2018 edition

COMPUTER APPLICATIONS TECHNOLOGY

THEORY CONCEPTS

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SYSTEMS TECHNOLOGIES

CONCEPTS OF COMPUTING

1. CATEGORIES OF USERS: PERSONAL COMPUTER USER OR END-USER	
Description – What it is	This user uses a personal computer to do task of a personal nature, not requiring large amounts of processing power or speed (Anon., 1999). End users typically do not have advanced computing skills and only aim to use specific software applications. End users are individuals that use computing devices for personal use, often using MS Office or mobile application software. (Anon., 2018)

Advantages	• **Education:** Personal computer devices assist in research for school, work or personal needs.
	  ○ Personal computers at schools assist students in gaining knowledge.
	  ○ At work, personal users can manage and run their day-to-day tasks from any place at any time of the day.
	  ○ At home personal users have the ability to complete tasks, learn how to use the computing software or gain knowledge through the internet.
	• **Entertainment:** Applications such as Google Play, online games, videos and music allow the personal user to have fun and be entertained while using their devices.
	• **Communication:** Due to convergence, personal users can make and receive phone calls via the internet using applications such as WhatsApp of Skype.
	  ○ Personal computer devices can be synchronised so that the same information is stored on their mobile phone as well as laptop or tablet.
	  ○ Personal users also have the ability to access and share e-mails, documents or video chats instantly via an internet connection (Kirk, 2018).

Disadvantages	• **Increased communication:** Having a constant connection via a mobile device can result in the user being flooded with e-mails, voice messages or instant messages, often resulting in overlooking important communications received. • **Information overload:** Mobile users have access to vast amounts of content immediately via the device that can result in the user suffering from information overload or get inaccurate information. • **Health risks:** Mobile users can suffer from Repetitive Strain Injury, Carpal Tunnel Syndrome, sore wrists, necks, back

	aches, eyestrain and headaches due to spending prolonged time using the device. • **Addiction:** Gaming, cyber-relationship, online gambling, pornography and internet addiction can result due to constantly having access to the device (Kanobi, 2018). • **Unemployment:** The increased use of computer devices, results in less employees needed to complete tasks as the personal user can for travel between business branches and complete tasks where previously these branches needed different individuals to do the same tasks. • **Lack in productivity:** Constant connectivity may lead to these users focusing on their devices to e.g. socialise instead of their daily work tasks. • **Less data security:** Due to cloud computing and cloud storage, information is more openly available, so can be stolen or duplicated more easily (Khan, 2018)
Examples of the technology in practice	• **Education:** Many schools have moved away from the traditional textbook only thus enabling the learner to gain more knowledge via internet access and other digital resources. • **Entertainment:** Personal users can also watch television in real-time on their devices through websites such as DSTV now. • **Communication:** Personal users have the ability to constantly communicate without being influenced by borders. Most of these users' devices have some form of communicative connection so that e-mails, Skype, instant messaging or even regular telephone calls can take place **(Kirk, 2018)**.

2. CATEGORIES OF USERS: SMALL OFFICE HOME OFFICE – SOHO	
Description – What it is	SOHO is the acronym for a Small Office Home Office user. These users include all small, medium to large organisations which are operating from a small building or a house including one to ten individuals in the business operation. These types of users have increased since the effective utilisation of cloud computing, mobile devices and telecommuting (Ward, 2016).
Advantages	• **Less traveling**: SOHO users operate mainly from their houses. • **Increased family time**: Home office enables the employee to be available to attend to their personal obligations more often. • **Reduces stress and distraction**: SOHO workers don't have constant pressure to keep up with the fellow employees and don't get distracted by many individuals working around them in the same office. • **Increased comfort**: The work environment allows for a comfortable dress code and work environment, e.g. employee can wear pyjamas and listen to music during work hours. • **Independence**: Since most SOHO users are their own boss, they can structure their day as they see fit. • **Improved wellness**: The SOHO user can balance their work/social/personal life as they deem fit, leading a healthy balanced life (Ward, 2016).
Disadvantages	• **Lack in work related commitment**: SOHO users need to have a strong committed work ethic, as they are responsible for completing work related tasks on their own. • **No set work hours:** The flexible nature of this work environment often makes following a set work schedule difficult. • **Many distractions:** Family and personal life often distracts these users from their work (Uwe, 2012).
Examples of the technology in practice	SOHO users comprise of many different types of users such as lawyers, accountants, entrepreneurs, travel agents, sales representatives and consultants for large businesses. The number of SOHO's are on the ever increase as many organisations are realising the financial benefits of having employees as telecommuters **(Ward, 2016)**.

3. CATEGORIES OF USERS: SUPER USER/POWER USER	
Description – What it is 	Super users are also known as power users. These users are typically system administrators of a computer network (Anon., 2018). These users require high-end hardware and software not typically utilised by personal users. However not all power users require extensive technical knowledge of the computer system or programming but are more actively involved in the optimum utilisation of the system – often because the software they use, have such intensive system requirements.(Anon., 2018).
Advantages	• **System security**: All network based security systems are managed by the power user/super user. • **System management**: System policies are drawn up and maintained by the administrator. • **Training**: Basic system usage training can be provide by a super user. • **'Go-to IT'**: A power user can assist with basic IT support in an organisation to staff such as setting up Wi-Fi or printing connection (McNeive, 2009)
Disadvantages	• High security level • Not easily done by anyone • Needs highly skilled labour • Needs expensive equipment
Examples of the technology in practice	Super/power users can often be found as software developers, network administrators, graphic designers, gamers, animators and audio mixers that require devices with high-end computing abilities **(Anon., 2018)**.

4. CATEGORIES OF USERS: MOBILE USER	
Description – What it is 	The mobile user is any one that uses a mobile device to perform actions on the move. These users have the ability to access data or information anywhere as long as there is an internet connection available such as Wi-Fi, mobile networks or hotspots (Bucki, 2017).
Advantages	• Always available – mobile networks • Flexibility in terms of work space • Increase productivity • Easy access to services such as banking • Convergence • All-in-one devices • Customisation according to mobile apps needed • Wi-Fi and hotspot internet capabilities • Cloud storage capabilities (Anon., 2018)
Disadvantages	• **Cost**: The latest technology usually needs major financial cost. • **'Always-on'**: May cause the user to be distracted from completing workplace activities. • **Miss-use of resources**: Employees having access to company network connections may lead to resource being abused as the employee uses the resource for personal matters rather than work. • **Frequent technology training**: Ever changing technology may lead to employees frequently needing training to use the latest version of the technology. • **Higher security is needed**: The more individuals are on the network, the more the company is open to security threats such as hacking and viruses (Anon., 2018). • **Not ergonomically designed**: Resulting in health related illnesses such as repetitive strain injury and wrist pain (Anon., 2018).
Examples of the technology in practice	Mobile users are seen as any individual that is utilising a mobile device such as laptops, smartphones, tablets and any other wearable computing device e.g. Apple Watch. The mobile device indicates that the user is able to access data and information from anywhere at any time and moving around whilst having access to the device is possible.

5. ENTRY-LEVEL COMPUTER	
Description – What it is	These models are the cheapest to purchase in their range as they have fairly low hardware specifications.
Simple explanation of how it works	This computer has low processing power therefore it will be used for basic tasks.
Advantages	• Not expensive to purchase. • Has enough processing power to do the basic tasks without hanging.
Disadvantages	• Low processing power. • Short life span. • Installed with pre-installed version of the operating system, if professional version is needed, it needs to be purchased. • Software is rarely pre-installed.
Limitations	The specifications of these systems change over time, so a current top-level computer system will be regarded as an entry-level system in a few years' time.
Relevance and impact on personal lives	These entry-level devices can be used to for basic tasks in everyday life. They are inexpensive to purchase.
Examples of the technology in practice	• Can be used when a new skill is being introduced on the computer. • Can be used to do basic administration tasks. • Can be used to browse the internet.

6. STORAGE	
Description – What it is	Storage is a process through which data is saved on any storage device. Storage enables a computer or device to retain data, either temporary or permanently.
Capacity	The smallest unit of storage measurement is a byte. 1024 B = 1 KB 1024 KB = 1 MB 1024 MB = 1 GB 1024 GB = 1 TB Hard drive: 250 GB – 12 TB External hard drive: 128 GB – 8 TB Flash drive: 1 GB – 256 GB CD: 700 MB DVD: 4.7 GB or dual-layered 8.5 GB Blu-ray: 25 GB or dual-layered 50 GB Memory card: 1 GB – 256 GB
Volatility	The condition when storage is lost when electricity is switched off.
Types of storage	Primary storage or memory: The CPU directly communicates with the primary storage area (RAM) to access data required to process. This is volatile memory (temporary). Secondary storage: Refers to non-volatile storage devices, such as hard drives, optical media, flash drives.
Storage devices	**Hard drive (HDD)** The hard disk drive is the main, and usually the largest, data storage hardware device in a computer. The operating system, software, and many other files are stored on the hard disk drive. **External hard drive** An external hard drive is a portable storage device that can be attached to a computer through a USB or a FireWire connection, or wirelessly. External hard drives have high storage capacities and are often used to back up computers or save large files. **Flash drives** A flash drive is a small, portable storage device which, unlike an optical drive or a traditional hard drive, has no moving parts. Flash drives connect to computers and other devices via USB. **CDs/DVDs** To use CDs (compact disks) and DVDs (digital video disks) are a relatively inexpensive way of storing data. **Blu-ray** Blu-ray Disc (BD), is the name of an optical disc format that offers more than five times the storage capacity of traditional DVDs. This

	format allows recording, rewriting and playback of high-definition video (HD). **Memory cards (see memory cards)** A memory card is an electronic flash memory storage device used for storing digital information especially in digital cameras and mobile phones.
Advantages (Computers, part of your life - Grade 12)	**Hard drive (HDD)** • Larger capacity than RAM • Cheaper per GB than RAM • Store data and programs **External hard drive** • Large capacity – can store larger amounts of data than internal hard drives • Portability – small and easy to carry around • Ease of use – can be plugged into a USB-port and used • High speed – faster than optical media • Reliability – more reliable than optical media **Flash drives** • Portability • Fast data access • Cheap • Larger capacities than optical media • Industry-standard use • Reliability • Ease of use (in terms of adding and deleting files) • No need for a power source **CDs/DVDs/Blu-ray** • Cheap • Portable • Industry uses optical storage as a standard
Limitations (Computers, part of your life - Grade 12)	**Hard drive (HDD)** • Easy to damage • Comparatively slow – operates on a magnetic and mechanical basis **External hard drive** • Not physically as small as a flash drive • As vulnerable as hard drives and can be damaged easily because they are mechanical and magnetic **Flash drives** • Easy to lose • More expensive per GB than hard drives • Lower capacities than newer hard drives

	• A limited life span in terms of how many times data can be saved on them **CDs/DVDs/Blu-ray** • Slow • Easily damaged • Relatively small capacity • Not as easy or intuitive to write to as flash disks • Some computers like netbooks do not have optical drives built-in
Simple explanation of how it works	**Magnetic storage** uses magnetic field to write on magnetic media and is one of the most common types of storage used with computers and is the technology that many computer hard drives use. **Optical storage**, which uses lasers and light for reading and writing data. Examples of storage devices that make use of optical storage, CDs, DVDs, Blu-ray. **Flash memory** has replaced magnetic media as it becomes cheaper as it is the more efficient and reliable solution. Examples of storage devices that make use of flash memory, flash drive, memory card, SSD. **Cloud storage** is becoming popular as people need to access their data from more than one device and more than one place.

HARDWARE

7. BIOMETRIC INPUT	
Description – What it is	It's an authentication technique which relies on measurable physical characteristics that can be automatically checked. It includes making use of a person's fingerprints, voice patterns, facial characteristics or eye characteristics to uniquely identify a persons' identity.
Simple explanation of how it works	Security systems and timekeeping systems make use of a person's unique physical attributes like a fingerprint, to ensure that the person making use of said system is in actual fact the person he is representing to be. Since these attributes are unique to each person, it is much more secure in establishing the authenticity of the person. The device scans the unique attribute and checks it against the database stored. Once the attribute is recognised and action such as opening a door takes place.
Advantages	• It is much less likely that a person will be able to bypass the security of a biometric system, making the system more secure. • It is much easier to teach a person how to use a biometric system, since not much training is required to scan a biological component of a person. • It's a form of authentication, which cannot be lost or forgotten. • It reduces operational cost since it no longer is necessary to replace or repurchase new authentication keys to allow employee access. Once the initial expense of incorporating the system is incurred, the running cost reduces drastically.
Disadvantages	• If the attribute being used of a person is damaged or cannot be clearly read, the biometric system will not work. • If the biometric system is in an environment which is not environmentally suitable for the system, it will not work effectively. For example, voice recognition in a noisy environment. • The initial setup and integration cost of such a system is very high and may not be financially viable for many businesses. • If the system is compromised or down, you will not be able to gain access to the device or area which is controlled by the system which will lead to loss of productivity.
Limitations	• It's expensive to maintain. • If the biometrics being used as security has been duplicated or compromised, it cannot simply be reset like a password and therefore will pose a serious risk to the security of the item or information being protected.

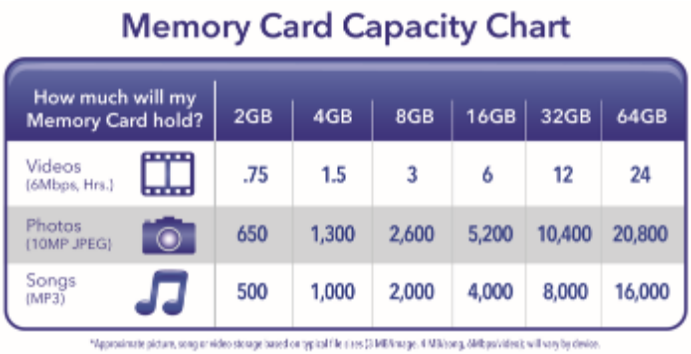
	• You need specialised hardware and software to implement a biometric system.
Relevance and impact on personal lives	• Biometrics is used to ensure security and, in a world, where security systems can easily be hacked or compromised, it is a more secure form of authentication since it is not so easy to duplicate or hack. It can be used to lock the information on your flash drive or used to ensure the safety of a company's database. Since it is unique to the person who is protecting the access, it is a much more secure way to go.
Examples of the technology in practice	• Using an attribute unique to a person to identify a person for example fingerprints, palm print, facial recognition, DNA, hand geometry, iris recognition, retina scanners. • It is mostly used to ensure security and is used to allow access, allow a person to clock in and out at work or allow access to files on a flash drive or computer hard drive.

8. CONVERGENCE	
Description – What it is	Convergence is the combination of two or more technologies in a single device. It's having one device, which is able to perform many functions.
Simple explanation of how it works	When you use your smartphone to take photos, you are using a device which might originally been seen as a telephone, to take photos. You are using one device to replace the functionality of both a phone and a camera.
Advantages	• It is cost effective since you can purchase one device and use it for many functions. • It's more efficient since you do not need to carry many devices around with you and you are able to use your one device to complete many tasks. • It's convenient since having and using one device is much less effort than having to carry many devices around with you.
Disadvantages	• There is a higher risk of losing your information. Since you are now using only one device to do many functions, all of the information connected to these functions are linked to that one device and if the device crashes, breaks down or is stolen and you haven't kept a backup, all of your information goes with it. • You will have less memory available on your device since you are using one device for many functions. • If your device breaks down you may be left without access to many devices at once. One device is used to do many things, thus you may not have the functionality of many devices when your one convergent device breaks and has to go in for repairs.
Limitations	• The relevance of the technology is limited to how up to date the one device is which is being used. • The functionality of the different components is limited to the availability of each component on the selected device. • The different components cannot be upgraded individually since they are limited to the device being used.
Relevance and impact on personal lives	• Since convergent devices are already used on a daily basis, most people are influenced by them and any advantages or limitations they may present. Most people choose to rather purchase a tablet or smartphone to use as a camera or GPS system instead of purchasing each individual device solely for their one individual purpose.

Examples of the technology in practice	• A smartphone which includes a camera, mp3 player, GPS system, games, modem, radio etc. • A tablet which includes a camera, office programs, movie player, GPS system, games, social networking sites, etc. • Smart televisions that can access the internet and therefore allow video on demand. • Laptops are devices that can create documents, browse the internet, make video calls, etc. • The ability of a vehicle to use the onscreen camera to make phone calls and navigate. • Smart watches used to read time and record physical activities.

