Inside the system

1 Technical specifications

A Read the advertisement and translate the technical specifications into your own language.

Dell Inspiron 9200

- ○ Intel Core 2 Duo processor at 2.4GHz
- ○ 2048MB RAM, expandable to 4GB
- ○ 500GB hard drive
- ○ Comes with Windows Vista Home Premium

B In pairs, answer these questions. If necessary, look at the Glossary.

1 What is the main function of a computer's processor?

2 What unit of frequency is used to measure processor speed?

3 What does RAM stand for?

2 What is inside a PC system?

A Read the text on page 12 and then answer these questions.

1 What are the main parts of the CPU?

2 What does ALU stand for? What does it do?

3 What is the function of the system clock?

4 How much is one gigahertz?

5 What type of memory is temporary?

6 What type of memory is permanent and includes instructions needed by the CPU?

7 How can RAM be increased?

8 What term is used to refer to the main printed circuit board?

9 What is a *bus*?

10 What is the benefit of having expansion slots?

B Look at these extracts from the text. What do the words in bold refer to?

1 **This** is built into a single chip. (line 2)

2 ... **which** executes program instructions and coordinates ... (line 3)   *CPU*

3 ... **that** is being executed. (line 22)   *instruction*

4 ... performance of a computer is partly determined by the speed of **its** processor. (line 25)   *CPU*

5 ... the CPU looks for **it** on the hard disk ... (line 35)   *program*

6 ... inside the computer to communicate with **each other**. (line 52)   *electrical channels*

What is inside a PC system?

Processing

The nerve centre of a PC is the **processor**, also called the **CPU**, or **central processing unit**. This is built into a single **chip** which executes program instructions and coordinates the activities that take place within
5 the computer system. The chip itself is a small piece of silicon with a complex electrical circuit called an **integrated circuit**.

The processor consists of three main parts:

- The **control unit** examines the instructions in
10 the user's program, interprets each instruction and causes the circuits and the rest of the components – monitor, disk drives, etc. – to execute the functions specified.
- The **arithmetic logic unit** (**ALU**) performs
15 mathematical calculations (+, -, etc.) and logical operations (AND, OR, NOT).
- The **registers** are high-speed units of memory used to store and control data. One of the registers (the program counter, or PC) keeps track
20 of the next instruction to be performed in the main memory. The other (the instruction register, or IR) holds the instruction that is being executed (see Fig. 1 on page 13).

The power and performance of a computer is partly
25 determined by the speed of its processor. A **system clock** sends out signals at fixed intervals to measure and synchronize the flow of data. **Clock speed** is measured in **gigahertz** (**GHz**). For example, a CPU running at 4GHz (four thousand million hertz, or
30 cycles, per second) will enable your PC to handle the most demanding applications.
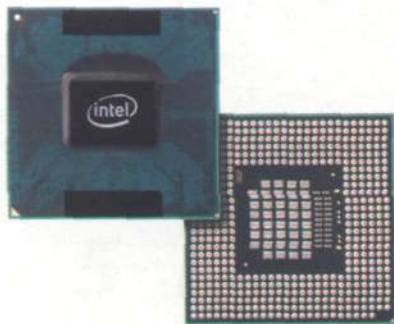
The Intel Core 2 Duo processor; other chip manufacturers are AMD and Motorola

RAM and ROM

The programs and data which pass through the processor must be loaded into the main memory in order to be processed. Therefore, when the user runs
35 a program, the CPU looks for it on the hard disk and transfers a copy into the **RAM** chips. RAM (**random access memory**) is volatile – that is, its information is lost when the computer is turned off. However,

ROM (**read only memory**) is non-volatile, containing
40 instructions and routines for the basic operations of the CPU. The **BIOS** (**basic input/output system**) uses ROM to control communication with peripherals.

