COMPARING COMPUTERS

DESKTOP COMPUTER VS AN ALL-IN-ONE COMPUTER

- Desktop computer has a system unit (tower), monitor, keyboard and mouse as separate devices whereas an all in one computer has the monitor and system unit combined, thus taking less physical storage.
- Processing power is the same.
- All in one is not necessarily cheaper.

DESKTOP VS A LAPTOP

- Laptop is portable as it has a battery, whereas a desktop is not.
- Can use laptop without having physical power.
- Laptop can be just as powerful as a desktop.
- Laptop is more expensive as all the components are smaller in physical size.
- Desktop is cheaper for more powerful components
- Desktop cannot be stolen as easily as a laptop as it is not portable.

HARDWARE COMPONENTS

INSIDE SYSTEM UNIT

MOTHERBOARD

- Electronic circuit board used to connect all the different components (CPU, RAM, HDD, etc.) together.
- Allows for communication to occur between the different components.
- Allows other external cards such as a Graphics Card to be added.

PORTS BUILT INTO MOTHERBOARD (USB, FIREWIRE, ETHERNET, VGA, HDMI)

USB

- Universal Serial Bus used to connect external peripherals such as Flash Disks, external HDD, Smartphones, Printers, Mouse, Keyboard.
- The drivers for these devices are generally loaded automatically by the operating system.
- USB 3.0 has faster data transmission than the older USB 2.0

FIREWIRE AND THUNDERBOLT

- Special high speed transmission originally created by Apple for data transmission from an external device to the computer.
- Thunderbolt is faster than FireWire port but also for only certain devices.

ETHERNET

- Used to connect to a network via a UTP (Unshielded Twisted Pair) cable.
VGA

- Video Graphics Array which is a port used to transfer video from one device to another, such as a computer to a data projector or in the case of a desktop computer it is used to connect the monitor to the motherboard / graphics card.

HDMI

- High Definition Multimedia Interface – Allows for high definition video to be transferred as well as sound with the video.

CPU (CAN BE UPGRADED TO INCREASE PERFORMANCE)

- Central Processing Unit – performs all the calculations / does all the processing
- Speed is measured in GHz (Gigahertz), the higher the speed, the faster the processing.
- Intel and AMD are popular manufacturers
- Quad-core (4 processors) / Dual-core (2 processors): More than one processor on a single chip. Can thus perform multiple tasks at the same time – allows for faster processing.
- Cache memory on CPU – special high speed memory that stores recent/frequently accessed tasks/programs with the prediction that it will be used again soon. This allows the CPU to load the task/program faster than what it would from RAM.

RAM (CAN BE UPGRADED TO INCREASE PERFORMANCE)

- Random Access Memory which is also known as your primary memory
- Temporary storage for data/programs that are currently being used
- Indicated by terms such as DDR3/ DDR4 / DIMM in adverts
- Volatile – thus it loses its contents when the power is off
- It is electronic, thus it is faster than secondary memory / storage.
- It is more expensive per GB than storage.
- Cache memory within RAM – special high speed memory that stores recent/frequently accessed tasks/programs with the prediction that it will be used again soon. This allows the CPU to load the task faster than loading it from normal RAM or Storage.
- The more RAM the computer has, the faster the computer will be able to process multiple tasks or the more tasks can be loaded simultaneously.

ROM

- Read only memory – chip on the motherboard
- Non-volatile – it keeps it contents when the power is off
- Holds the instructions on how to boot up the computer (start-up) known as BIOS
- BIOS (Basic Input Output System) – instructions on where must the CPU look for the operating system.
- POST (Power of Self-Test) where it tests all the components of the computer to see if it is working.
- Once all is tested, the CPU loads the operating system into RAM and the operating system takes control over from ROM.
HDD VS SSD (CAN BE UPGRADED TO INCREASE PERFORMANCE)

- Both are secondary memory or known as storage (main storage for programs / files / data)
- HDD – Hard Disk Drive
  - Greater storage capacity than the SSD. 500GB, 1TB, 2TB
  - Magnetic storage
  - Moving parts, thus can break easily and not as quiet as SSD.
  - Physically bigger than SSD
  - Cheaper per GB than SSD
- SSD – Solid State Drive
  - Smaller storage capacity than HDD.
    - 128GB, 256 GB, 528GB (Apple)
    - 120 GB, 240 GB, 580 GB (Other, such as Gigabyte, Verbatim)
  - Electronic storage
  - No moving parts, thus it cannot break easily and is quieter than HDD.
  - Physically thinner / smaller in size than HDD
  - More expensive per GB than HDD
- External HDD types
  - 2.5” external which means it is powered by the USB
  - 3.5” external which means that it needs to be plugged into a wall socket in addition to the USB.
- Other features:
  - Serves as virtual memory - Area on hard drive that serves as RAM (when RAM becomes full). Swopping files that between the HDD & RAM as they become needed.
  - Internal HDD connects to motherboard via SATA cable, thus SATA is a term also seen on adverts that links to HDD.