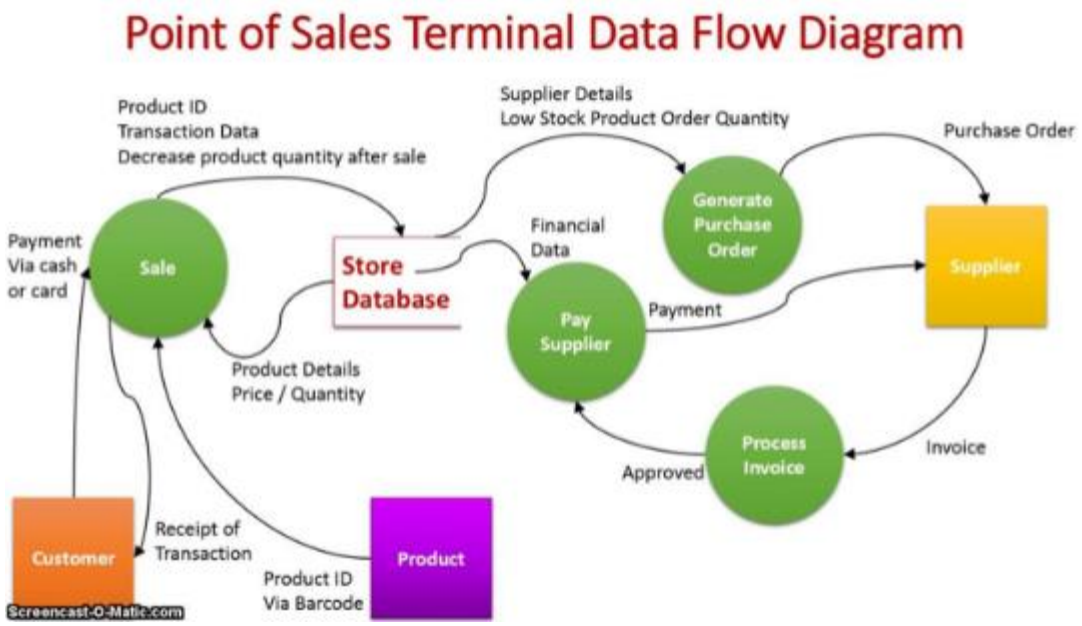
9. INTERACTIVE WHITEBOARDS	
Description – What it is	It's an interactive display device, in the form of a whiteboard, which reacts to user's input either directly with touch or using other devices like specialised interactive whiteboard stylus pens.
Simple explanation of how it works	The interactive whiteboard is connected to a computer device and can either be used as a whiteboard displaying a picture from a projector or as an interactive input device. With the relevant software, the interactive whiteboard becomes an interactive input tool used to directly input information or instructions by touching the board.
Advantages	• By using an interactive whiteboard the presentation or lesson becomes more interactive. Instead of a one way lesson or presentation, the audience or learners are able to join in on what is being presented. • Since the interactive whiteboard allows for multiple input, it makes the sharing of ideas and information possible making it easier for learners to learn while doing. • It adds convenience and flexibility to the lesson or presentation. Since a computer device is connected to the whiteboard, the teacher is able to use videos, pictures and audio files interchangeable during the presentation of their lesson.
Disadvantages	• Specialised software is required to take full advantage of the capabilities of the interactive whiteboard. • Teachers or other users of the interactive whiteboards need additional training to teach them how to use the capabilities of the interactive whiteboard effectively. • It is relatively expensive to purchase and maintain an interactive whiteboard in comparison to a regular whiteboard. • Staring at an interactive whiteboard for long periods of time and especially in poorly lit rooms, will put strain on the viewers eyes.
Limitations	• The wrong lighting in the room where the whiteboard is used can affect the effectiveness of the whiteboards visibility as display unit. • It is relatively expensive to purchase and maintain an interactive whiteboard in comparison to a regular whiteboard. • If the interactive whiteboard is not regularly calibrated, the input capability of the whiteboard will not be very accurate.
Relevance and impact on personal lives	• Many schools have already incorporated interactive whiteboards in the classes making teaching and learning more interactive and effective.
Examples of the technology in practice	• Interactive whiteboards used in teaching instead of the old school blackboards or wipeable whiteboards.

10. MEMORY CARDS	
Description – What it is	A memory card is used as a primary and portable flash memory in mobile phones, cameras and other portable and handheld devices. Memory Card
Different types of memory cards	**SD (Secure Digital) Memory card**: SD cards are the common type of memory card. They are compatible with the majority of digital cameras. **CompactFlash (CF) Memory card:** CompactFlash (CF) cards offer very high storage capacities and fast processing times. **Mini SD Memory card:** The MiniSD card provides the same benefits as the SD card, but is smaller than the original SD card. **Micro SD Memory card:** Micro SD cards were initially a popular method of storing images and document in mobile phones. They are the smallest commercially available memory card. **Multi Media Cards (MMC):** Multi Media cards have the same physical appearance as Secure Digital Cards, but just without the access lock. They are used as an alternative to SD cards and will fit most compatible cameras, although transfer rates are lower.
Advantages	• Memory cards are reliable because they have no moving parts. • Memory cards have a non-volatile memory that maintains the stability of the data on the card; the data on them are not threatened by the loss of the power source. • Memory cards are very portable; they can be used in small devices. • Memory cards allow more immediate access. • Memory cards come in all sorts of sizes and they have relatively large storage space. • Memory card consumes very little power.
Disadvantages	• Memory cards can easily break, they can be lost, misplaced. • They can be affected by electronic disturbances. • Power users may need more storage capacity.

Limitations	• Storage sizes are limited. • Depending on what they are needed for, alternative storage devices may be considered.
Storage capacity	

Memory Card Capacity Chart

How much will my Memory Card hold?	2GB	4GB	8GB	16GB	32GB	64GB
Videos (6Mbps, Hrs.)	.75	1.5	3	6	12	24
Photos (10MP JPEG)	650	1,300	2,600	5,200	10,400	20,800
Songs (MP3)	500	1,000	2,000	4,000	8,000	16,000

11. POS – POINT OF SALE	
Description – What it is	A point of sale system is a combination of software and hardware that allows traders to perform transactions and simplify key day-to-day business operations. https://www.softwareadvice.com/resources/what-is-a-point-of-sale-system/
	
Simple explanation of how it works	Before POS systems, the person operating the till would manually enter the prices of purchased items, with the help of price tickets. They would then take the money, place it in the cash drawer, and hand the customer a paper receipt. In some cases, the only record of the transaction the business would have would be their own copy of the cash register roll. This has become more computerised through a POS system, storing a product database on the register itself, on a computer, or on a server. (Taylor) A barcode reader reads the code on the product, searches through the database to find the price of the product and displays it on the computer monitor. All the items purchased would display on the computer monitor which is attached to a cash drawer that will open to receive the payment. Transactions would be stored electronically.
Components of a POS system	**The POS system itself** could be a cash register linked to a server or PC, or even an iPad or other tablet device linked to a cloud-based system. **A cash drawer** is used to store the day's takings, along with cheques, vouchers and payment slips. **A receipt printer** is used to print receipts to hand to customers. **A barcode reader** is typically used in retail environments with many different products.

	A card machine is used to process payments made by debit or credit card. (Taylor)
Advantages	• Scanning is more accurate and prevents errors. • A product, stock or client database is available at any time. • POS systems allow you to record sales, manage stock and analyse sales patterns. • Past transactions can be looked up easily. • The service provided is faster.
Disadvantages	• If the network is not available, the POS system cannot work. • It is time consuming to capture all stock initially. • Maintaining of updates on pricing and promotions. • If the software and the hardware fail, transactions are not recorded. • Security risk – customers entering the PIN numbers run the risk of divulging personal information to other people. • Repairs to the system can be costly.
Limitations	• Reliability of internet access. • Employees should be trained on the system used.
Relevance and impact on personal lives	Information that can be gathered from a POS system includes, product descriptions, product prices, sales trends, stock levels, performance of cashiers, etc.
Examples of the technology in practice	Restaurant POS systems Retail POS systems Salon POS systems Small business POS systems

12. RESOLUTION AND IMAGE QUALITY	
Description – What it is	**Resolution** refers to the number of pixels an image is made of. **Image quality** is the detail an image is made of.
Simple explanation of how image resolution works	Resolution does not measure the size of the pixels, but only the number of pixels an image is made of. Pixels per inch (PPI) indicate the size of the pixels and the number of pixels that fit into one inch. The more number of pixels that fit into one inch, the better the image quality. **Higher resolution** means that the more pixels per inch (PPI), results in more pixel information and creating a high-quality image. Images with **lower resolution** have fewer pixels, and if those few pixels are too large (usually when an image is stretched), they don't display clearly.
Simple explanation of how monitor and printer resolution work	The quality of monitors and printers are indicated by resolution: **Monitors.** A small monitor may have a resolution or 640 x 480, which means there are 640 pixels horizontally across the screen and 480 pixels vertically. Some other common monitor resolutions are 800 x 600, 1,024 x 768, and 1,280 x 1,024. The higher the resolution, the more can be displayed on the screen. **Printers.** Printer resolution measures how fine a printer can print. This measurement is known as dots per inch, or "dpi." The greater the dpi, the better the image clarity. Scanner resolution is also measured in dpi.
Advantages of high resolution	• Larger picture size. • Better quality images taken in low light situations. • Better cropping options. • Better text identification. • Clearer and sharper images.
Disadvantages of high resolution	• Large file sizes due to more detail captured in images, resulting in the need for more storage. • Higher resolution restricts the camera's frame rates and its buffer. • High resolution cameras require high-quality lenses and optics.

Limitations	• When scanning, the original document needs to be clear. • Hardware has to be capable of capturing high resolution. • Need bigger lenses for clearer images.
Relevance and impact on personal lives	• Detailed images are required for many reasons in a professional environment, high resolution images enable the details to be clear and viewable and will enable better efficiency. • Social media platforms allow high-resolution images to be uploaded and these images will attract more attention as they will have outstanding detail.
Examples of the technology in practice	• A photographer can capture sharper clearer images with complete detail, for multiple scenarios, such as landscapes, weddings, and concerts. • An image with high detail can be scanned using high resolution and then converted to text for editing using OCR technology.

13. TOUCH SCREENS	
Description – What it is	A touchscreen is both an input device which allows the user to access a device using simple or multi-touch gestures, touching the screen of the devices, with fingertips or a stylus, enabling the user to accomplish certain tasks as well as an output device, displaying certain information or data.
Simple explanation of how it works	The user makes use of a fingertip or specialised stylus to touch the screen of the device. The touch enables the user to give instructions to the device by inputting it directly via the screen. Although it's an excellent input device, it also doubles as an output device since the device will also give you an output back on the screen, communicating back to the user.
Advantages	• Since the touchscreen is also an input device, it makes the use of additional hardware devices like a mouse or keyboard, unnecessary, making it a cost-effective device. • Since a touchscreen has multi-touch functionality, it is possible to use various input functions and operations like zoom in/out, rotation, etc. • The use of a touch screen is intuitive since the user simply needs to touch the device to use it. • Since the use of the touchscreen is intuitive, little to no training is necessary to use it. • With the fact that the display of the touchscreen is display and input integrated, how you use it is much more flexible. • Since the touchscreen does not use a keyboard and mouse with buttons or spaces in between the buttons, there is no risk of dust or dirt accumulating on or inside the device.
Disadvantages	• Since the display unit is also the input device, and will get dirty much easier when used with dirty hands, making the display less visible. • Scratches or cracks on the touchscreen can affect the touch sensitivity of the screen, making the use of the screen as input device less effective. • Since some touchscreens are small and therefore the buttons smaller, bigger individuals may find it hard to work with and the input clumsy. • A touchscreen is difficult and close to impossible for a visually impaired person to use since it offers no physical stimulation.

Limitations	• With the fact that the input and output is integrated into the touchscreens' display, the size of the display is reduced when the on-screen keyboard is being used. • Not all touchscreens have the same level of screen sensitivity, making applications like drag and drop difficult to execute accurately. • When you interact with the touchscreen you obscure a certain part of the display, making some actions difficult to execute especially if the display determines the input space.
Relevance and impact on personal lives	• Most devices we use today has a touchscreen display due to the cost effectiveness of integrating the input and display functions. You will find a touchscreen on your smartphone, tablet and even other everyday devices like a microwave or washing machine.
Examples of the technology in practice	• The screen of your smartphone. • The screen of your tablet. • The screen of your smartwatch. • Selected computer screens.

14. USB AND PLUG AND PLAY	
Description – What it is	**USB: Universal Serial Bus**: Standard port commonly used to connect peripheral devices to a computer. **Plug and Play (PnP):** Technologies that allow us to simply plug in a new hardware device to the computer and for it to be setup to run automatically.
Simple explanation of how it works	The USB connectors allow you to attach devices like a keyboard, printer, etc. easily and quickly. The operating system supports USB as well, so the installation of the device drivers is quick and easy. Plug and Play means that you can connect a device or insert a card into your computer and it is automatically recognized and configured to work in your system.

Advantages	• **USB**
	  ○ Reliable.
	  ○ Self-powered.
	  ○ Can be connected and disconnected while the device is on.
	  ○ It has true plug and play nature.
	  ○ Fits all devices that have a USB port.
	• **Plug and Play**
	  ○ More mobility.
	  ○ It allows true plug and play compatibility.
	  ○ It is simple to use.

Disadvantages	• **USB**: It has limited capability and overall performance. The data transfer not as fast as some other systems. • **Plug and Play**: Security could be an issue - shared files or folders could become available to external sources via the internet, so third party security software may be required to block this.
Limitations	• Each USB cable can't be longer than 5 meters. • Each USB device can't have more than 5 'nodes' between it and the computer – A 'node' is a hub, switch, or repeater, allowing another set of devices to be attached to the USB network.
Relevance and impact on personal lives	• The USB and plug and play technology makes the lives of an everyday home user easier by enabling them to plug any device that is plug and play enabled into the USB port and it will work instantly without having to go through an installation process themselves.

Examples of the technology in practice	Examples of USB devices: • External drive • Keyboard • Microphone • Mouse • Printer • Joystick • Scanner • Smartphone • Webcams Examples of plug and play devices: • Keyboards • Mouse

SOFTWARE

15. DOCUMENT MANAGEMENT SOFTWARE	
Description – What it is	Document management is the use of a computer system and software to store, manage and track electronic documents and electronic images of paper based information scanned by a scanner.
Simple explanation of how it works	Documents can be stored electronically or as paper. Many documents are available in electronic format. Therefore, it is more efficient to store documents electronically. Paper documents are scanned by a scanner in any of the following formats, PDF, TIF, JPEG and PNG. • **PDF (Portable Document Format)** A PDF file is among the most commonly used file types. This file type is great for documents with text, forms, and images that contain words. Certain programs use OCR technology to make the characters in the document searchable and editable. • **JPG or JPEG (Joint Photographic Experts Group)** JPEGs are great for images because they can compress very large files down to a small size. • **PNG (Portable Network Graphics)** PNG files are mostly for digital image files and they utilise document compression, but not as much as JPEGs do. • **TIF or TIFF (Tagged Image File Format)** TIFs are great for files that you don't want compressed, because you want every bit of the data in your document.
Advantages	• Reduced storage space – no need for file cabinets. • Enhanced security – all documents can be stored securely with passwords. • Easier retrieval – if an electronic file system is logically arranged, retrieval of documents is easier. • Better collaboration – documents can be sent through e-mail to many recipients. • Better backup – backups can be made online and offline. • Versioning – earlier versions are readily available.

	• Paperless office – no need for hard copies. • Access to documents is available anywhere.
Disadvantages	• Too much dependence on technology. • Can cause RSI and other health issues. • Security may be compromised because many people have access to documents. • If no backups are made, loss can be huge. • Updated hardware and software is necessary.
Relevance and impact on personal lives	
Examples of the technology in practice	• Document management systems are used more often to simplify management of documents. • Examples of document management systems: UnForm ContractZen PandaDoc

16. E-MAIL SOFTWARE	
Description – What it is	E-mail (electronic mail) software is software downloaded on your computer or smart device that allows you to create, send, receive and organise e-mail. Online e-mail services, called webmail, have features and functions for managing e-mail similar to desktop e-mail software, but over the internet.
Simple explanation of how it works	**Client-based e-mail** • The sender creates a message using the e-mail program on their computer. • When the user sends the message, the e-mail text and attachments are uploaded to the SMTP (Simple Mail Transfer Protocol) server as outgoing mail. • All outgoing messages wait in the outgoing mail queue while the SMTP server communicates with the DNS (Domain Name Server–like a phone book for domain names and server IP addresses) to find out where the recipient's e-mail server is located. If the SMTP server finds the recipient's e-mail server, it will transfer the message and attachments. • If the recipient's server cannot be found, the sender will get a message indicating that the sending of the mail has failed in their inbox. • The next time the recipient clicks 'Send & Receive,' their e-mail client will download all new messages from their own e-mail server. (Group, 2010) **Web-based e-mail** To use webmail you do not need any e-mail software – just a computer connected to the internet and a browser. Webmail accounts are usually free. You have to register for a webmail service and then you are given a user name and password and a personal mailbox. Every time you want to send or receive e-mails, you just have to log onto the webmail server. You can also set up your web-based e-mail on an e-mail program on your computer. In order to do this, you will also need the incoming (POP) and outgoing (SMTP) settings. Some ISP's provide users with an e-mail account and a mailbox.
Advantages	**Client-based e-mail** • Your e-mail is on your computer, so it is available at all times. • No internet is needed to be able to find an old e-mail. • Additional features are available. **Web-based e-mail** • All e-mail is stored on a server, which serves as a backup. • E-mail can be accessed anywhere where there is internet access.

	• No specific settings are needed on your computer, you just have to log onto a website. • Additional features are automatically made on your webmail, no need to update.
Disadvantages	**Client-based e-mail** • The space of the e-mail is limited by your hard drive space. • If POP3 services are used, once you have downloaded the e-mail, it is only available on your computer. • Synchronisation may take long. • Updates need to be installed. **Web-based e-mail** • If there is no internet access, you cannot access your e-mail. • A limited amount of storage space is available. • If the internet connection is slow, accessing e-mail becomes difficult. • If the web-based e-mail service provider is offline, you won't be able to access your e-mail.
E-mail communication etiquette	• Insert a subject line. • Add your name or signature. • Have a professional salutation such as 'Dear' or 'Good day'. • Ensure that your e-mail has proper grammar and have no spelling mistakes. • Reply politely to e-mails received. • Do not use vulgar language. • Do not send attachments that are too large (no more than 2 MB). If you need to send large attachments, warn the receiver. • Ensure your e-mails don't have viruses. • Do not send confidential information. • Avoid using SMS-language and/or jargon or slang. • Be careful when using the 'reply all'.
Relevance and impact on personal lives	• E-mail apps come preloaded on smart devices. These apps can be configured to receive and send e-mails at any time while internet is available. • E-mails are one of the greatest methods of communication in the technological era.