RAM capacity can be expanded by adding extra
45 chips, usually contained in small circuit boards called dual in-line memory modules (**DIMMs**).
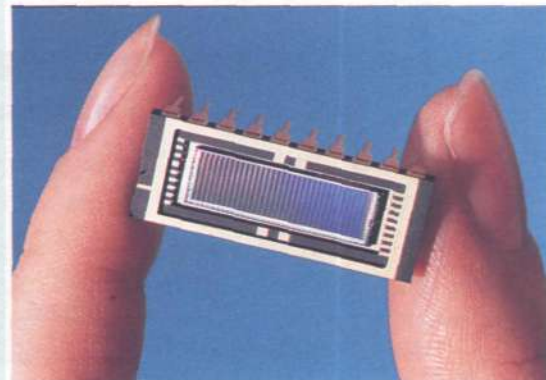

A RAM chip

Buses and cards

The main circuit board inside your system is called the **motherboard** and contains the processor, the memory chips, expansions slots, and controllers
50 for peripherals, connected by **buses** – electrical channels which allow devices inside the computer to communicate with each other. For example, the front side bus carries all data that passes from the CPU to other devices.

55 The size of a bus, called **bus width**, determines how much data can be transmitted. It can be compared to the number of lanes on a motorway – the larger the width, the more data can travel along the bus. For example, a 64-bit bus can transmit 64 bits of data.

60 **Expansion slots** allow users to install **expansion cards**, adding features like sound, memory and network capabilities.
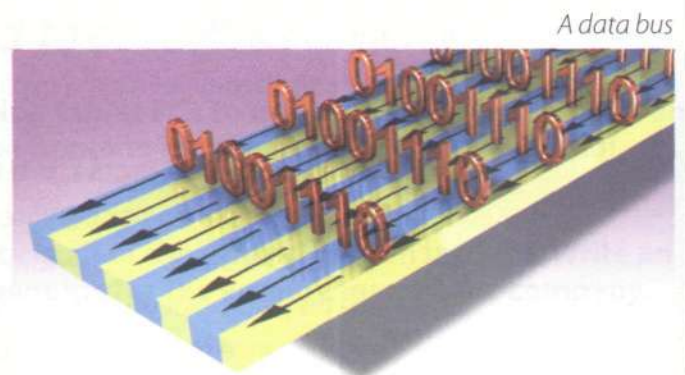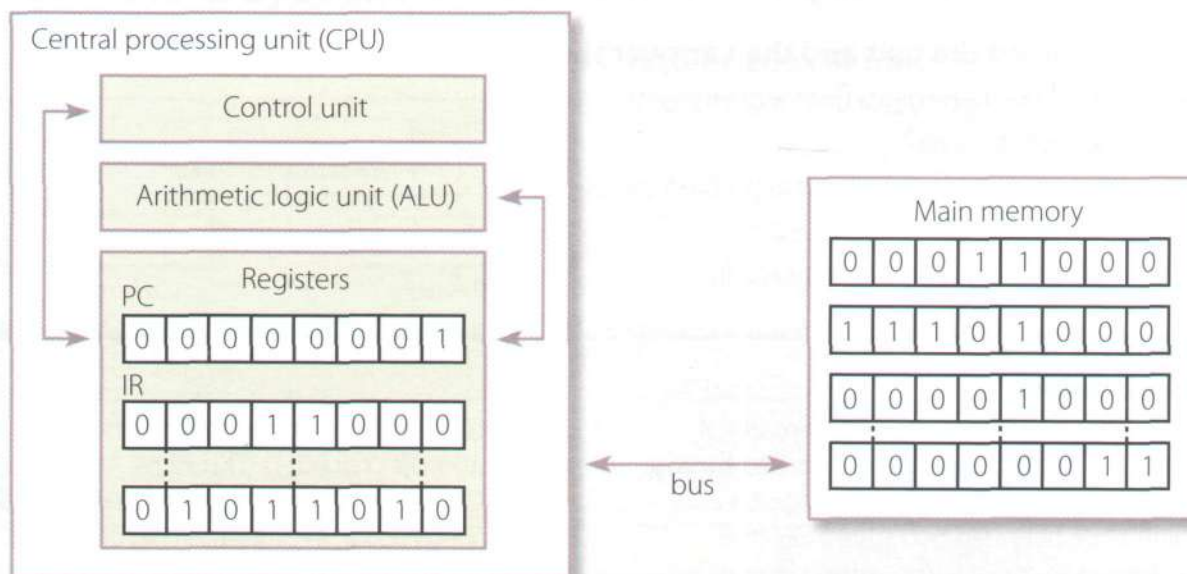

A data bus

Fig. 1: Organization of a simple computer; the CPU is built into a single microprocessor chip

3 Language work: defining relative clauses

Look at the HELP box and then complete the sentences below with suitable relative pronouns. Give alternative options if possible. Put brackets round the relative pronouns you can leave out.