OUTSIDE SYSTEM UNIT

CDS/DVDS

- Optical Storage
- CD – 700 MB, DVD – 4.7 GB
- Optical storage is not commonly used anymore because:
  - It takes longer to burn to a CD/DVD than to copy to a flash drive or External HDD
  - Flash Drive has greater storage capacity
  - Flash Drives cannot damage/scratch as easily as CDs/DVDs
  - Programs are often paid for online and downloaded onto the computer instead of purchasing on a CD/DVD from a physical store
  - Laptops also do not really come with CD/DVD drives anymore because of the reasons above

WI-FI / HOTSPOT

- Hotspot is a physical location (area) where people may obtain internet access, typically using Wi-Fi technology, via a wireless local area network (WLAN) using a router connected to an internet service provider.
- This means that you switch on your Wi-Fi on your portable device in order to connect to a router that is giving off wireless internet access, for example in a coffee shop or at school you have areas where you have internet access.
MONITOR/SCREEN

- Physical size measured in inches diagonally from corner to corner, for example 19”
- Quality of the display (picture) on the monitor is measured in RESOLUTION, which is the horizontal x vertical pixels, for example 1920 x 1080
  - The higher the resolution, the better the quality picture the monitor can produce as it has more pixels
- Response time – measured in milliseconds (ms) which indicates how quickly a pixel can change its colour
- Refresh rate – for example 60 Hz (hertz) which indicates how quickly the entire screen can refresh.

Take note: A Desktop computer monitor is a separate device that is connected to the system unit via a VGA or HDMI cable.

- Touch screen/multi touch screen - Can recognise more than one ‘touch’ and react - like pinch/zoom (also applicable to touch pad).
  - For security, use a screen lock pattern on portable devices.

PRINTER

- Specifications:
  - Pages per minute (ppm) – how many pages can be printed per minute – measures speed of printer
  - Dots per inch (DPI) – the quality of the printer, the higher the better the quality of the picture printed
  - Monthly duty cycle – the amount of paper recommended that can be printed per month without breaking the printer
  - Ink – black and white / Colour (CMYK) – Consumables that can be replaced or refilled.
  - Bluetooth / Wi-Fi capabilities – can print via Bluetooth or Wi-Fi
  - Card reader / USB slot – can print to SD card and Flash Drives
  - Multi-function (All in one) printer – can print, copy, scan and fax/email

- Laser compared to Inkjet
  - Laser printer uses a laser light to burn the image onto the paper whereas an inkjet printer sprays microscopic ink onto the paper.
  - Laser printer used toner cartridges whereas inkjet uses ink cartridges.
  - Laser printer is more expensive to purchase than the inkjet
  - Laser printer works out cheaper in the long run as you get more pages per toner cartridge than ink cartridge.
  - Laser printer and inkjet can both print in colour, but inkjet produces the better quality photos as it can mix colours better and print on special glossy paper.
  - Laser printer is better for large quantity of printing as it prints faster than inkjet.

- 3D Printer
  - Prints 3 dimensional solid obtains from a digital model in a program on your computer usually out of plastic
  - Allows you to print prototypes at home for testing
  - Allows you to print special tools needed for a specific job
  - Cheaper option than asking a company to print a specific object
SCANNER

- Flatbed scanner (1 page at a time) or sheet-fed scanner (pack of paper)
  - Quality measured in DPI
  - Scanned image quality only as good as the original
  - Slow to scan with flatbed
  - Could also take a photo to get a printed copy into a digital copy
  - OCR (optical character recognition) – Software that converts the scanned image into editable text that can be edited in a word processor.
    - This software sometimes does not recognise the characters correctly, thus not 100% all the time.
- Barcode scanner
  - Uses light to scan barcode (Stripes on a product)
  - Used at POS (point of sale) system to improve accuracy and speed in the stores
- RFID tags (radio frequency identification)
  - Uses radio waves (wireless technology) to transmit data
  - A tag that contains your details when swiped over a sensor can either open a door or let you sign into your account to put lights on a squash court.
- Biometric scanners – better security than a password as it is linked to one person.
  - Face recognition with camera
  - Fingerprint scanner
  - Iris/Retina scanner

DIGITAL CAMERA

- Quality of image (resolution) measured in MP (megapixels) which is the result of the horizontal times vertical pixels.
- The higher the resolution, the better the quality of the image, the bigger the physical size of the picture and the bigger the file size, and the lower the resolution, the lower the quality of the image as well as the smaller the physical size of the picture and the smaller the file size.
- Allows one to view images immediately and delete ones that you do not want
- Can transfer pictures from camera via a USB cable or by taking out the SD card and inserting it into a card reader slot on the computer
- When using the camera on a smartphone / tablet it can be transferred to your computer via Bluetooth or via a USB cable.

OTHER DEVICES:

- Devices for gaming – joystick, steering wheel, controller with vibration
- Devices for people with disabilities – trackball/ foot pedal/ suction-blowing device/ braille keyboard / large key keyboard
TROUBLESHOOTING HARDWARE DEVICES

For the most part, doing the following would help when a computer component/peripheral stops working or does not work properly:

- restarting/rebooting your computer could fix most problems with devices not working as it reloads all the drivers again.
- Plugging the device out and in again
- Making sure the device is plugged in correctly and into the correct port

MOUSE AND KEYBOARD

- If the mouse and keyboard is wireless, replace the batteries
- Test mouse and keyboard with another computer to determine whether the problem is with the mouse and keyboard or with the ports on your computer.

HARD DISK DRIVE

- Computer usually starts running slowly if hard drive is full, thus you can perform a disk clean-up or delete unnecessary programs/files
- Files could be fragmented on the hard drive (scattered) – perform disk defragmentation to re-organise the files into order again allowing the files/programs to be loaded quicker.
- There could also be a possibly be malware on your hard disk which could also make it run slower.
  - Scan hard drive for viruses using your anti-virus software
  - Keep anti-virus software up to date.