Examples of the technology in practice	**Client-based e-mail** • Microsoft Outlook • Windows Live Mail • Outlook Express • Gmail App **Web-based e-mail** • Yahoo! Mail • Gmail • Hotmail • AOL Mail

17. FREEWARE	
Description – What it is	Freeware is software that is distributed free of charge. They normally come without any warranty. The copyright still remains even though it is free of charge. Anyone can download the software free of charge from the internet. https://www.youtube.com/watch?v=G3d5vMAEEdo https://www.youtube.com/watch?v=1xZYTyaqbpU https://www.youtube.com/watch?v=BPOhHoaFc_s
Simple explanation of how it works	Freeware is small utility software BUT some of them can be full working software for example Adobe Acrobat Reader. Freeware can be freely downloaded from the internet. Freeware can be freely shared among people.
Advantages	• The software is free of charge. • The software is easily available, you only need an internet connection. • Software will operate without upgrades.
Disadvantages	• Might not be as user friendly as commercial versions. • Does not come with extensive support. • Cannot modify any of these software. • Cannot sell any free software.
Limitations	• There is not free software available for all commercial software. • The free software may be missing key features. • No upgrading or adding of features available. • It is not as stable or reliable as commercial software.
Relevance and impact on personal lives	• The fact that the software is free, assists in bridging the gap between people who can afford expensive software and the ones who cannot.
Examples of the technology in practice	• Software like Adobe Acrobat Reader makes it easy for people to send documents without any worries and the receiver will be able to open the document. Adobe will read any pdf document. • 7Zip is a compressing software.

18. KEY LOGGING	
Description – What it is	The use of a computer program to record every keystroke made by a computer user, especially in order to gain fraudulent access to passwords and other confidential information.
Simple explanation of how it works	Most key loggers on average computers arrive as malware. If your computer becomes compromised, the malware may include a key logger or function as a Trojan that downloads the key logger along with other harmful software. Most sources define a key logger as a software program designed to secretly monitor and log all keystrokes.
Advantages	• Parental control: parents can track what their children do on the internet, and can opt to be notified if there are any attempts to access websites containing harmful or otherwise inappropriate content. • Company security: tracking the use of computers for non-work related purposes, or the use of workstations after hours. • Company security: can also be used to track the input of keywords and phrases associated with commercial information which could damage the company if disclosed. • Other security: using key logger's records to analyse and track incidents linked to the use of personal computers.
Disadvantages	• Can be used to intercept passwords and other confidential information entered via the keyboard. • PIN codes and account numbers can be acquired.
Limitations	• Created with the idea of using it legally, but in most cases it is used in illegal activities. • Employees can sue their employers if they are not made aware of key logging being used.
Relevance and impact on personal lives	• Cyber criminals can get hold of confidential data, transferring money from the user's account. • Cyber criminals can get hold of the password to the gaming account. • Key loggers can be used in industrial and political surveillance.

Examples of the technology in practice	• ATM keypads • Capture any passwords entered by users on the device. • Take screenshots of the device at periodic intervals. • Record the URLs that were visited via web browsers. • Record a list of the applications run by users on the device. • Capture logs of all instant messaging (IM) sessions. • Capture copies of sent e-mails. • Automatically send the reports containing stored logs and e-mails it to a remote location.

19. KEY LOGGING SOFTWARE	
Description – What it is	A key logger (keystroke logging) is a type of surveillance software that once installed on a system, has the capability to record every keystroke made on that system. The recording is saved in a log file, usually encrypted.
Simple explanation of how it works	**Key logger software** runs hidden in the background, and automatically records all keystrokes (keystroke logger).
Advantages	• Key logging software allows you to determine who is spending time on work related stuff and those that are not. • Ethical hacking: The software can be used to point out weak areas in your personal computing. If you use the software to do that, you can improve the privacy on your own computer.
Disadvantages	• When you install key logging software, trust is lost by the employees in your business. • Storing passwords of social media profiles is unethical. • Keylogging software can be installed without your knowledge in the following ways: - A person you know might install one on your computer while you are not watching. - By using an infected USB device. - From downloading cracks or key generators from the internet. These files often contain viruses or key loggers. - By installing games or software from unknown publishers. - From downloading and installing programs from Torrents. - By visiting a website that exploits some browser vulnerability, this usually happens when you are using an outdated browser or have outdated plugins in a browser, or your operating system is not up-to-date with the latest security patches.

Limitations	• Cannot be used effectively if on screen keyboard is used.
Relevance and impact on personal lives	• Key loggers can be scary if you are running an online business because someone can simply take down your website or install a malicious code that abuses your hosting server. • In a business key logging software can be used to make sure that employees are working and not wasting time.
Examples of the technology in practice	• Software can be installed to monitor the things you do at work. • Key logging software can be installed on your child's cell phone/tablet to ensure their safety.

20. LICENSING AND LICENSING AGREEMENTS INCLUDING END USER, SITE LICENSE AGREEMENTS AND CREATIVE COMMONS	
Description – What it is	A licensing agreement is a legal contract between two parties, known as the licensor and the purchaser. The purchaser has the right to use the software. The license may define how the software may be used or not used. **End user license** – An End User License Agreement (EULA) is a legal contract between a software application author or publisher and the user of that application. The user agrees to pay for using the software, and promises the software author or publisher to obey all rules stated in the EULA. **Site license** – is a type of software license that allows the user to install a software package on several computers simultaneously. Depending on the amount of fees paid, the license may be unlimited or may limit access to a certain number of users. **Creative commons** – a creative commons license is one of several public copyright licenses that enable the free distribution of an otherwise copyrighted work. A creative commons license is used when an author wants to give people the right to share, use, and build upon a work that they have created.
Simple explanation of how it works	A user or company buys a license and has the right to use it within the rules of the license agreement that the user has agreed to.
Advantages	• The software owner protects himself from legal issues and potential lawsuits. • Software that has creative commons may be freely distributed and may be altered according to the user's needs. • To prevent piracy. • Cost saving for companies that make use of a site license. • Site license allows software to be installed to as many computers as possible.
Disadvantages	• May only use it for what its intended for. • Site license may only be used at the specific location depending on the agreement made with the licensor. • May be expensive. • Software that comes from creative commons may be big to download.
Limitations	• Limits the users with the number of installations – end user
Relevance and impact on personal lives	• Companies cost and expenditure are greatly reduced with site licenses. • Software owners are protected from piracy.
Examples of the technology in practice	• Windows • Office • Proprietary software

21. OCR	
Description – What it is	OCR (optical character recognition) is the recognition of printed or written text characters by a computer.
Simple explanation of how it works	OCR involves photo scanning of the text character-by-character, analysis of the scanned-in image, and then translation of the character image into character codes, such as ASCII.
Advantages	• **Ready available:** By scanning the information of documents through OCR, the data can be made available in several different places. One can carry it in a USB drive and retrieve the wanted information with just a few clicks. • **More storage space:** The smaller the documents, the smaller the space. OCR creates smaller documents. • **Efficient management:** With the OCR technique, managing data of confidential documents becomes easy and effortless as everything becomes automated. • **Security:** Stealing of data is not as easy if documents are scanned and stored safely in digital format. Furthermore, the access can also be limited to avoid mishandling of the documents.
Disadvantages	• **Limited documents:** OCR works best with good quality typed documents. Handwritten documents cannot be easily read by OCR software. OCR has difficulty with documents that have both images and text. Spreadsheets will also produce more errors. • **Accuracy:** No OCR software is 100 percent accurate. The number of errors depends upon the quality and type of document, including the font used. Errors that occur during OCR include misreading letters, skipping over letters that are unreadable, or mixing together text from adjacent columns or image captions. If high accuracy is required – as with converting digital books to electronic format – then a clean-up of the electronic text will be needed. • **Work-arounds:** OCR has difficulty differentiating between characters, such as the number zero and a capital 'O'. To work around this, a special OCR font can be used, such as writing out zero. • **Additional work:** Even if the scanned image of the original document is high-quality, additional steps must occur to clean up the OCR text. It is very labour-intensive to correct the errors created by OCR.
Limitations	OCR software is useful for converting scanned images of typed or handwritten documents to searchable electronic text, but it has disadvantages that limit its applications.
Relevance and impact on personal lives	Scanning a document does not provide you with the type of digital document that can immediately be edited using a word processor.

Examples of the technology in practice	To be able to make changes to any scanned document or image.

22. ONLINE/WEB APPLICATIONS	
Description – What it is	Online applications are software, like ones you would use on your computer such as Paint or Word that operate online on a website. Unlike desktop applications, which run through your operating system, web apps must be accessed through a web browser.
Simple explanation of how it works	A web application or web app has a client side and server side software application in which the client request a service in a web browser. After requesting, the web server responds to the client. Common web applications include web mail, online retail sales, online auctions, wikis, instant messaging services.
Advantages	• Web applications runs regardless of the operating system or device as long as the browser is compatible. • All users access the same version, eliminating any compatibility issues. • They are not installed on the hard drive, thus space is saved. • They reduce software piracy. • Costs for both the business and end user is reduced as there is less support and maintenance required by the business and lower requirements for the end user's computer. • No need to purchase the application, but licensing is still needed. • Data is available anywhere as long as an internet connection is available.
Disadvantages	• **Internet dependence** – If your internet goes down or you happen to be in an area that has poor connectivity, you will not be able to access your web app. • **Security** – Data is less secure when it's in the cloud, especially when users from all over the world are accessing the same server. • **Reduced speed** – A web app will probably be slower than an application hosted on your computer. • **Browser support** – The web app may not be supported by your browser and should be compatible for various screen sizes. • **Cost** – You may need to pay a fee to use the software. • **Limited functionality** – The online version of programs often has less functions than the 'desktop' (installed) version e.g. Word Online doesn't have Mail Merge.

Examples of the technology in practice	Google Docs is used to create and use word processing documents. Office 365 has online versions of the Office programs that can be used from any device with an internet connection. Pixlr is a web application for photo editing. Netflix (video on demand) allows its users to watch their favourite series and movies whenever they want. Dropbox allows users to store and share documents with other users.

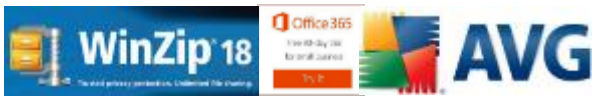
23. OPEN SOURCE SOFTWARE (OSS)	
Description – What it is	Open source software is software that comes with the source code and can be modified. This is the biggest example of collaborative programming as any person can make changes and then puts it back on the internet for people to use it. Free open source software come with the source code, but there is no cost attached to the software. https://www.youtube.com/watch?v=a8fHgx9mE5U
Simple explanation of how it works	It is a lot like freeware – the only difference is that the source code is also available and can be modified by anyone as long as they put it back out as open source software and do not make money from it.
Advantages	• Lesser hardware costs as it uses a lot less resources like power, hard drive space and memory. • High-quality well designed software. • Open source software can be customised. • Simple license management as you can load it on as many devices as you need without any tracking and counting of licenses. • Abundant support – the open source online community is big and provides support mostly free of charge.
Disadvantages	• Can be difficult for unskilled users to use. • Most people are familiar with propriety software and finds open source software intimidating. • In some cases the hardware may not be compatible with open source software and will need additional drivers.
Limitations	• Developers must be willing to contribute and better the software without any payment – this can result in software not being up to the same standard as the same propriety software counterpart. • There might be hidden cost that you were not aware of.
Relevance and impact on personal lives	• The mere fact that software can be freely available to all is a huge advantage but the migration to open source software is not that easy as people prefer to work with software that is familiar to them. • Freeware and open source software fall now in the same category called 'Free and Open-Software'.
Examples of the technology in practice	• WordPress is used to create functional websites and mobile applications. • Ubuntu is one of the most popular open source operating systems. • Firefox is a web browser.

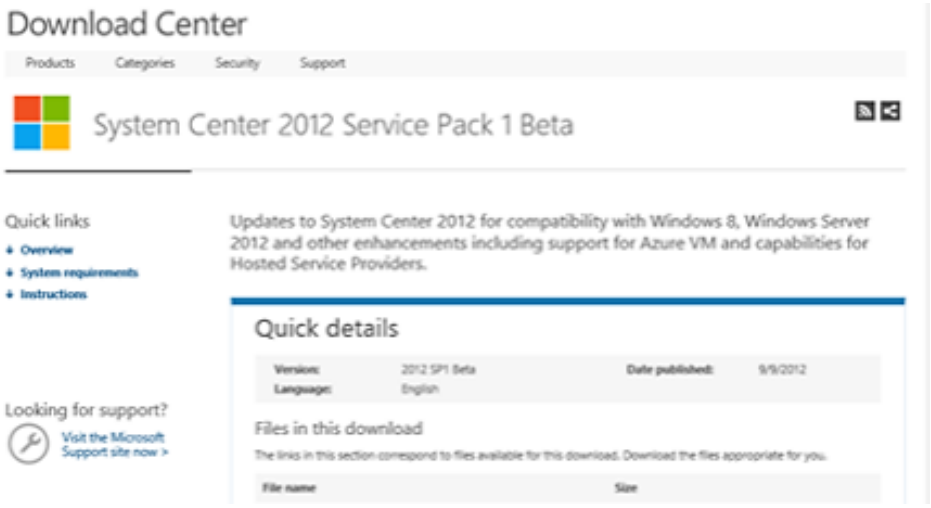
24. PROPRIETARY SOFTWARE	
Description – What it is	Proprietary software is any software that is copyrighted and has limits against use, distribution and modification that are forced by its publisher or developer. Proprietary software remains the property of its owner/creator and is used by end-users/organisations under agreed conditions. Proprietary software is usually paid for.
Simple explanation of how it works	Needs to be purchased/downloaded from a licensed vendor and then installed on the user's computer. The user needs to agree to all terms and conditions before installation can take place and the user does not have access to the source code.
Advantages	• There is user support for users who struggle with installation etc. • Bugs and patches will get fixed by a development team.
Disadvantages	• The user cannot make changes to the software as he/she doesn't not have access to the source code. • May need to pay for new features or updates. • Initial cost and setup may be expensive. • Security issues may take time to fix.
Limitations	• User may be limited with choice e.g. Microsoft or Apple for operating systems.
Relevance and impact on personal lives	• More costly than open source software. Some people prefer to use open source software that is free. • Proprietary software may contain more features and provide more support than open source software.
Examples of the technology in practice	• Windows • Office

25. REFERENCE/EDUCATIONAL SOFTWARE	
Description – What it is	**Educational software** provides practise in a specific subject and is usually classified by grade, age or specific subject (for example math, science, history and geography). **Reference software** is very similar to educational software but it contains information on a variety of subjects. It is usually grouped per subject. Educational and reference software is available as proprietary, shareware, and freeware software packages available for download on the internet. Reference software is becoming outdated, since information can be downloaded freely from the internet.
Simple explanation of how it works	Reference software consists of a large database of information and a user interface that provides search functions for easy access to the information. Educational software provides specific information for a particular age group. Educational software teaches a particular subject and also works as a digital reference guide for that subject.
Advantages	• Students control their own learning experience, the pace at which they learn and how challenged they are. • Computers help students to use all of their senses to extract information. • Students learn through creating and utilising hands-on knowledge. • Computers help students develop a positive attitude towards technology. • Computers are beneficial in developing student's fundamental skills (i.e. letters, numbers, colours, shapes, rhythm, cause and effect, problem solving, procedural thinking, creativity). • Computers are really beneficial to students who have speech, audio or motor limitations because they act as a patient tutor allowing the student to learn at his own pace. • Educational software can save the teaching and learning time of teachers and students.
Disadvantages	• Software needs to be carefully chosen in order to ensure that what is holding the child's attention and also educate at the same time. • Some software doesn't make it obvious that it has no educational value. • It is rare to find a school that has enough computers for every student. • It is difficult to get a student's attention whenever they are on the computer. • Muscular injuries and vision problems can arise whenever students spend too much time using the computer. (wahmbrenda, n.d.)

Relevance and impact on personal lives	• Most software can be used on smartphones nowadays, so school children have access to information at their fingertips. • When used in class, teachers are making themselves relevant to their students. Today's generation of learners get more involved if ICT is used, since that is what they are used to.
Examples of the technology in practice	• Rapid Typing Tutor • Google Earth • Compu-Read • Geogebra • Mathematica • Yousician • Scratch

26. RISK OF USING FLAWED SOFTWARE	
Description – What it is	Flawed software is when software has a certain bug or error when installing or running the program. The design of the software is flawed and it might be a result of the incorrect coding of the software. This software might produce an incorrect or unexpected outcome and can result in harming your computer.
Simple explanation of how it works	When a program has a bug, it will not install properly on the device and you will not be able to use it. Sometimes one can search on the internet for a solution to make the program work, but the advice given might be more harmful than helpful. It can instruct you to download extra files of delete files and can cause other bugs in the program.
Advantages	• If you paid for the software and it has bugs, you can phone or enquire with the developers to helping you fix the problem.
Disadvantages	• Your computer might be at risk of obtaining a harmful virus. • The software will not work correctly and may have limited access. • The software may become unusable. • Updates (to fix bugs and flaws) may not always be available for the user to download and 'fix' the program. • Security issues can arise from using this software and can be used as a way to 'spy' on you or get personal information.
Relevance and impact on personal lives	• With the availability of software on the internet, especially free software, there is no real solution to this problem. Some people prefer to use free software, even if it contains flaws, just to save money or not support developers. • Software piracy is another problem. The software is spread illegally and it can result in the company losing money. This is illegal.
Examples of the technology in practice	A beta version is when the developers publish a program knowing that it is not completely in the final stages of development and might cause some bugs. They give the public a chance to test the software and give them feedback on the defects and bugs they came across. This way the developers can fix all the flaws before they bring out the final version of the software.

27. SHAREWARE	
Description – What it is	Shareware, also known as 'try before you buy' is any software that you can use for a trial period. If you like the software you can buy the full version. The developers urge you to share this software and make copies so that people can test it and buy it if they like it. The software is normally limited by time or features until you buy the full software. https://www.youtube.com/watch?v=tNuDxYHQRs8 https://www.youtube.com/watch?v=BPOhHoaFc_s
Simple explanation of how it works	Shareware can be freely downloaded and share, if you like it you can buy the full version, if not then you just uninstall it.
Advantages	• You can test the software before you invest money in it, especially if you are not sure what you are looking for. • Personal after sales service as these companies are usually smaller – interaction is usually with the developer as they want to assist in making the product better. • Costs are normally less than for software sold (like propriety software). Lower operating costs (to the company) mean shareware authors can charge users less. • Shareware files get tested for viruses on a much larger scale ensuring that the user gets a good quality software free of any viruses. • Shareware is easily available on the internet.
Disadvantages	• The software cannot be modified. • It is not a full version of the software, works with limited features. • Trial period for use. • Some of the software is not updated on a regular basis.
Limitations	• It is not a full version of the software. • Trial period for use.
Relevance and impact on personal lives	• If you are unsure of the software that will meet your needs then shareware will be your answer, as you can try out different types and only buy the one that speaks to your needs. • Shareware is also cheaper to buy. • Shareware can get distributed with computer magazines – this introduces everyone to new shareware.
Examples of the technology in practice	• WinZip is a compressing shareware. • Office 365 is an office suite that you can try before you buy is. • AVG is an anti-virus software shareware. 

