FACTFILE:
GCSE DIGITAL TECHNOLOGY
Unit 1
COMPUTER HARDWARE 2

Rewarding Learning

Introduction

Learning Outcomes

Students should be able to:

- Describe the characteristics, typical uses, and advantages and disadvantages of input, output and storage devices;
  - Mircophone
  - Mouse
  - Graphics Digitiser
  - Touch Screens
  - Speakers
  - Printers (laser and 3D)
  - Hard Disc Drive (HDD)
  - High Definition (HD) Storage Media
  - Solid State Drive (SDD)
- Explain the purpose of random access memory (RAM), read only memory (ROM) and cache.

Contents in Computer Hardware Factfile 2

- Input, Output and Storage devices
- Random Access Memory
- Read Only Memory
- Cache

Input Devices

These are used to enter data into a computer system. They can be manual or automated. A manual device requires the user to complete a task such as typing on a keyboard. An automated device is already encoded to transfer data directly to the computer for example a scanner.

	Characteristics	Typical Uses	Advantages	Disadvantages
Microphone 	A microphone has a diaphragm, usually made of plastic inside it. When a sound wave hits it, the diaphragm moves back and forth.	To input sound into the computer. To record sound. To convert it into digital data.	Wireless microphones allow ease of movement for performers. They reduce the chance of tripping. Can be used with the voice recognition software.	Wireless microphones have limited range and limited battery life.
Mouse 	A mouse has 1 or more finger operated buttons. When these buttons are clicked they perform an action. A mouse must sit on a flat surface to move around using either a roller ball or optical sensor.	To perform actions and help the user navigate around the user Interface. For example clicking on a program to open it or clicking on a print icon to print a document.	Gives the user freedom of movement. Can be adjusted to suit the users' needs. There is a large variety available. They are highly responsive and accurate.	Needs a flat, unobstructed surface. Wireless mice need to be close to the computer. Operated by hand Easily broken.
Graphics Digitiser 	Consists of a flat surface where you can use a special "pen"/ stylus to write or draw with. As you draw on the surface an image will appear on the screen of the connected computer.	Often used by graphics designers and illustrators.	Greater accuracy can be achieved. Enables the user to draw more naturally.	Much more expensive than a mouse.

Output Devices

Once the input data is processed the computer produces results. This is known as output. There are many devices that can be used to view this output. For example a monitor will show the results on screen, a printer will produce a hard copy/paper copy of the results.

	Characteristics	Typical Uses	Advantages	Disadvantages
Touch Screen 	Works by using your finger to touch the screen. Touching is detected and translated into instructions for the device. The screen can detect the difference between tapping, swiping and pinching actions.	Mobile phones. Tablets. ATMs – checking bank balance, withdrawing money etc. Museums and galleries. Paying for tickets in a train station.	Easy to use. Can see all available options. Don't need excellent ICT skills to use. Can be adapted for many uses for example: cashpoint, supermarkets, mobile phones, and airports. Usually fixed to larger devices so there is less chance of them being stolen.	User needs to understand the icons used. Limited options available. If damaged the touch screen may not respond. Can be easily scratched or become dirty. Difficult to see in bright sunlight.
Speakers 	Uses audio signals and converts them to sound. It has several parts:	Used to output sound. For example: Music, audio from films, satellite navigation voice, text-to-speech systems.		Can disturb others who are trying to work. Good quality speakers can be expensive.

	Characteristics	Typical Uses	Advantages	Disadvantages
Printer (laser) 	Uses a laser beam to "write" the image onto a light-sensitive drum. The drum uses electrostatics to attract toner to the image of the drum. Paper is pressed against the drum to transfer the image. The drum roller is heated to seal the toner on the paper.	Used to print documents at high speed.	Produces high quality prints. Prints very quickly, Very quiet. Can get colour laser printouts.	Produces shiny images. More suited to text printing.
Printer (3D) 	Usually cube shaped with a transparent "door" that can be opened to remove the finished product. The "product" is created in layers.	Prototyping in the Medical, Aerospace, Automotive, Jewellery, and Art industries.	Streamlines production and design processes. Saves time and money at the initial product development.	Equipment very expensive. There is a wide range of printing materials from plastics, ceramics, metals and many others. The price difference between different materials is huge.

Storage Devices

These are pieces of equipment that store all the programs and data used by the computer or the computer user.

	Characteristics	Typical Uses	Advantages	Disadvantages
Hard Disk Drive (HDD) 	Rigid magnetic disk(s) enclosed in a sealed container. Recording heads are very close to the magnetic material.	Stores all the programs, software and applications used by the computer or user.	High recording density. Large storage capacity. Faster than CD/ DVD. Cheap per megabyte. Stored items are not lost when computer is switched off.	Slower than RAM or ROM. Can crash which stops the computer working. Regular crashes damage the surface.
High Definition (HD) Storage Media 	Computers today need as much storage as possible, they need equipment that can store high quality data. This includes HD-DVD or Blu-Ray, optical devices. Blu-ray is an optical disc format used to store high-definition video as well as games.	To store large amounts of high-quality data, such as films.	Blu-Ray and HD-DVD disks work the same way as DVD disks but can hold more high quality data. Better picture, better sound than previous optical media.	You need dedicated players. With so much data it can take time to load a film.
Solid State Drive (SDD) 	A collection of memory chips controlled by its own software. The software makes the chips act like a disk drive.	In some machines these are replacing hard disk drives.	Faster RAM. Faster start-up. Less noise. Disk defragmenting is not required. Less power requirements.	Limited Capacity.

Random Access Memory (RAM)

This memory has the same access time for all locations. RAM can be **static** or **dynamic**. Static memory is held as long as the computer is turned on. Static memory is therefore temporary. Dynamic memory has to be refreshed by reading and writing the contents frequently. As the computer boots, parts of the operating system and drivers are loaded into memory, which allows the CPU to process the instructions faster and speeds up the boot process. After the operating system has loaded, each program you open, such as the browser you're using to view this page, is loaded into memory while it is running. If too many programs are open the computer will swap the data in the memory between the RAM and the hard disk drive.

Read-Only Memory (ROM)

This memory can only be read from, the computer system cannot write any new data to it. ROM is used for both data and programs. ROM is non-volatile memory which means that when the computer is switched off the data is permanently stored. ROM holds the instructions used to “boot-up” the computer (BIOS = Basic Input Output System).

Cache

A cache (pronounced CASH) is a place to store something temporarily in a computing environment. It has extremely fast access and is temporary storage between the CPU and rest of the main store. Using cache memory can greatly reduce processing time therefore the larger the amount of cache memory, the quicker processing time will be.

Cache memory: memory that a computer microprocessor can access more quickly than it can access regular RAM. Cache memory is usually tied directly to the CPU and is used to cache instructions that are frequently accessed by the processes that are currently running.

Cache server: A dedicated network server, or service acting as a server, that saves webpages or other Internet content locally.

Questions

1. Name 2 types of Input device and give an example of each.

   (a) _____ (1)

   Example: _____ (1)

   (b) _____ (1)

   Example: _____ (1)

2. Explain how a 3D printer could be used by the medical industry.

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   _____ (3)

3. What are the advantages of using a Solid State Drive compared to using a Hard Disk Drive?

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   _____ (3)

4. What is the difference between RAM and ROM?

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   _____ (3)

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