1 That's the computer ___that___ I'd like to buy.

2 Core 2 Duo is a new Intel processor ___which___ contains about 291 million transistors.

3 A webmaster is a person ___who___ designs, develops and maintains a website.

4 A bus is an electronic pathway ___that___ carries signals between computer devices.

5 Here's the DVD ___which___ you lent me!

6 Last night I met someone ___who___ works for GM as a software engineer.

HELP box

Defining relative clauses

- We can define people or things with a defining (restrictive) relative clause. We use the relative pronoun **who** to refer to a person; we can also use **that**.

  *A blogger is a person **who/that** keeps a web log (blog) or publishes an online diary.*

- We use the relative pronoun **which** (or **that**) to refer to a thing, not a person.

  *This is built into a single chip **which/that** executes program instructions and coordinates the activities that take place within the computer system.*

- Relative pronouns can be left out when they are the object of the relative clause.

  *The main circuit board (**which/that**) you have inside your system is called the motherboard …*

13

4 How memory is measured

A Read the text and then answer these questions.

1 How many digits does a binary system use?
2 What is a *bit*?
3 What is a collection of eight bits called?
4 What does ASCII stand for?
5 What is the purpose of ASCII?

Bits and bytes

Computers do all calculations using a code made of just two numbers – 0 and 1. This system is called **binary code**. The electronic circuits in a digital computer detect the difference between two states: ON (the current passes through) or OFF (the current doesn't pass through) and represent these states as 1 or 0. Each 1 or 0 is called a **binary digit**, or **bit**.

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

Computers use a standard code for the binary representation of characters. This is the American Standard Code for Information Interchange, or **ASCII** – pronounced /ˈæski/. In order to avoid complex calculations of bytes, we use bigger units such as kilobytes, megabytes and gigabytes.

We use these units to describe the RAM memory, the storage capacity of disks and the size of a program or document.