28. VERSIONS (UPDATING SOFTWARE), PATCHES AND SERVICE PACKS	
Description – What it is	Software **versions** indicate changes in a software product. As creators update and improve their products, they have several versions of the product available for users. A software version can be a version name or version number as it is developed and released. The version identifier can be a word, a number, or a date, e.g. 7, 8, 8.1, 10 or Lollipop, Marshmallow or 2010, 2013, 2016. A **patch**, sometimes just called a fix, is a small piece of software that's used to correct a problem, usually called a bug, within an operating system or a software program (Fisher, 2018). ***Patches*** are often temporary fixes between full releases of a software package. A **service pack**, often abbreviated as SP, is a *collection* of updates and fixes, called patches, for an operating system or a software program. Many of these patches are often released before the larger service pack, but the service pack contains many patches and allows for a single installation.
	
Simple explanation of how it works	**Version:** Not only do version numbers indicate that a product has been altered or improved on some level, they can also be used to indicate the following: • Order of release • The volume of changes • Date of release Each developer has their own way of 'numbering' a version of software. **Patches**: Major software companies will periodically release patches, usually downloadable from the internet, that correct very specific problems in their software programs.

	These downloads can be very small (a few KB) or very large (hundreds of MB or more). The file size and time it takes to download and install patches depend entirely on what the patch is for and how many fixes it will address (Fisher, 2018). **A Service pack**: Most of the time, a program or operating system will refer to service packs by the number of service packs that have been released. For example, the first service pack is usually called SP1, and others take on their own numbers like SP2 and SP5. Most of it not all operating systems and software programs provide service packs free of charge as either a manual update from the developer's website or through an auto-update feature within the program or OS. Service packs are often released on a schedule, like every year or every two or three years. Even though service packs contain lots of updates in one package, you don't have to manually install each update on your own. The way service packs work is that after you download the initial package, you just install it like you would a single program, and all the fixes, new features, etc., are installed automatically or with you having to click through just a few prompts (Fisher, What is a service pack, 2017).
Advantages of upgrading software, installing patches and service packs	• Security is better. • New features are included. • By keeping software updated, your computer's performance is faster. • Support can be provided, older versions' support gets discontinued. • Upgrades are free. • Bug fixes. • Problems you've had with the software or potentially would have in the future could be fixed. • Security holes in the software that could be used by hackers could be fixed.
Disadvantages of upgrading software, installing patches and service packs	• You may not like the new feature(s). • Problems could be caused with the software or other software. • Sometimes you have to pay for it. • You might get bugs, which might stop you from using the older data files. • It might take time re-learning some parts of the software. • The software might be unreliable.

Examples of the technology in practice	Windows: Windows 8, Windows 10 Android: Lollipop, Marshmallow iOS: iOs 11.2.6, 11.3 Service pack: SP1, SP2 Office: Office 2016, Office 2016

29. VOICE RECOGNITION ALSO KNOWN AS SPEECH RECOGNITION	
Description – What it is	Speech recognition is the ***conversion of speech to text***. The words that you speak are turned into writing that the computer can process further.
Simple explanation of how it works	The computer will have a kind of *dictionary***,** that it uses for possible *words* in the required language (English, French, German etc.) The words also have 'pronunciations' for each problematic word. The computer can hear three different versions of the same word spoken by different people and still recognise it as one and the same word. ***Speaker-dependent applications*** involve the automatic speech recognition of **a single person/speaker**. ***Speaker-independent speech recognition*** have developed systems that **can recognise anyone**.
Advantages	• It could be a hand-held dictation system that is carried around by doctors or lawyers, composing medical reports on patients or talking to clients. • It can be used to call (voice dial) one of your saved contacts, search through your music library for a track with a simple voice command, tweet, or even do online banking.
Disadvantages	• ***Speaker-dependent applications*** need to be set up to recognise the user's voice. • ***Speaker-independent speech recognition applications*** *need expert assistance to setup.*
Limitations	• If you are using your smartphone to search for a restaurant on Google Maps, the recogniser is actually found in the cloud, on Google servers, rather than on the smartphone.
Relevance and impact on personal lives	• Voice recognition is an alternative to typing on a keyboard. You talk to the computer and your words appear on the screen. The software has been developed to provide a fast method of writing on a computer and can help people with a variety of disabilities. It is useful for people with physical disabilities who often find typing difficult, painful or impossible. • Voice-recognition software can also help those with spelling difficulties, including users with dyslexia, because recognised words are almost always correctly spelled.
Examples of the technology in practice	• There are many **off-the-shelf speech recognition software** packages out there. o Nuance o Loquendo o Telisma o LumenVox o Microsoft has speech processing capabilities and lately Google has also made speech recognition possible.

30. WEB BROWSERS

Description – What it is	A web browser is a type of software that is used to retrieve, display and navigate through the information found on the world wide web. That includes web pages, images video and various other files (Wikipeadia, 2018).
Simple explanation of how it works	A web browser can be viewed as a push-pull technology, since the user requests information via web server, the server then returns the information to the web browser to be displayed onto an internet compatible device (Anonymous, 2006).
Advantages	Web browsers provide the following advantages to users: <u>Mozilla Firefox</u> • Firefox is considered easy to use with its minimalist interface • Has a large add-on library • Private browsing allowed <u>Opera</u> • Does not use a lot of memory • E-mail and RSS included in browser • Opera has faster loading on a slow network connection • Private browsing allowed <u>Google Chrome</u> • Faster performance • Compatible with a large extensions library • Excellent HTML5 support • Built-in Flash Player and PDF-reader • Private browsing allowed called 'Incognito mode' <u>Internet Explorer</u> • Windows operating system comes with Internet Explorer already installed • Faster loading of images • Most widely used browser • Internet Explorer contains a well-designed touch-screen interface • Private browsing allowed through and 'InPrivate' browsing window

	Microsoft Edge • You can add notes to webpages that are viewed • A reading list is added • A personal assistance 'Cortana' is included • Private browsing allowed through and 'InPrivate' browsing window Safari • Loading pages is fast • Best browser for Mac users • Provides bookmarking and RSS feeds • Private browsing allowed (Lubis, 2012)
Disadvantages and Limitations	Mozilla Firefox • Uses more memory than other browsers • Not designed for mobile users • Lacks performance on weaker hardware Opera • Not all websites are compatible with browser • Updating means that the software must be downloaded again Google Chrome • The more tabs open, the slower the browser, because more memory is used • Configuration of the browser is not easy Internet Explorer • Has slower response times • Windows support is low sometimes • Add-ons installation could be slow Microsoft Edge • Similar user interface as Internet Explorer • Compatibility bugs • Limited capabilities • No browser add-ons or extensions Safari • Only fully compatible with Apple devices • No support since 2013 **(Anon., 2017)**
Relevance and impact on personal lives	The use of web browsers have become a daily activity to gain information from the internet. Browsers enable people to easily and effectively do tasks such as language translation of content. Browsers cannot only provide access to vast amounts of content, it also enables users to access social media faster. (Anon., 2015)

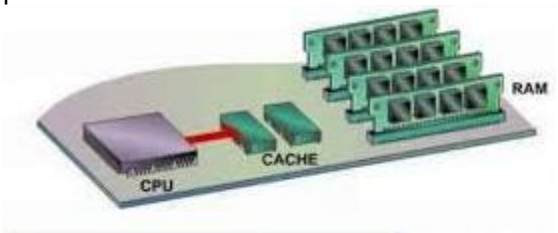
Examples of the technology in practice	Web browsers are used by users to search for content on the internet, preform multimedia activities such as video conferencing (Beal, 2018).

31. WEB-BASED APPLICATIONS VERSUS INSTALLED APPLICATIONS	
Description – What it is	**Web-Based Application** • Known as web apps. • Software that is accessed via a web browser by connecting to the internet. • Sometimes known as cloudware. • May be used to run local Intranets in companies or schools **Installed** • Software that needs to be installed onto your local device before you can use it also known as a 'desktop version'.
Simple explanation of how it works	**Web-Based** • Software runs in a web browser. • The software is delivered to the user location. • Documents that are created using web-based software are stored online (in the cloud). • Web-based software may be free or purchased at a cost. • There are websites that offer free alternative software to some licensed (proprietary) software. For example you can use Google Docs or ThinkFree Online instead of having to pay for Microsoft Office. **Installed** • Desktop software may be purchased on a CD or downloaded from the internet. • Once the program is installed locally on the device it is ready to use.
Advantages	**Web-Based** • Accessible everywhere with internet access. • No installation of software is required. • Vendor is responsible for backups of data. • Automatic software updates. • Centralised storage of data (often off site). • More secure environment – stored on secure servers that get latest patches and antivirus vaccines. **Installed** • Never lose access to your locally stored data. • No internet required to access work. • Faster data entry, reporting than over internet connection. • Can be customised to meet your specific needs. • You own and control your own data. • Less expensive over time. • Have the full version of the program as opposed to the web-based 'lite' version that doesn't have all the features.

Disadvantages	**Web-Based** • Can't access critical data when ISP (Internet Service Provider) is down. • Slower data entry because it is via internet connection, not stored locally on your device. • Someone else stores and controls your data. • More expensive over time due to subscription payments. • 'Lite' version of the program that doesn't contain all features of the installed version. **Installed** • Software must be installed on each computer. • Technical knowledge required to install, configure and update • You must make your own backups of your work.
Limitations	**Web-Based** • Need internet connection to access your information. **Installed** • You need to purchase the proprietary software before you can install and use it. • Need technical skills to install, update and secure application.
Relevance and impact on personal lives	**Web-Based** • Easy for corporates to get a company to host the web apps. • Convenient for people using portable devices. • Can access app regardless of local operating system. **Installed** • App runs faster on own device. • No internet connection required.
Examples of the technology in practice	**Web-Based** • Google Docs, Google Sheets, Google Slides. • Office 365 **Installed** • Proprietary (licensed software which you pay for). • Microsoft Office Suite 2013, Office Suite 2016.

COMPUTER MANAGEMENT

32. BACKUP	
Description – What it is	The process of backing up, is the copying of computer data so it can be used to restore the original in the event of a loss.
Simple explanation of how it works	Types: 1. **Full backup** – copy of all data is saved to an external device. 2. **Incremental** – only new files created or files which were modified after the last backup date will be copied. 3. **Differential** – all files which were created or modified after the original (first) backup date will be copied – this takes longer than incremental backups. Backup intervals vary according to individual / company's needs e.g.: • Full daily • Full weekly + differential daily • Full weekly + incremental daily • Full monthly + full weekly + incremental daily
Advantages	• Data is available should a computer crash/be infected by a virus/damaged/stolen/file deleted accidently. • Security – data stored at a different location to the computer/device can be used.
Disadvantages	• Uses storage space on other devices/media. • Manual backups are time consuming. • People often resist/too lazy to backup data regularly.
Limitations	• Any files created after the last backup date will not be available.
Relevance and impact on personal lives	• Time and resources are not wasted recreating documents/data bases etc. should files be lost/corrupted. • Depending on the size of the backup, different storage media can be used, e.g. for more than 1 TB an external hard drive can be used. • Cloud storage normally has a limited space available, therefore the size of the backup should be checked before stored on the cloud.
Examples of the technology in practice	• DVD/CD • Flash drive • External hard drive • Server • On-line/cloud storage

33. CACHING	
Description – What it is	Caching is temporary storage of data and instructions likely to be processed next. 
Simple explanation of how it works	It improves the performance of the computer as it fetches the data from the faster cache and not the slower storage. Disk caching – program opened before stays in cache and when you open it again it loads much faster. Web caching – web pages previously visited stays in cache and is loaded from cache.
Advantages	• Cache is located closer to the CPU and therefore faster to be reached than main memory. • It stores the program that can be executed in a short period of time. • Stores data for temporary use. • Processing seems faster.
Disadvantages	• When the computer is switched off, cache is cleared.

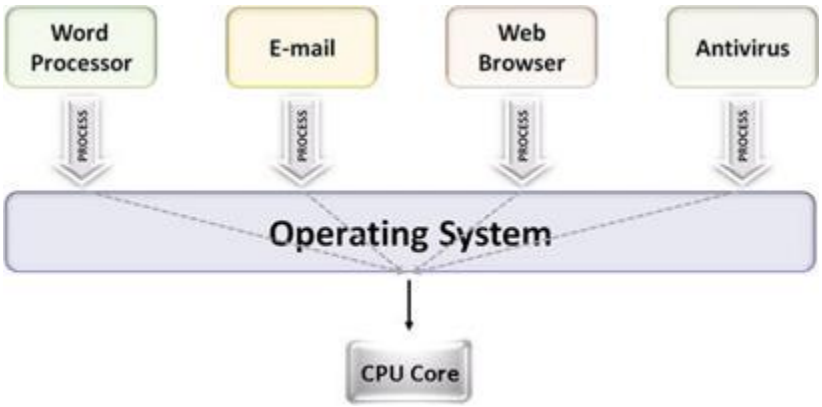
34. COMPATIBILITY ISSUES	
Description – What it is	Compatibility is the ability of your software to work with the hardware and software installed on your computer or other computers.
Simple explanation of how it works	Compatibility can be divided into three categories: **Compatibility with the operating system** • Most software are created to work with a specific set of operating systems like the Microsoft range, the Apple range or the Android range. Together with this you may find that the software will also need a 'minimum' version to run on for example, it may run on Windows Vista and any higher version software produced after Vista, but not on older versions such as Windows XP. **Compatibility between versions of the same application** • Most software is downward compatible so they will be able to use files created in older versions but these software applications are not always 'upwards compatible' which means that older versions may not be able to open or use files created in a newer version. **Compatibility between the motherboard and the hardware** • If you want to use new hardware, the motherboard should contain the port that the hardware uses for it to be compatible.
Advantages of using compatible software	• Most software is downward compatible so they can use files created in older versions. • Files can be shared with users from different locations without the concern of not being able to read the files. • If a network uses compatible software, maintenance is lower. • Training is less for users with compatible software.
Disadvantages	• When a file is shared between two computers with incompatible software it will not be able to open.
Limitations	• Sharing files with someone else might be problematic. • Documents should be saved in 'compatibility mode' for it to be able to open in earlier versions. • Some features may not be available in earlier versions of software, thus these features may be deleted from documents.
Relevance and impact on personal lives	• If the user does not pay special attention to the type of software they purchase and the requirements to run the software, the user might not be able to use the software. • Sharing files with someone else might be a problem, because the receiver might not be able to open the file because of the software version that the file was created in and the software version available to open it up with.

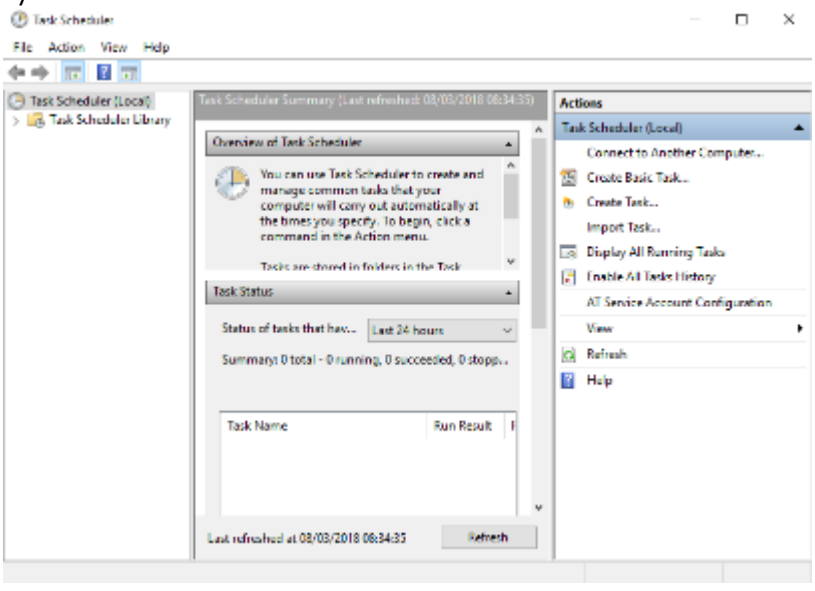
Examples of the technology in practice	• Operating systems: Windows XP 'older version' → Windows 10 'Newer version'. • Microsoft Office 2003 'older version' → Microsoft Office 2016 'newer version'.

35. DEFRAGMENTATION, SCAN DISK/CHECK DISK, DISK CLEAN-UP	
Description – What it is	Defragmentation/Scan disk and Disk clean-up are all part of the operating system utilities software. • **Defragmentation:** In the maintenance of file systems, defragmentation is a process that reduces the amount of fragmentation (In computer storage, fragmentation is when storage space is used inefficiently and reducing performance.) • **Scan disk:** It is a utility that comes included with all operating systems. It is used to detect and repair damaged files and read errors on your disk to improve the performance of your computer system. • **Disk clean-up:** This is a useful utility that comes with the operating system and it is used to free up some storage space by removing temporary files downloaded from the internet or temporary files created by Windows. It can also remove installed programs that you no longer/seldom use as well as delete files and folders from the recycle bin.
Simple explanation of how it works	• **Defragmentation** When you use the computer for a while and you install and uninstall applications/delete files on your hard disk, various files and parts of a file may be stored in different locations on the disk. The disk defragmenter moves all these various file parts back next to each other on the disk. • **Scan disk** Scan disk is a diagnostic utility and it corrects errors that prevents your programs from running properly, and removes temporary files. However all applications must be closed before scanning and you may not work on the computer while the utility checks for errors. • **Disk clean-up** The utility first searches and analyses the hard drive for files that are no longer of any use, and then removes the unnecessary files.
Advantages	• **Defragmentation** o Increased speed (Improved system performance). • **Scan disk** o Fixes drives and files and corrects errors. • **Disk clean-up** o Increased available disk space. o Cleaning your disk regularly will keep your system free from harmful files where your sensitive information could be leaked.
Disadvantages	• **Defragmentation** o Time consuming process. o Slows down access to the hard drive while in process.
Limitations	• It is not advised to use the device while this utility is in use.

