoft product for including multimedia effects on web pages. Another competitor is Macromedia’s Shockwave, a plug-in that lets you animate pictures, add sound and even make interactive pages so that people can play games on websites.

Task 1. These statements about Java are all false. Correct them

- 1 Java was invented by Microsoft.
- 2 Small applications written in Java are called ‘animations’.
- 3 With the interpreter, a program is first converted into Java bytecodes.
- 4 Java is not compatible with most computing platforms.
- 5 The Java language is single-threaded, one part executing at a time.
- 6 Java doesn’t let you watch animated characters on your webpages.
- 7 ActiveX and Shockwave are not real competitors for Java.

Task 2.

a) Match each word on the left with its partner to make a common technical term.

- | | |
|---------------|---------------|
| 1 programming | a. browser |
| 2 web | b. error |
| 3 Java | c. code |
| 4 multimedia | d. protection |
| 5 source | e. format |
| 6 virus | f. effects |
| 7 compression | g. applet |

b) Which verbs on the left are often found with nouns on the right?

- | | |
|---------------|---------------------|
| 1 to download | a. the Web |
| 2 to play | b. a source program |
| 3 to run | c. files |
| 4 to browse | d. an application |
| 5 to compile | e. data |
| 6 to process | f. music |

Security and privacy on the Internet

There are a lot of benefits from an open system like the Internet, but we are also exposed to hackers who break into computer systems just for fun, as well as to steal information or propagate viruses. So how do you go about making online transactions secure?

Security on the Web.

The question of security is crucial when sending confidential information such as credit card numbers. For example, consider the process of buying a book on the Web. You have to type your credit card number into an order form which passes from computer to computer on its way to the online bookstore. If one of the intermediary computers is infiltrated by hackers, your data can be copied. It is difficult to say how often this happens, but it's technically possible.

To avoid risks, you should set all security alerts to high on your Web browser. Netscape Communicator and Internet Explorer display a lock when the Web page is secure and allow you to disable or delete "cookies".

If you use online bank services, make sure your bank uses digital certificates. A popular security standard is SET (secure electronic transactions).

E-mail privacy.

Similarly, as your e-mail message travels across the net, it is copied temporarily on many computers in between. This means it can be read, by unscrupulous people who illegally enter computer systems.

The only way to protect a message is to put it in a sort of 'envelope', that is, to encode it with some form of encryption. A system designed to send e-mail privately is Pretty Good Privacy, a freeware program written by Phil Zimmerman.

Network security.

Private networks connected to the Internet can be attacked by intruders who attempt to take valuable information such as Social Security numbers, bank accounts or research and business reports.

To protect crucial data, companies hire security consultants who analyse the risks and provide security solutions. The most common methods of protection are passwords for access control, encryption and decryption systems, and firewalls.

Virus protection.

Viruses can enter a PC through files from disks, the Internet or bulletin board systems. If you want to protect your system, don't open e-mail attachments from strangers and take care when downloading files from the Web. (Plain text e-mail alone can't pass a virus.)

Remember also to update your anti-virus software as often as possible, since new viruses are being created all the time.

Preventative tips.

Don't open email attachments from unknown people; always take note of the file extension. Run and update antivirus programs, e.g. virus scanners. Install a firewall, a program designed to prevent spyware from gaining access to the internal network.

Make backup copies of your files regularly.

Don't accept files from high-risk sources.

Use a digital certificate, an electronic way of proving your identity, when you are doing business on the Internet. Avoid giving credit card numbers.

Don't believe everything you read on the Net. Have a suspicious attitude toward its contents.

Task 1. Fill in the gaps with the following words: *digital, certificate, malware, virus, scanner, spyware, firewall, antivirus*

1 Malicious software, (1) ..., can be avoided by following some basic rules.

2 Internet users who like cybershopping should get a (2) ..., an electronic identity card.

3 To prevent crackers from breaking into your internal network and obtaining your data, install a (3) It will protect you from (4)

4 If you have been hit by a (5) ..., don't panic! Download a clean-up utility and always remember to use on (6) ... program, for example, a virus(7)

Test yourself

Say whether the following statements are true (T) or false (F)

1 A modem transforms the signal from an audio frequency signal to digital form.

2 Laser printers use a system of heating an ink in the form of liquid powder.

3 Portable computers use flat-screen displays.

4 An optical character reader can read crosses in boxes in a questionnaire.

5 A scanner copies the image of a document and sends it to the computer.

6 Portable computers have a laser track instead of a movable mouse.

7 A floppy disc is suitable for storing large files.

8 A ROM memory is volatile.

9 An encoder is an input device that changes the format of information.

10 A register is a memory location operating inside the computer at high speed.

11 An optical character reader can read sentences in a questionnaire.

12 Dot-matrix printers use a system of heating an ink in the form of liquid powder.

13 An MP3 file enables over four hours of music to be recorded on a Compact Disc.

14 Portable computers have a trackpad instead of a movable mouse.

15 A cache is a small low-speed memory buffer.

16 A ROM memory is non-volatile.

17 CD-ROMS can be used for storing large quantities of text.

18 DVD technology offers a hard disc with a very large capacity.

19 DVD-Video was launched in 1987 in the USA.

20 The MP3 file is created from an audio source using 'ripping' software.

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