Note: bit is pronounced /bɪt/; **byte** is pronounced /baɪt/

One bit

01000011

Example of a byte

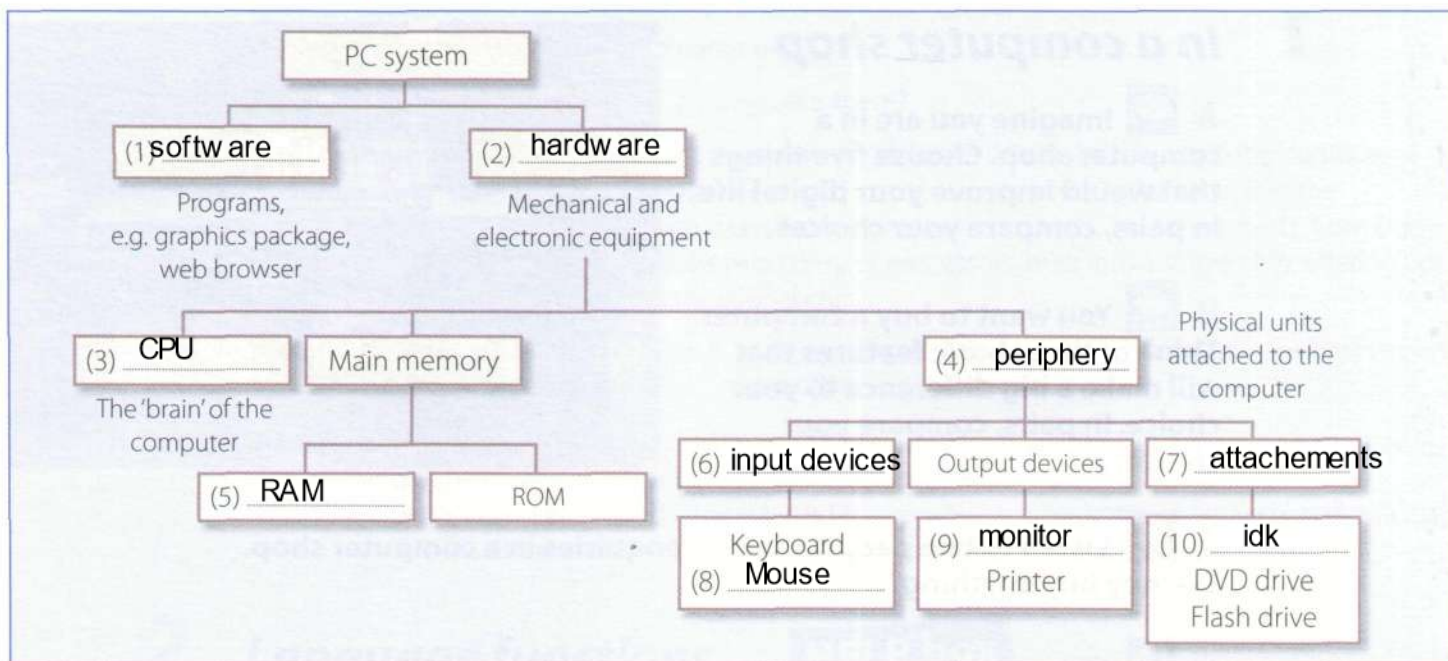| Unit of memory	Abbreviation	Exact memory amount
Binary digit	bit, b	1 or 0
Byte	B	8 bits
Kilobyte	KB or K	1,024 bytes (2^{10})
Megabyte	MB	1,024 KB, or 1,048,576 bytes (2^{20})
Gigabyte	GB	1,024 MB, or 1,073,741,824 bytes (2^{30})
Terabyte	TB	1,024 GB, or 1,099,511,627,776 bytes (2^{40})

1, 10, 11, 100...
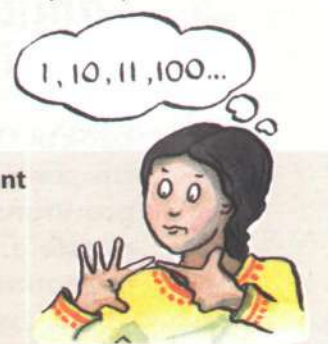
B Complete these descriptions with the correct unit of memory.

1 A ___Terabyte___ is about one trillion bytes – about as much text as the books and magazines in a huge library.
2 A ___megabyte___ is about one million bytes – about as much text as a 300-page novel.
3 A ___Kilobyte___ is about one thousand bytes – equivalent to one sheet of A4.
4 A ___Gigabyte___ is about one billion bytes – about as much text as 1,000 books.
5 A ___Byte___ can store a single character, such as the letter *h* or number *7*.

5 A PC system

A Complete this diagram of a PC system. Look at Units 1, 2 and 3 to help you.

PC system

(1) software — Programs, e.g. graphics package, web browser

(2) hardware — Mechanical and electronic equipment

(3) CPU — The 'brain' of the computer

Main memory
- (5) RAM
- ROM

(4) periphery — Physical units attached to the computer
- (6) input devices
  - Keyboard
  - (8) Mouse
- Output devices
  - (9) monitor
  - Printer
- (7) attachements
  - (10) idk
  - DVD drive
  - Flash drive

B In pairs, compare your answers.

C Listen to a teacher explaining the diagram to her class and check your answers.

6 Your ideal computer system

A Make notes about the features of the computer that you would most like to have. Think about the features in the box.

CPU	Speed	Optical disc drives	Wireless connectivity	Minimum/maximum RAM
Monitor	Ports and card memory slots	Hard disk	Software	

B In pairs, describe your ideal computer system. Give reasons for your choices.

Useful language

It's got …

It's very fast. It runs at …

The standard RAM memory is … and it's expandable …

The hard disk can hold …

I need a large, flat LCD screen because …

As for the Internet, …