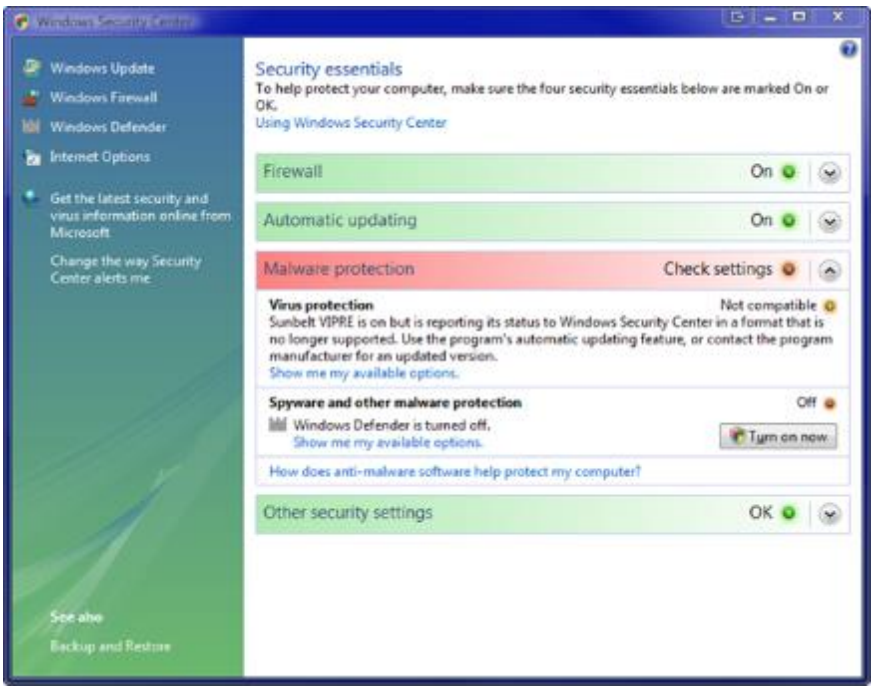
Relevance and impact on personal lives	• This utility program allows the everyday user to perform basic maintenance on their device.

36. DRIVERS	
Description – What is it	A **driver** is a program that controls the communication between the device and the operating system. Devices include printers, scanners, digital cameras and external hard drives.
Simple explanation of how it works	The operating system gets access to the device and the driver is the communication between the device and the operating system. The **driver** of a device carries out the function that is needed by the user.
	Plug & Play is a term used for when the operating system automatically installs the device driver and the user is able to immediately use the device. **Hot swappable** means that you are able to plug in a device and use it immediately without switching off the computer.
Examples of the technology in practice 	
General troubleshooting	• Reinstall drivers if a device fails to communicate with the operating system. • Update drivers to ensure latest features and functions are up to date. • Ensure that the hardware device is compatible with the operating system. • Download drivers from the internet.

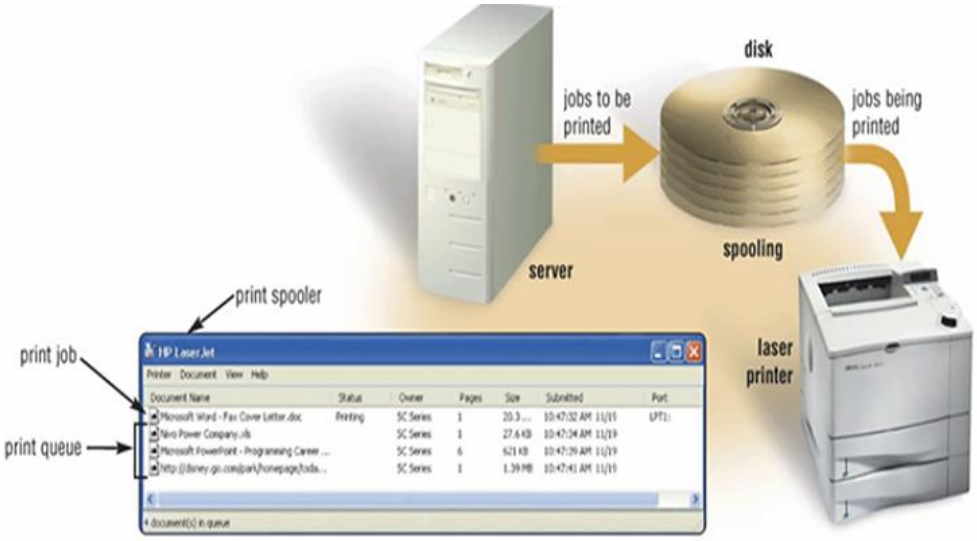
37. MULTITASKING	
Description – What it is	Multitasking is a processing technique whereby the operating system execute more than one task (process or program) simultaneously on a single core (processor).
Simple explanation of how it works	 Multitasking is the ability of the operation system to switch the attention of the CPU between different tasks so quickly that it appears as if all the tasks are being processed at the same time. Examples of some operating systems that supports multitasking are Windows 7/8/10, Linux, Mac OS, Android, and iOS.
Advantages	• Several applications can be opened and tasks can be completed simultaneously. • Tasks can be managed more efficiently and increase productivity. • CPU is used most of time and never become idle. • The system looks fast as all the tasks runs in parallel. • Response time is shorter.
Disadvantages	• Tracking all tasks/processes is sometimes difficult to handle. • Due to high load of tasks, long time jobs have to wait long. • Multitasking could also be a time waster since you'll need to switch from task to task.
Examples of the technology in practice	• The ability to open word processor, spreadsheet, e-mail, browser, windows media player and print at the same time for example, is multitasking. • When your smartphone plays music, receives WhatsApp messages, downloads updates and browses the internet at the same time that is multitasking.

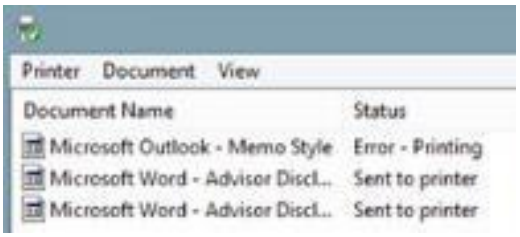
38. SCHEDULING	
Description – What it is	A scheduler determines which programs are admitted to the system for processing. A **task scheduler** is used to create and manage common tasks that your computer will carry out automatically at the times you specify. There are other schedulers such as a CPU scheduler.
Simple explanation of how it works	This utility enables the computer to automatically run tasks at a specific time. For example, Windows automatically defragments the hard disk or performs disk clean up at regular interval as long as the time is set for it to run.
Advantages	• The computer gets to automatically run the programs without manually doing it. • Plan of the sequence of which job can run first based on the priority of the file or the size of the file.
Disadvantages	• It might slow the computer if many programs are set to automatically run at the same time as when the user is busy with the computer. • Due to not seeing the interface of the running program on the screen the user might be confused not knowing how the music is playing yet they didn't click or play music.
Relevance and impact on personal lives	• The computer can run programs without you physically being there which means it saves you time to do other tasks.
Examples of the technology in practice	• You can access task scheduler by typing the word **scheduler** on the start screen and then click on 'schedule task' or you can go to Control Panel – System and security – Administrative tools – Task scheduler depending on the version of the operating system. 

39. SECURITY FEATURES SUCH AS ACCESS CONTROL, CONTROL OF SPYWARE, ADWARE AND FIREWALL	
Description – What it is	Computer security refers to the protection of user data from being accessed or interfered with by unauthorised users. This security is provided by the operating system.
Simple explanation of how it works	**Access Control** Access to the computer system or user data can be controlled by: • What you know, for example – a user account and a password. • What you possess/what you have, for example – access card or token. • Who you are, for example – biometrics. • A combination of two or all of the above, for example – a debit card/credit card is a combination of what you possess (a physical card) and what you know (PIN). **Security features in the operating system** • Authorisation – requests a username and password. • Confirmation to install software or delete a file. • Security alerts from the security centre – for example, 'your anti-virus has expired' message. • File permission – set the file read only attribute or the option to remove everyone from the default file permission. • Audit trail – to keep track of events such as who logs onto the system and make changes; thus ensuring accountability. An audit trail helps the user to know what was happening on the computer. • Firewall – is the fence between the computer and the internet. Operating systems come with firewalls which regulate programs or resources that can be accessed on the internet or from the internet. **Security Centre** Operating systems such as Windows have Security Centre utility/tools where users can ensure that their computers remain in a healthy state. The Security Centre, if configured properly can provide alerts and guidance to assist a user to protect his/her computer. For example, the Security Centre can send a warning if there is no anti-virus on the computer. Features that can be found on the Security Centre of the operating system include settings for: • firewall • automatic updates • Windows Defender • anti-malware (virus and spyware)

Advantages	• **Virus and threat protection**. Monitor threats to your device, run scans, and get updates to help detect the latest threats. • **Device performance and health**. See status about your device's performance health and keep your device clean and up to date with the latest version of Windows. • **Firewall and network protection**. Manage the settings for the firewall, and monitor what's happening with your networks and internet connections. • **App and browser control**. Helps protect your device against potentially dangerous apps, files, sites, and downloads. Also provides exploit protection where you can customise protection settings for your devices. • **Family options**. Provides easy access to managing your children's online experiences and the devices in your household. (Windows, 2017) • It comes freely included in a Windows operating system.
Disadvantages	• If you need additional features, third party software should be purchased. • Scan speed could impact on performance of computer. • Not all threats may be detected.
Example of the technology in practice	

40. SPOOLING	
Description – What it is	Spooling is a process of storing/caching documents that were sent for printing on the disk until the printer is ready to print them. A spooler is a space set aside on the hard drive by the operating system to store print jobs.
Simple explanation of how it works	Printers have a limited amount of memory. Spooling allows computers to send the next task to the printer without having to wait for it to finish printing the current document. Print jobs are sent to the spooler and then the spooler sends the print jobs one at a time to the printer in the order in which they were received (this creates a print queue). While documents are waiting in queue to be printed, you can continue doing other things on the computer because the spooler schedules all the printing in the background.
Advantages	• Promotes multitasking – no need for a computer to wait for a slower printer. Once the document is send for spooling, the printing document no longer consumes the computer resources. Thus, the computer is free to attend to other programs. • Allow print jobs to be managed effectively – while documents are lined up in the printer spooler/queue, they can be paused, cancelled or assigned higher or lower place in line. • Provides opportunity to effectively correct mistakes – if a large document is send to the printer by accident, you can cancel the printing via the spooler without having to reboot the computer or rebooting the printer or waste a lot of paper.
Disadvantages	• Need larger amounts of disk space. • Increase disk traffic. • Not practical for real-time environment, because results are produce at a later time. (Shah)
Limitations	• No reprint option is available. • No print confirmation.

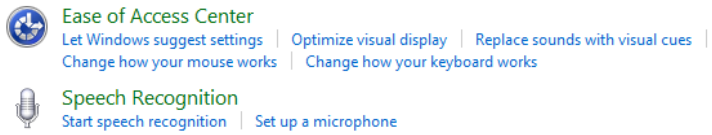
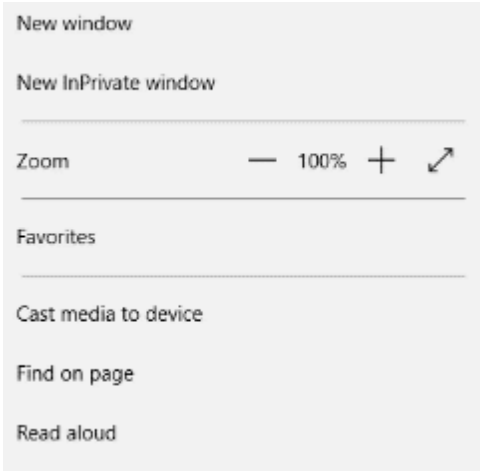


Examples of the technology in practice	

41. UTILITY PROGRAMS	
Description – What it is	**Utility programs** help to manage, maintain and control computer resources. These programs are designed to perform specific functions, such as backing up data.
Simple explanation of how it works	**Utility programs** aim to make specific tasks better on a computing device. It assists the user to communicate with the system. Utility programs are generally included within an operating system, however, it is possible to purchase separate utility programs for specific functions.
Types/examples of utility programs	**Backup**: makes copies of data files for restoring in case of data loss. **File Compression**: shrinks the file to take up less space on the hard drive. **Disk scanner**: scans the hard disk to check for errors. **Anti-virus software**: scans the system and files for viruses. **System restore**: creates a restoration point, in case you need to reset your computer. **Disk clean-up**: removes unnecessary files such as temporary files and old system information. **Disk defragmentation**: reorganises the files on the hard drive in order for the operating system to access the data faster. **Formatting**: allows a user to add, edit and delete files on storage devices.
Advantages	• Because it is included with an operating system, users don't have to purchase additional software.
Examples of the technology in practice	• Disk tools (defragmentation; disk clean-up); • File manager; • Image viewer; • Search utility; • Antivirus software; • Back-up/restore utility.

ACCESSIBILITY

42. ACCESSIBILITY FOR THE DISABLED	
Description – What it is	Accessibility refers to the design of products and environments for people with disabilities. Accessibility often describes hardware and software designed to help those who experience disabilities.
Simple explanation of how it works	**Hardware** Accessibility hardware may refer to a custom computer system designed for a specific person or simply an accessory that helps a person with a computer. Examples of accessibility accessories include keyboards with large letters on the keys, an oversized mouse and trackball, that can be activated with only a small amount of force. These and other devices can make it possible for users with disabilities to use computers. **Software** Modern operating systems include standard accessibility options that can make computers easier to use without the need for specialised hardware. For example, Windows provides display modification options, such as magnification and inverting colours, which helps those with difficulty seeing. Text-to-speech can also be turned on to provide audible descriptions of objects and text on the screen. Dictation can be used to perform common tasks with vocal commands.
Advantages	• Ability to work at their own pace. • Included in the workforce.
Disadvantages	• Majority of assistive technologies are very costly. • To be able to use the technologies properly, training has to take place which is very time consuming. • Technology can never be fully relied on.
Types of disabilities and their assistive devices	**Blind or visually impaired** (uses sound) • Screen magnifier • Braille keyboards and printers • Screen reader software (e.g. Jaws) • Text to speech software • Optical Character Recognition software • Zooming in **Deaf** (uses touch and vision) • Visual warning software (e.g. blinking border) • Closed-captioning (sends audio information in visual form) **Physically disabled** • Track ball mouse • Big keyboard • Eye controlled mouse

	• Sip and puff technology (SNP) • Eye controlled headset
Examples of the technology in practice	**Operating system accessibility** Operating systems have many built-in accessibility features that are useful for individuals who have difficulty typing or using a mouse, are blind or have low vision, or who are deaf or hard-of-hearing.  **Web accessibility** Websites have to be designed in such a way that disabled users can access the web. Browsers have certain accessibility settings. 

43. SOFTWARE FOR PHYSICALLY CHALLENGED PEOPLE	
Description – What it is	For most of us, sitting down in front of a computer for work or play is a pretty simple affair. But for people who are blind, paralysed or otherwise physically disabled, using a computer can be frustrating. However, a new generation of gadgets, equipment and software is making it easier for disabled people.
Simple explanation of how it works	The PC is a computing device that's adaptable to different forms of input and output. The computer doesn't care whether the user is controlling the pointer with their feet or eye movements instead of a traditional mouse and keyboard.
Advantages	• A blind accountant can tell screen-reading software to read spreadsheet data aloud. • A paralysed programmer can write code by controlling his computer with the subtle movement of his neck muscles.
Disadvantages	• Software needs to be carefully chosen in order to ensure that what is holding the child's attention is also educating them at the same time. • Muscular-skeletal injuries and vision problems can arise whenever students spend too much time using the computer.
Relevance and impact on personal lives	• It gives the learner more self-confidence. • Students can better reach their potential. • It can help learners to be more independent. • It makes the curriculum available to all.
Examples of the technology in practice	

NETWORK TECHNOLOGIES

<table>
<tr><th colspan="2">1. WIRELESS ACCESS POINT COVERAGE</th></tr>
<tr><td>Description
– What it is</td><td>A wireless access point sends and receives wireless traffic to and from nearby wireless clients. The access point can include a router which will allow the access point to share the internet connection with wireless clients connected. Considerations for coverage by access point include speed, area covered and number of devices connected at any given time.</td></tr>
<tr><td>Simple explanation of how it works</td><td>Wireless access points run a specific 802.11 standard.
Different standards of Wi-Fi (802.11) – the two newest standards are:
802.11n – most devices in use currently in South Africa
Covers largest area (lower frequency)
802.11ac – newer standard (higher frequency)
Faster with limited indoor coverage but great outdoor coverage
<table>
<tr><th colspan="6">802.11 Wireless Standards</th></tr>
<tr><td>IEEE Standard</td><td>802.11a</td><td>802.11b</td><td>802.11g</td><td>802.11n</td><td>802.11ac</td></tr>
<tr><td>Year Adopted</td><td>1999</td><td>1999</td><td>2003</td><td>2009</td><td>2014</td></tr>
<tr><td>Frequency</td><td>5 GHz</td><td>2.4 GHz</td><td>2.4 GHz</td><td>2.4/5 GHz</td><td>5 GHz</td></tr>
<tr><td>Max. Data Rate</td><td>54 Mbps</td><td>11 Mbps</td><td>54 Mbps</td><td>600 Mbps</td><td>1 Gbps</td></tr>
<tr><td>Typical Range Indoors*</td><td>100 ft.</td><td>100 ft.</td><td>125 ft.</td><td>225 ft.</td><td>90 ft.</td></tr>
<tr><td>Typical Range Outdoors*</td><td>400 ft.</td><td>450 ft.</td><td>450 ft.</td><td>825 ft.</td><td>1,000 ft.</td></tr>
</table>
Lower frequencies, like 2.4 GHz, can penetrate solid objects better than higher frequencies. That means with 2.4 GHz, data can travel farther. However, a higher frequency, like 5 GHz, can transmit your data faster, although it does not have a very far range.</td></tr>
<tr><td>What to consider during wireless communication</td><td>Distance from the tower
The strength of your wireless signal will vary depending on your distance from the tower.
Physical barriers
Signal strength may be affected by objects between your device and the tower.
For example:
Trees, hills, valleys, buildings, and walls may cause poor connection
Coverage indoors will vary from coverage outdoors.</td></tr>
</table>

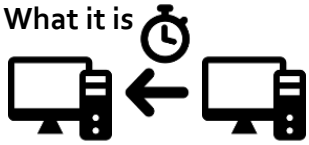
	Number of users on the network • Your wireless connection may be slow or poor if there are many people using the network. For example, the wireless network may be used to size at large events and popular resort locations. **Physical damage to the tower** • Wireless service may be affected when a tower is damaged. For example: A fibre cut may cause a cellular outage because the tower has lost communication • A wind storm may damage equipment on a tower. (SaskTel, 2017)
Advantages	• Wi-Fi allows mobile devices to connect quickly and remain mobile and connected without any cables required.
Disadvantages	• Security – harder to control access to network. • Wi-Fi is very susceptible to interference (Wi-Fi uses radio waves to send a signal but often crashes with other radio waves at similar frequencies).
Limitations	• Access point placement is important for maximizing the signal strength • Wireless radio waves are affected by: o **Absorption** occurs when the radio waves cannot penetrate a specific material o **Diffraction** loss is caused by the signal passing through a material, but the signal is badly affected o **Reflection** is caused by the signal bouncing off materials such as glass, whiteboards, and plastic • The biggest misconception is that Wi-Fi is the same as internet, it is NOT. The access point must also be a router otherwise you will have Wi-Fi but not internet.
Relevance and impact on personal lives	• We use Wi-Fi for communication (E-mail/WhatsApp), entertainment (streaming/gaming) and social media/news.
Examples of the technology in practice	Wi-Fi uses besides for connecting to the internet: • Use smartphone as remote control using an app and Wi-Fi. • Wireless printing from smartphone to printer. • Stream to any device in your home from home media device. • Stream audio to any speakers in the house. • Wireless transfer of photos from camera to any device.

2. BROADBAND AND BANDWIDTH	
Description – What it is	**Broadband** – a High-speed, high-bandwidth connection to the internet. It commonly refers to high-speed internet access that is always on and faster than the traditional dial-up access. **Bandwidth** – Total amount of data that can be transferred from one point to another in a given period of time.
Simple explanation of how it works	**Broadband –** Dial-up and broadband may use the same phone line, but broadband uses it much more efficiently. Where dial-up sends only one voice or data signal down one channel, broadband divides the line into multiple channels, each of which can send data in parallel. **Bandwidth** – More bandwidth means that you'll receive more data at the same time. Your data is just transferred to you at a faster rate because more data can be sent at the same time. (e.g. per second).
Advantages	• Broadband internet access allows us to be connected to the internet while the phone line is in use. • Connection speed is up to 100 times faster than dialup connection. • It is convenient because the internet connection is always on.
Disadvantages	• Not all phone wires are equipped for DSL service. May not be available in rural or remote areas. • Higher security risk than dialup connection. A personal firewall is needed to protect your computer.
Relevance and impact on personal lives	• **Home Entertainment and Connectivity** (Look up a recipe, the latest stock information, video chat, stream a movie or music, play interactive on-line games) • **Work from anywhere** (makes it possible for professionals to work from home) • **Distance Learning** (colleges, adult education programs etc.)
Examples of the technology in practice	• Web-page viewing, e-mail access, messaging etc. • Improved access to audio materials (music and internet radio) and video. • Network backup and storage.

3. COMMUNICATION DEVICES: SMART PHONES AND OTHER PERSONAL MOBILE DEVICES	

Description – What it is	• Mobile devices:
	  ○ A mobile device is a handheld device that is small enough to fit into your hand. Some of the mobile devices are just as powerful as desktop computers or laptops. Examples include smart phones, smart watches, tablets, portable music players.
	• Smart phones:
	  ○ A mobile phone that performs many of the functions of a computer, typically having a touchscreen interface, internet access, and an operating system capable of running downloaded apps.

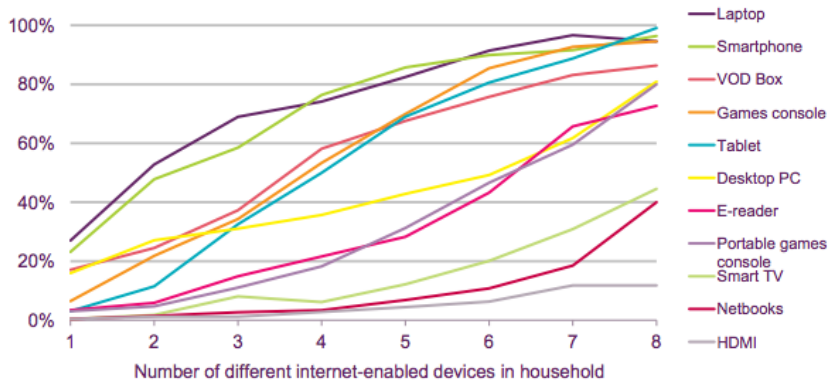
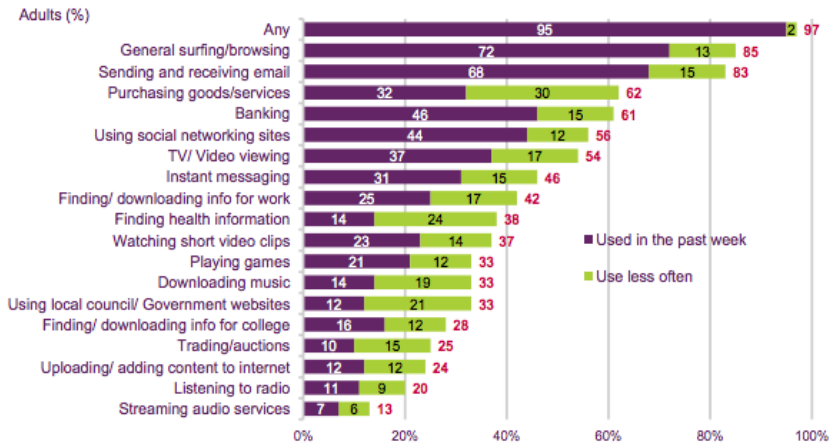
Advantages	• Communication can be done anytime anywhere. • Access to internet and social media. • Easy access to information with internet access. • Navigation to places. • Photos can be taken. • Long battery life. • Any application can be downloaded for a user's need, e.g. banking. • Convergence, many functions are included. • Portability since mobile devices can be carried anywhere.
Disadvantages	• Data input is slower. • Because it is small, it may get lost or stolen easily. • Security risk (everything is connected to internet, therefore identity theft may be easier). • Smaller screens make it more difficult to see. • With long use, batteries don't last long.
Limitations	• All these new technology and devices are costly and for some people just not possible to buy. • When it comes to work you cannot perform all your duties like type letters etc. on mobile devices it is more difficult.
Relevance and impact on personal lives	• Mobile devices can be used as teaching tools in schools. • Constant contact with family and friends. • Apps can assist with transport, paying bills, navigating, making appointments etc. • Mobile devices help with daily organisation, with apps like alarms, calendars etc.
Examples of the technology in practice	• Smart watches • Tablets

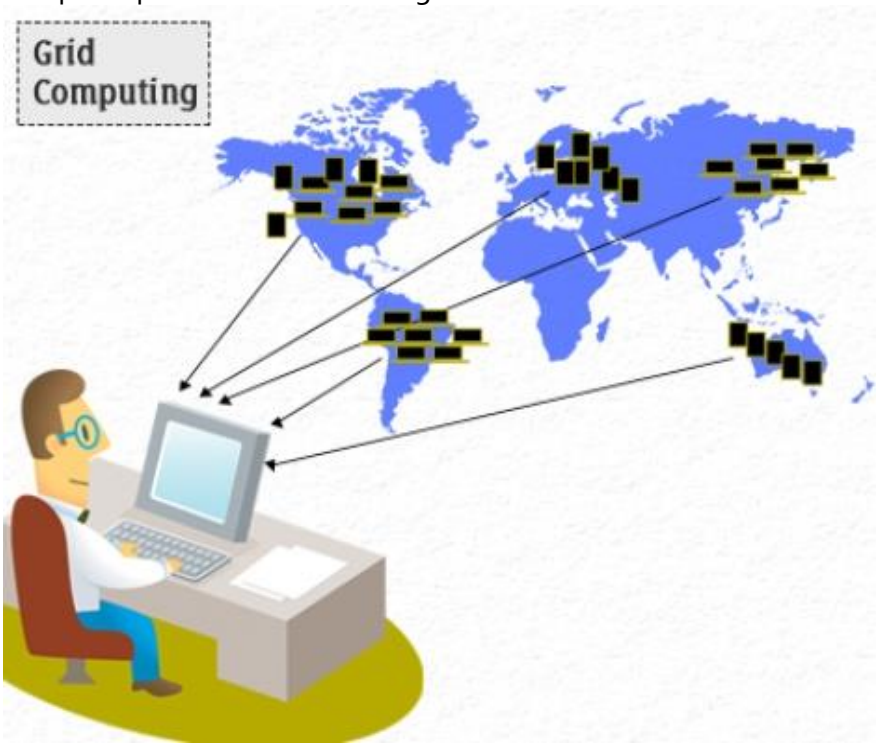
4. DATA TRANSMISSION SPEED	
Description – What it is 	**Data transmission speed** refers to the speed at which data can be passed from one device to another.

Simple explanation of how it works	• Data can be transferred over a variety of communication channels (e.g. copper wires, fibre-optic cables, wireless networks, satellites etc.)
	• The speed of data transmission between two points is measured in *megabits per second* (Mbps), and *gigabits per second* (Gbps) for faster connections.
	• Comparisons of transfer rates:
	  ○ ADSL: Up to 15 Mbps
	  ○ 3G: Up to 21 Mbps
	  ○ 4G/LTE: Up to 50 Mbps
	  ○ Fibre: Up to 105 Mbps
	  ○ Gigabit Fibre: up to 1000 Mbps (1 gigabit per second)

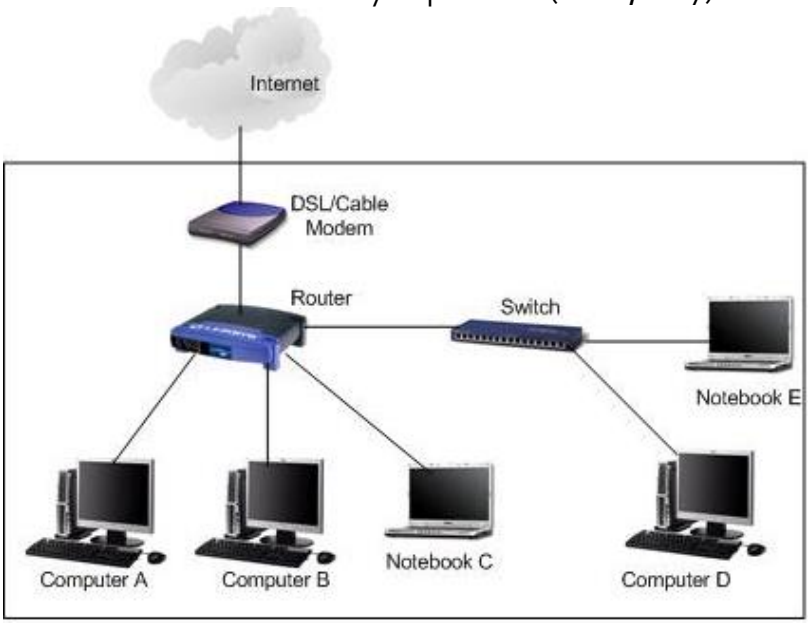
Advantages	A higher speed of data transmission means: • Smooth streaming of high-definition media. • Several people can use the same connection. simultaneously without 'lagging'. • Cloud storage will sync faster.
Disadvantages	• It can be expensive to install and maintain high-speed data connections. • Data caps or bundles may be depleted faster.
Limitations	• High-speed data networks are limited to urban centres. • Networks may become overloaded, reducing data transmission speeds.
Examples of the technology in practice	• Apps will update faster using high-speed networks like fibre or LTE. • Gamers prefer high-speed connections when playing online. • Test your own network speed by visiting http://www.speedtest.net/.

5. DIGITAL COMMUNICATION	
Description – What it is	Digital communication is the electronic transmission of information that has been created digitally through various devices, like smartphones, tablets, laptops.
Advantages	• Digital communication contributes towards green computing and protecting the environment because costs can be saved if no printing takes place and no paper, ink cartridges or toner is wasted. • Files can be saved electronically on various storage media for later use. • People from all over the world are able to collaborate and share communications, graphics, interactive software, etc. • Messages can be read anywhere and at any time, and communication is much cheaper. • Digital communication enables facilities such as video conferencing, which can save a lot of time and money. • It can be easy to transfer data from one application to another. For example, you can copy text from an e-mail and paste it in a document. • High speed computers and powerful software design tools are available. They make the development of digital communication systems flexible. • Internet is available almost everywhere. The compatibility of digital communication systems with internet has opened new areas of applications.
Disadvantages	• Some people may misuse digital communications to send viruses or hoax messages to harm other people. • Digital communication equipment such as cellphone and microwave towers may not fi t into the environment or be pleasant to look at. • Many people cannot use computers and so cannot take full advantage of digital communication. • Some people may become addicted to cyber activities, which may lead to social withdrawal or anti-social behaviour. • Some people may find that they do not have time to relax and enjoy social activities because digital communications have taken over their lives in the form of e-mails and social networking on their mobile devices. • There is no guarantee of privacy especially with e-mail messages, which can be read by others. • There is the chance of cyber bullying taking place.
Limitations	• Electromagnetic fields and radio signals can interfere with wireless communications.

	• Large bandwidth is needed for data transmission. If a user does not have the correct bandwidth for the data type he or she wants to transmit, the data may not transmit successfully. • Too many messages at the same time may cause a server to fail.
Relevance and impact on personal lives	**Figure 5.19 Device ownership, by number of different internet-enabled devices in the household**  *Source: Ofcom research, Q1 2015, Base: Adults aged 16+with at least one IP-enabled device n = 2411* **Figure 5.28 Claimed use of the internet for selected activities**  *Source: Ofcom Technology Tracker, W1 2015* *Base: All adults aged 16+ who use the internet at home or elsewhere (n = 3095 UK)* *QE5. Which, if any, of these do you use the internet for?* People spent most of their time on digital devices and on the internet. Various devices as seen above are used to access the internet.
Examples of the technology in practice	Digital systems that we use every day include mobile phones, television, radio, and the internet. DVDs, MP3s and digital cameras are used everyday.

6. GRID COMPUTING	
Description – What it is	Grid computing uses resources from different computers in different locations instead of using resources for one single computer to complete a specific task. It is a service for sharing computer power and data storage over the internet. 
Simple explanation of how it works	Computer power from different computers used to achieve a common goal. These computers are used when they are unused. Each computer will perform a specific function. The 'grid' is usually controlled by a powerful server. The server controls several other computers that contain grid computing software and several software packages that are installed on the computers.
Advantages	• More efficient use of unused resources. • More modular – if one computer fails its function is taken over by another. • Policies managed by grid software. • Upgrading can be done without downtime as the function of one is taken over by another. • Jobs can be split into smaller chunks.
Disadvantages	• Needs a fast internet connection. • Applications may need to be changed. • Licencing may prohibit use across servers. • A task is not completed until all the smaller tasks have been submitted.
Relevance and impact on personal lives	• Weather forecasting • Earthquake simulation

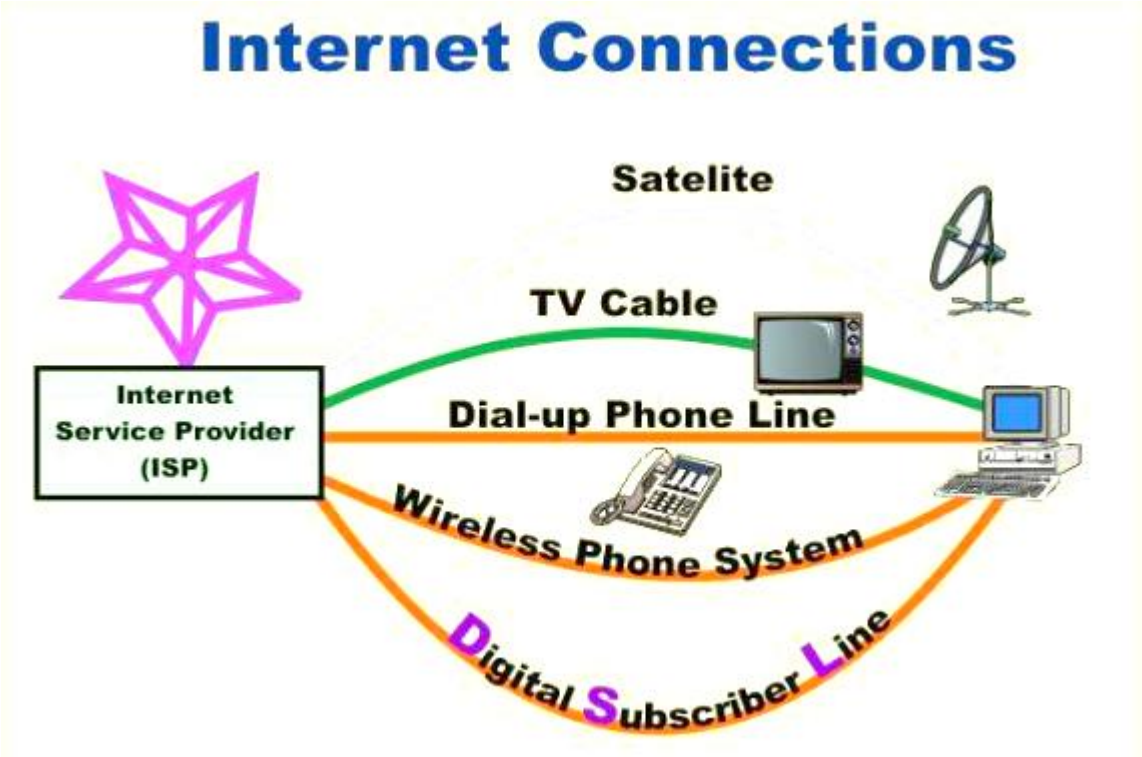
7. INTERNET SERVICE PROVIDER (ISP), INTERNET SERVICES	
Description – What it is	An ISP is a company that has a permanent, fast connection to the internet. This company supplies individuals and businesses with internet access and its services, for a monthly fee. It is the midway between a user and the internet. (Jacobs , et al., 2013)
Simple explanation of how it works	When you buy 1 GB bandwidth (data) from an ISP, you rent their internet connection and are only allowed to use 1 GB of bandwidth, in other words they give you a 1 GB cap. All ISP's have different packages and these packages differ depending on the usage need and the level of services needed. (Reference for Business, 2018)
Advantages	• No additional cost if cables are stolen. • The user does not have to do any maintenance. • There is regular support with your internet. • The user does not have to do any installations.
Disadvantages	• Cannot manage your own line. • If you want to change your CAP or line speed you have to physical go in to the store. • Not all suburbs are covered by the ISP.
Limitations	• Not all areas have internet coverage especially rural areas due to the lack of infrastructure. • Your internet connection speed is limited to the area's coverage of the ISP.
Relevance and impact on personal lives	No one can connect to the internet without an ISP.
Examples of the technology in practice	South African ISP companies include MWEB, Telkom SA, MTN, Internet Solutions, Vodacom, 8ta, Cell C, VOX telekom.

8. NETWORK DEVICE: MODEM, ROUTER AND SWITCH	
Description – What it is	**Modem** – A modem is a hardware device that allows a computer to send and receive data over a telephone line, cable or satellite connection. An ADSL modem is a device that transmits and receives data over analogue (telephone) lines. **Switch** – A switch is a device that connects any device to a network. **Router** – A router is a device that connects networks to other networks wirelessly or through cables. Modern routers have switches built into them that enables a computer to connect to the router and then be able to communicate with other networks.
Simple explanation of how it works	**Modem** – A modem is used to send digital data over a telephone line. The sending modem **mo**dulates the data into a signal that is compatible with the telephone line, and the receiving modem **dem**odulates the signal back into digital data. Wireless modems convert digital data into radio signals and back. **Switch** – Switches allow different devices on a network to communicate. **Router** – Routers allow different networks to communicate. A router also connects networked computers to the internet, so that multiple users can share an internet connection. A router acts as a sender. It chooses the best route for information to travel, so that it is transmitted as efficiently as possible. (Cisco, 2017) 
Advantages	**(A)DSL Modems** • Even though (A)DSL modem service requires a phone line, subscribers can still use phone services while online. • Connections speeds are better than those of dial-up. **Switches** • There is reduced workload on individual computers. • Increased network performance. **Routers**

	• Routers can connect different network architectures, such as Ethernet. • Routers can choose the best path across connected networks. • Routers reduce network traffic.
Disadvantages	**(A)DSL Modems** • Higher costs. • Modem service is still not available in many remote and rural areas. **Switches** • They are significantly more expensive. • Network problems can be difficult to trace through a switch. **Routers** • Complicated setup. • Less security.

9. REAL-TIME MESSAGING – INSTANT MESSAGING (IM) AND CHAT	
Description – What it is	Instant messaging (IM) Is the sharing or exchanging of text based messages in real-time via an internet connection and an instant messaging application. Many individuals prefer using instant messaging instead of services such as e-mail as it is immediate and an individuals can see when an instant message was delivered and read. (Davis, 2018)
Simple explanation of how it works	Common instant messaging applications work on the basis of the user having an internet connection and then via the instant messaging application connecting with fellow application users known as a 'buddy list'. These 'buddy lists' are typically made up of the user's device contact list, when the user registers him/herself on the application they are prompted to make their usage of the specific application visible to other users as to increase their 'buddy list' (Davis, 2018). Most instant messaging services such as WhatsApp and WeChat have the ability to make video calls, voice notes, picture taking, document sharing along with the standard typed out messages.
Advantages	• **Cost savings**: Through instant messaging users can communicate internationally without having to paying high fees associated with international phone calls. • **Instant communication:** Users can in an immediate manner communicate without having to wait for the web server for instance to deliver their communication, furthermore with applications such as WhatsApp the user is also able to see whether the instant message had been delivered and read. • **Convenient**: Instant messaging applications can be linked to multiple devices thus enabling users to do computer based tasks whilst attending to the instant message on the same device (Root, 2018).
Disadvantages	• **Viruses/hacking:** Internet based real-time messaging or instant messaging run the risk of being hacked by third parties or gaining viruses through sent communication. Users might unknowingly send a documents to another user over the instant messing application that contains a virus. • **Miscommunication:** IM messages often get misinterpreted due to the wrong emotional connection being attached to the message, unlike physical/phone call communication the users often do not see or hear each other. • **Crime:** The receiver of the IM is never fully sure that the communication they are receiving is from the individual they believe it to be. IM has led to various crimes such as identity theft; data theft; kidnapping and human trafficking. • **Misuse and distraction:** IM in the work place can lead to employees misusing the resource to do personal business or

	even lead to working less and not completing their tasks **(Woodart, 2011)**.
Limitations	• **Network:** IM can only fully take place if all parties involved in the communication has access to a functioning network connection such as 3G and 4G. • **Frequent updates:** Most IM platforms need frequent updates, in some instances the IM will not be delivered to the user if the application is out of date. (Anon., 2001)
Relevance and impact on personal lives	Currently IM is also being incorporated in to the educational scene as educators and schools are making use of it to communicate with one another on school related matters, and also share resources such as papers and textbooks (Bakker, 2016). Instant messaging has caused these users opening themselves up to various crimes and online dangers. One method of avoiding spam messages for instance is to add the spam contact to the users block list, to not allow the messages sent from that specific user to be delivered to the receiver. IM promotes anti-social behaviour as many users would rather send an IM to another individual than taking the time or effort and speaking face-to-face to the person (Anon., 2001).
Examples of the technology in practice	Messenger WhatsApp Messenger WeChat Snapchat Telegram Google Hangouts

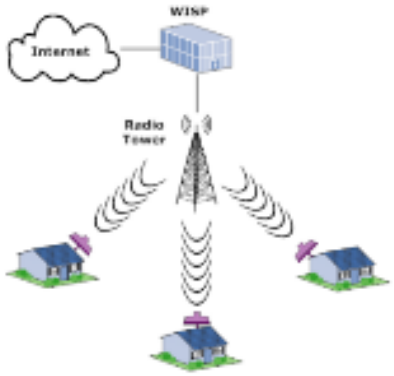
10. TYPES OF CONNECTIONS, E.G. ADSL, WIRELESS TECHNOLOGIES	
Description – What it is	The internet is a computer network that stretches over the whole world and consists out of computer networks and connections. For computers to be able to communicate, a network connection is needed.
	
Simple explanation of how it works	Network connections are made out of telephone lines, cables under the sea, microwave connections and satellite. A connection is allowed through an Internet Service Provider (ISP).
Types of internet connections	**Cable** Internet connections are provided through cables. Coaxial (the same as used by TV), fibre optic (electrical signals are converted to light), Ethernet (used to connect to a network). Speed ranges from 512 Kbps to 20 Mbps. **Fibre** Fibre uses fibre optic cables. These cables involve tiny tubes that are reflective on the inside. They transfer information by sending flashes of light through the tubes. Equipment at the receiving end can then interpret the flashes as data. Speeds vary from 32 Mbps to 1 Gbps. **Fibre-to-the-home (FTTH)** means the entire line is fibre from the supplier all the way into your building. All you need to do is install the right equipment in your phone socket and plug in your router. **DSL** It is a permanent internet connection that is always 'on'. This uses two lines so your phone can be used while your computer is

connected. DSL uses a router to transport data and the range of connection speed, depending on the service offered, is between 128 Kbps to 8 Mbps.

There are two types of DSL connections:

- **ADSL**
  With ADSL download speed is faster than your upload speed, and this is because the typical user will be downloading files more often than uploading files.

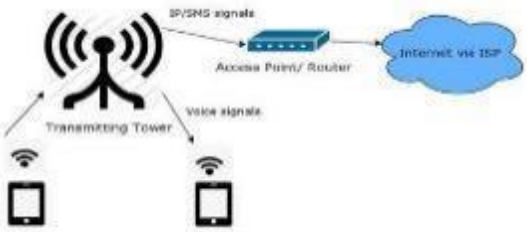
- **SDSL**
  The upload and download speeds are the same.



Wireless
Wireless, or Wi-Fi does not use telephone lines or cables to connect to the internet. Wireless Internet Service Providers (WISP) transmit radio signals to a tower. It may go through several towers before it reaches a home's receiver. It must be line-of-sight. Speeds range from 5 Mbps to 20 Mbps.

Satellite
Satellite accesses the internet via a satellite, a satellite dish at a home and a modem. Satellite internet is provided through a satellite broadband provider. Satellite internet speeds vary from 1 Mbps to 15 Mbps.

Cellular
Cellular technology provides wireless internet access through cell phones. The speeds vary depending on the provider, but the most common are 3G and 4G (which is included in LTE) speeds.



Cell phones have an in-built antenna which is used to send digital information with cell phone towers via radio waves. Mobile phones

	connect to a cell tower in the area, and instead of connecting to another phone it connects to the internet and can fetch or retrieve data.
Advantages	**Cable** • **Security**: As wired networks are connected by physically plugging in a cable from one device to another, it is much more difficult to access them without authorisation. • **Reliability:** Wired networks have a reliable, constant download and upload speed unaffected by the environment. • **Ease of use:** Plugging an Ethernet cable into a laptop or printer can easily access the network and get connected. • **Distance:** Ethernet cabling can stretch up to 100 meters without any loss of quality. **Fibre** • **Extremely high bandwidth:** The volume of data that fibre optic cables transmit per unit time is far great than copper cables. • **Longer distance:** Signals can be transmitted to a longer distance than copper cables. • **Low security risk:** Data or signals are transmitted via light in fibre optic transmission. There is no way to detect the data being transmitted by 'listening in' to the electromagnetic energy 'leaking' through the cable, which ensures the absolute security of information. • **Light weight:** Fibre optic cables are made of glass or plastic, and they are thinner than copper cables. These make them lighter and easy to install. **ADSL** • Provides the ability to talk on the phone while surfing through the internet, voice and data work in separate bands. • Use existing infrastructure (the basic telephone network). This is advantageous for the operators who do not face large costs for the implementation of this technology to users. • ADSL users have permanent access to the internet. • Provides higher connection speeds. **Wireless** • **Freedom: You can get signal from any location.** • **Setup cost:** No cabling required, this saves money. • **Flexibility:** Quick and easy to set up in a temporary or permanent space. • **Scalable: Can be expanded.** • **Mobile access:** Can access the network on the move.

	Satellite • **Global coverage:** There is coverage at any location on Earth. The wide coverage makes high-speed internet access from remote locations quick and easy. • **High speed access:** Satellite users can provide end users with high upload speed and download speeds. • **Cost effective:** A satellite connection can be installed within days and offers a high-speed connection. This will save you a lot of money. • **Location independent:** The end user locations is connected to the internet as long as the satellite has a clear line of sight. **Cellular** • No need for a desktop or laptop with internet, just a mobile device that supports internet connection. • Files and documents can be easily downloaded on your phone. Songs can be downloaded online, games can be played on your mobile with internet. E-mails can be read and sent anytime and anywhere.
Disadvantages	**Cable** • **Setting up**: Cables have to be run from the router to each room in the building. • **Cost**: Installation is expensive. • **Mobility**: You cannot connect in a room that does not have a connection point. You have to unplug it and move to the next room and plug it into the port there. **Fibre** • **Fragility**: Usually optical fibre cables are made of glass, which lends to they are more fragile than electrical wires. • **Difficult to install**: It's not easy to join fibre optic cable. And if you bend them too much, they will break. • **Weakening**: As transmission distance getting longer, light will be weakened. • **Cost is higher than copper cable**: Installing fibre optic cabling is still relatively more expensive than copper cables. **ADSL** • Connection is limited by the amount of cable between the modem and the nearest telephone hub. • ADSL connections degrade once they must download from numerous contacts at a time. • The service is not available anywhere. **Wireless** • **Speed**: Slower than cable. • **Range**: Affected by various mediums.

	• **Signal interruptions**: Signal travels best through open space. Signal can be reduced by walls, glass, water, etc. • **Security**: If not secured properly people can access the private network and steal information. • **Unauthorised** access • **Compromising of data**: Data interception and tampering is easy for anyone with the proper hardware and/or software tools and knowledge. **Satellite** • **Fair Access Policy**: The amount of access a customer has during a specific time is limited. When a user exceeds the usage limit, the account is restricted for a time. • **Weather**: The weather can have a negative impact on satellite internet users. When the weather is rainy, cloudy, windy or snowy, satellite signal can be lost, leaving customers without service. Users must also have a clear view of the satellite to have a good signal. • **Lower speeds during peak times**: Streaming videos and watching a movie may be significantly slowed during peak times. • **Placement of receiver**: Placement should not be blocked by trees and should have a clear view location to be able to receive the clearest signals. **Cellular** • The internet connection on mobile phones is not too fast and sometimes problem arises in certain areas. • Sometimes while downloading files problems arise because of the poor connection and it takes a lot of time to download the file and if the connection is too weak the file may not be downloaded at all. • You need to pay extra money for the mobile internet apart from the talk time.
Limitations	**Cable** • The wired network using fibre optic is often prone to a threat of being cracked by mice or fish (if the cable is spread under the water). • The connection of wires even does not allow you to work in an open space like in a garden, park or near your swimming pool. • One cannot form a network in the areas where it is difficult to carry cables. In those areas expensive wireless connection need to be developed. • Specialised labour is required to install any wired network connections.

	Fibre • Outdoor fibre need to be shielded well. • Fibre is a small and compact cable, and it is highly susceptible to becoming cut or damaged during installation or construction activities. • Animals damage fibre optic cables. **ADSL** • AM radio frequencies can interfere with DSL signal quality, causing data reduction. • Crosstalk occurs when there is frequency overlap between channels. **Wireless** • When the wireless signals are transferred they are blocked by the certain obstacles as walls, gates and human beings. • The strength of wireless signals depends upon the location; if you're closer to infrastructure you receive signals. • Wireless signals can be hindered by other electronic devices, the rate of frequency and the height from the ground. • If your wireless internet connection is not secured any unauthorised user can exploit the signals or even hack important information. • The recent upgrading of wireless technologies also require you to improve your knowledge about how to make use of any wireless technology. **Satellite** • Repairs can take long. • Delayed because of the huge distance over which the satellite must send the signal. • Somewhat unreliable signal. **Cellular** • Network congestion. • No data – some applications do not work if no internet access. • Use of internet makes it difficult for you to secure your phones form viruses. • Accidents are caused due to the distractions caused because of mobile devices.
Relevance and impact on personal lives	• People communicate out of various parts of the world with each other. • Work, business etc. happens globally. • It is difficult to control the flow of information and to limit the information. • Telecommunication is possible. • Some people suffer from information overload.

Examples of the technology in practice	• Social – People socialise with anyone around the world through MySpace, Twitter, Facebook etc. • Information – Instead of doing research in a library it can be done on the internet through Google. • Navigation – Waze, Google Maps and Foursquare are examples of navigation systems that allows you to point where you are and where you are going.

11. WIRELESS VS CABLES	
Description – What it is	A **wireless** connection allows devices to communicate with each other without the use of wires. A **cabled** connection allows devices to communicate with each with the use of cables including twisted pair copper cables, coaxial cables and fibre optical cables.
Simple explanation of how it works	**Wireless**: Transmitters and receivers are located at each end of a wireless system, using an aerial or antenna. At the transmitter, the electrical signals leave the antenna to create electromagnetic waves that radiate outwards until it reaches the other end. **Cabled**: Devices are connected to each other with the use of cables. Data is transmitted through the cables.
Advantages	**Wireless** • Users can move around freely within the area of the network • Not having to lay lots of cables and put them through walls thus, ease of installation and lower cost. • Wireless networks can handle a larger amount of users because they are not limited by a specific number of connection ports. • Instant transfer of information is easier. **Cabled** • Computers can be added or removed, based on need. Resources, such as high-quality laser printers, can be shared to reduce costs. • Reliability is improved because system failures can be limited to only one site. • Generally faster transfer rates. • Not prone to interference. • Better security system, computers need to be connected to by cables.
Disadvantages	**Wireless** • It can require extra costs and equipment to set up. • Setting up a wireless network can sometimes be difficult for people who are not experienced with computers. • Transfer speeds can vary according to your location in relation to the network. • Wireless connections can be obstructed by other household items (interference). • Wireless networks are generally less secure. There can be problems with other people stealing bandwidth, if the network hasn't been set up to be password protected. Information is also less secure and can be easier to hacked into. • Not all devices have wireless capabilities. **Cabled** • Users are limited by the position of the cable and/or connection to a port.

	• Can be difficult and expensive to set up. • Messy cables are untidy.
Relevance and impact on personal lives	Examples of using wireless communication: • Turn your smartphone into a remote control to control a gate. • Send documents to your printer from any computer or smartphone. • Forward notifications from your smartphone to your computer. • Stream movies to any TV in the house. • Share files with nearby computers. • Wirelessly transfer photos from your digital camera. • Sync your Music library, Photo library, or other files with your smartphone USB-free.
Examples of the technology in practice	**Wireless** • Bluetooth, infrared • 3G, 4G, LTE **Cabled** • Printer connected to a network switch via a cable • ADSL

INTERNET TECHNOLOGIES

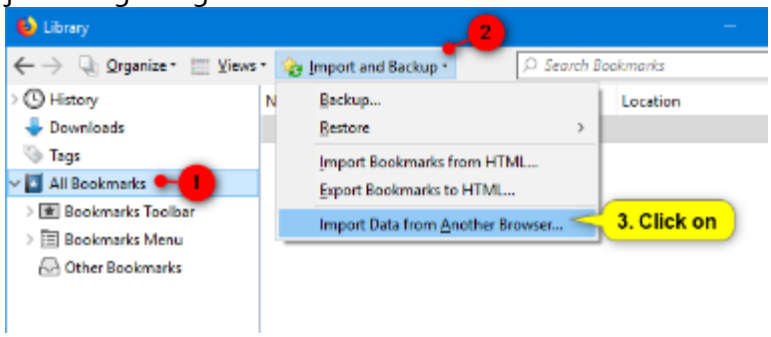
1. BLOCKING WEBSITES	
Description – What it is	Blocking websites is a process by which a firewall or an internet proxy prevents users from accessing some network resources, such as certain Web sites or FTP servers. (Hitachi ID Systems, 2018) A web filter is a program that can screen an incoming web page to determine which websites should be displayed. The filter checks the origin or content of a web page against a set of rules provided by company or person who has installed the Web filter. (Rouse, n.d.)
Simple explanation of how it works	Internet filters for the blocking of certain websites can be done on many different levels, it all depends on the browser that you are using and the purpose for blocking the website. Companies or individual users block out pages from web sites that are likely to include questionable advertising, pornographic content, spyware, viruses etc.
Advantages	• Productivity: By using filtering software in business, employers ensure that the worker does not waste time in personal matters and social networking. • Chat rooms: Guardians block websites like chat rooms, so that their children do not waste their time in inappropriate sites. • File sharing: People use internet filter software to avoid or keep their own files such as video and images from illegal trade and to try and stop software piracy. • Flexibility: If a website has been blocked by mistake, a user can adjust the settings to unblock such websites. • Safety: Help parents to protect their children against forbidden materials and that they can limit the content their children are exposed to. • Security: To block and keep customer information away from falling in the wrong hands and prevent information leaks from employees. • Web-based threats: Enables smooth internet surfing by blocking potential high risk websites. • Privacy: To prevent identity theft and protect your personal information.
Disadvantages	• Wrong sites blocked: Sometimes, some of internet filters can block a wrong websites based on constant rules. Safe websites can be blocked just because they contain one unsuitable keyword. • Certain sites not blocked: Sometimes, some of the internet filters act very idle. There is no warranty that internet filters will block all unsuitable contents.

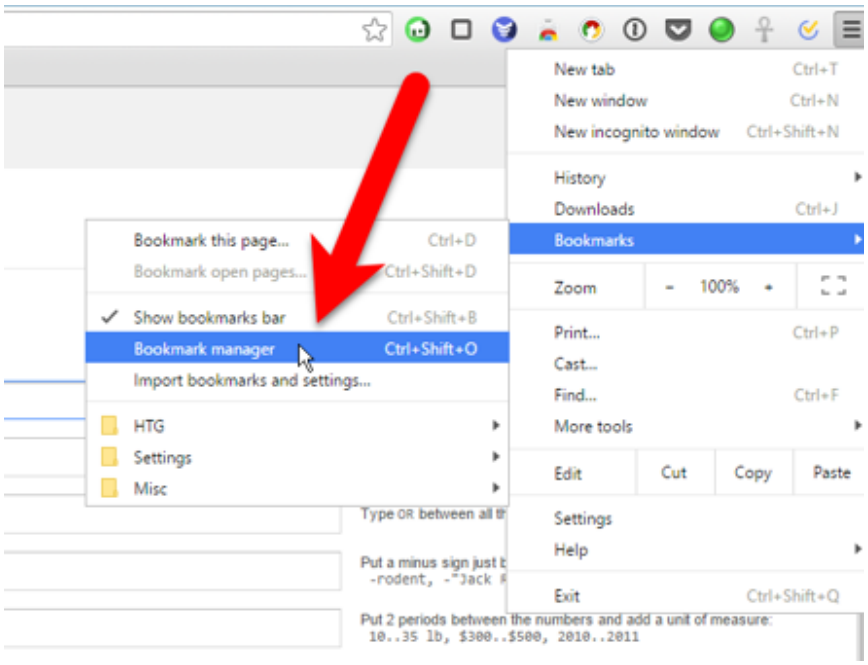
	• Non-banned sites: Filters sometimes block sites that have no threat in the workplace. • Number of websites: Websites are created and renamed at a fast pace and it almost impossible for filters to store and keep track of all information needed to filter internet contents. • Employee alternatives: The filtering of websites is not a definite block of the website, there are ways around it and the employees will try their best and find their way around the filter and access the websites. • Accidental access: Employees can make a mistake when they type in the URL or they may be redirected to another and the monitoring filters can pick it up and get the employee into trouble.
Limitations	• The amount of the filtering depends on the browser or the software that the user is using. • Filtering software can only reduce or limit the illegal use of computers, but not completely stop it. • The websites are measured against a certain set of filtering rules, but those rules can never be absolute because of the pace at which websites are created and renamed.
Reasons why someone would block a website or add a filter to the browser	• To avoid phishing websites. • To avoid spam bombarding your computer with adware and popups. • To add parent filters to the content their children watch. • To ensure that workers don't misuse their office resources for personal issues.
Examples of the technology in practice	Most antivirus programs use software filters to block unsafe websites to ensure safe online shopping and a virus- and spam free, browsing experience.

2. BLOGS/VLOGS	
Description – What it is	**Blog**: 'Blog' is an abbreviated version of 'weblog,' which is a term used to describe websites that maintain an ongoing record of information. A blog is a diary-type website that has the function of a journal and links to articles on other websites, usually presented as a list of entries in reverse chronological order. **Vlog**: A vlog (or video blog) is a blog that contains video content. The small, but growing, segment of the blogosphere devoted to vlogs is sometimes referred to as the vlogosphere.
Simple explanation of how it works	For both blogging and vlogging, all you have to do is find or generate content and videos that will be of interest to your audience, and post them on your blog or vlog. Promote your content or video blog. To gain an audience for your blog/vlog, you'll need to let the world know that it exists. You can do this through blog aggregation sites and search engines. You need to find a blog/vlog host website. This may be free or cost you money.
Advantages	• Express yourself and share your passions. • Share your knowledge. • Refine your writing skills. • Learn new things. • Build your professional network. • You can get more exposure. • Increases search engine traffic. • You can work as you like. You can do your work as you like at any time. • If you sell products or a service, you can make it available to your clients all time. • You can set your own revenue. As you give time and do your job you can earn as much as you like.
Disadvantages	• If you plan on scaling your business up or developing your own brand you will be disappointed when using free blogging sites like Wordpress and Blogger. • Posting personal information online can still be dangerous. • Certain blogs need to be private or require logins because of sensitive content. • Just asking or teaching someone to create a blog/vlogs will not lead to much interesting use. Blogs/Vlogs do not talk; people do once they have practice in the language or style of conversation that is needed for the blog/vlog.

Limitations	• The way blogs and vlogs are designed to move on to the next topic often limits further discussion and interaction on previous topics. • You also need to be aware that when you host your blog on a free blogging site you don't actually own it. Ultimately, it belongs to a business or corporation like Google and one wrong step can result in it being removed and with it your entire business. • Blogs and vlogs lack many important plugins that can improve the functionality of your site.
Relevance and impact on personal lives	• Bloggers and vloggers play a special role in creating opinions and sharing information in the world today. • Blogging and vlogging have become important tools for business and marketing because it can reach potentially large audiences. • It also it gives a sense of transparency in communication for the consumers.
Examples of the technology in practice	• Wordpress • Blogger • Weebly • Wix

3. BLUETOOTH	
Description – What it is	Bluetooth is a wireless technology that allows devices to communicate, or transmit data or voice, wirelessly over a short distance.
Simple explanation of how it works	A Bluetooth device works by using radio waves instead of wires.
Advantages	• **Widely** used. • **Feature simplicity**. You do not need to know much about technology in order to run Bluetooth. • **Free of charge.** • **Wireless**: You do not have to worry about finding the correct place to connect that extra-long cord. • **You're in control**: Even though you are able to exchange data across your cell phones, you still have the ability to keep your information private.
Disadvantages	• Battery drain. • Poor security. • Slow data transmission.
Limitations	• **Distance limitation**: Most Bluetooth devices, especially those that run on battery power, are Class 2 Bluetooth devices. Class 2 devices have a range of about 10 meters, or around 30 feet. • **Interference**: The Bluetooth signal was designed to change its frequency many times per second to reduce this interference, but if enough devices are trying to use the same small stretch of bandwidth, interference is inevitable.
Relevance and impact on personal lives	• With the new Bluetooth devices we can track almost every move that we make through devices such as fitness watches and smart watches. • This wireless standard may not be as well understood as Wi-Fi, 3G, or LTE.
Examples of the technology in practice	• Wireless mouse • Wireless keyboard • Wireless earphones • Wireless speakers • Hands-free kit in cars

4. BOOKMARK	
Description – What it is	A *bookmark* is a saved shortcut that directs your browser to a specific webpage, document or file. It stores the title, URL, and icon of the corresponding page. It is also sometimes referred to as 'Starred' or 'Favourites', depending on the browser.
Simple explanation of how it works	Most web browsers provide a bookmarking feature. A web bookmark is created by opening the desired web page and accessing the browser's bookmark menu. Browsers usually provide folder options for related bookmarks. For example, frequently visited sites about stocks and financial advice may be placed in a bookmark menu subfolder for easy reference. In addition, you can save your collection of bookmarks to third party websites so you can access them from anywhere on the web. They can then be shared.
Advantages	• Saving *bookmarks* allows you to easily access your favourite locations on the web. • If you participate in social bookmarking you can even share your bookmarks with your friends. • Google Bookmarks is a bookmark collection that is stored in the cloud by Google and can be accessed using any browser, not just using Google Chrome. 
Limitations	• *Bookmarks* only *bookmark* the top level pages of a website. A user is unable to *bookmark* any of the web pages viewed within a frame. • Unlike Google Bookmarks, Google *Chrome* bookmarks can only be accessed on Google Chrome.
Relevance and impact on personal lives	• It saves us time because we don't have to type in or know the URL of your favourite/frequently visited sites. • You can even bookmark a page that you visit less often, but would like to keep for future reference.

Examples of the technology in practice	

5. BROWSER PLUG-INS	
Description – What it is	A plug-in is an add-on for a program and adds functionality to that program. A browser plug-in allows you to listen to music and view animations, videos and other multimedia effects within your web browser. (TechTerms, 2018) Examples of plug-ins are Adobe Flash, Macromedia Flash, Apple QuickTime, Microsoft Silverlight, Windows Media Player and Adobe Shockwave Player.
Advantages	• Enhanced functionality without having to purchase any additional software. • Gives users easy customisability. • Paid plugins often include some type of support or installation assistance if necessary.
Disadvantages	• Not all programs use the same plug-ins. • It is hard to find support for an ill functioning plug-in. • If there is an update for the plug-in that is installed, it can throw off your personalisation of the software. • One plug-in is used by many users, which can lead to a security vulnerability, because some users have malicious tendencies when it comes to software. (BLUEPRINT, n.d.)
Limitations	• Some plug-ins are created for specific programs. • Plug-ins are created specifically for something, which makes its usage limited.
Relevance and impact on personal lives	Some websites cannot function without a plug-in, the plug-ins form an integral part of certain websites. For example interactive maps, content sliders, contact forms, and other dynamic or interactive content on a page.
Examples of the technology in practice	For example, a Photoshop plug-in (such as Eye Candy) may add extra filters that you can use to manipulate images. Browser plug-ins are a convenient way to expand the capabilities of the program.

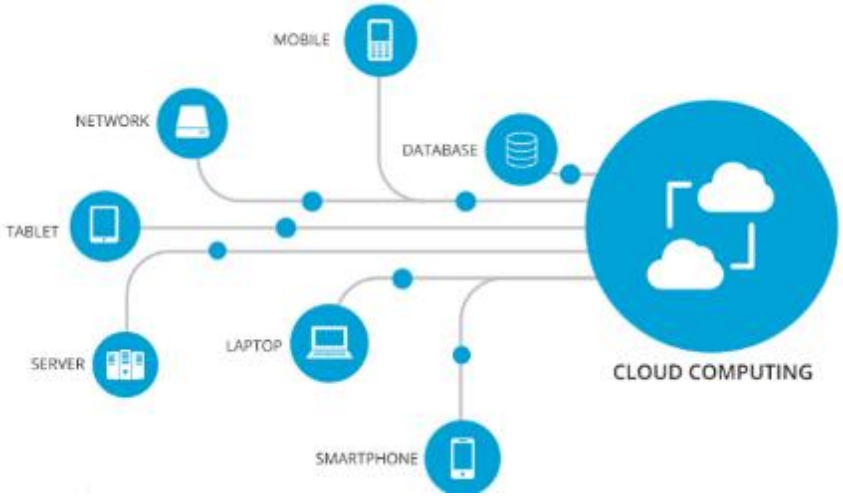
6. CAP, BUNDLE	
Description – What it is	• A *CAP* is the **limit** the ISP sets for customers on the amount of **data** used over a certain **period,** at a specified **speed** (or bandwidth) and specified **price**. • A *bundle* is a specific amount of **data** purchased from the ISP, which might **expire** after a certain period.
Simple explanation of how it works	Once the data cap has been reached (or if a data bundle has been used up) the ISP stops providing internet access.
Advantages	• User only pays for data they actually use. • It's easier to budget an exact amount for data usage each month. • Large data bundles are usually cheaper (per megabyte) than smaller bundles.
Disadvantages	• It can be expensive to purchase 'top-up' data after a cap is reached, or if a data bundle is exceeded. • Transfer speeds may be drastically reduced (or throttled) once the data cap is reached. • High data caps or uncapped connections can be expensive.
Relevance and impact on personal lives	• Streaming high-definition media or frequent downloading/uploading means the data cap can be exceeded quickly. • Smartphone apps can consume large amounts of mobile data, and may deplete data bundles quickly.
Examples of the technology in practice	• If you buy a 1 GB data bundle for R149, internet access will stop once that 1 GB has been used (or the data 'expires'). • A small business may have a 50 GB monthly data cap on their fibre internet line. Once 50 GB has been downloaded, they won't be able to access the internet for the rest of the month.

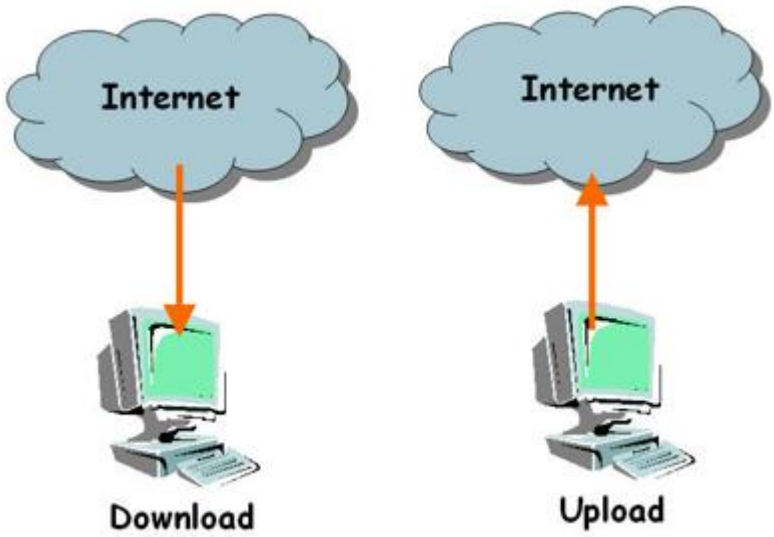
7. CHATROOMS	
Description – What it is	A chatroom is a web site or part of an online service that provides an online virtual space for users with a common interest to communicate in real time.
Simple explanation of how it works	Users communicate with each other through the internet in plain text or using graphics and sound. Most chatrooms have rules the user must obey hence it will have a moderator. Some chatrooms require a username and password allowing for privacy among the users.

Advantages	• Provides a platform for meeting and socialising with different people.
	• Allows you to express opinions and get other people's point of view.
	• Communicate instantly.
	• Attach files.
	• In a business organisation
	  ○ Provides a secure location for employees in a company to brainstorm.
	  ○ Have client conferencing.
	  ○ Customer support: a way to provide instant answers to customers.
	  ○ Distance training: Provides lower costs and easier to schedule dates for employee training.

Disadvantages	• One cannot access it if there is no internet connection. • Can be addictive and cause a lot of wasted time or anti- social behaviour with people around you. • People pretend to be someone else and you may fall prey to stalkers and paedophiles. • You could be threatened online by cyberbullies. • Communication barriers: remarks may be misinterpreted.
Limitations	• Without an internet connection you cannot chat. • Private chatrooms need usernames and passwords.
Dangers of chatrooms	• Predators target chatrooms to befriend children, posing as another child and gain trust to trap them into meeting them in person. • Bullies use chatrooms to find victims to bully and say harmful things. • Chatrooms can be used as a link for pornography. • People may share personal information that may be used for identity theft.
How to stay safe in chatrooms	• Never give out personal details. • Don't send your photo to anyone or pictures without the author's permission. • Don't open attachments from anyone. • Stay in the public chatroom. • Don't meet up in real life on your own.

Relevance and impact on personal lives	• People get to be informed instantly as they have the platform to interact with the organisation. • Provide lower costs and it saves money for transport. One does not need to physically go to a particular area but can use chatrooms.
Examples of the technology in practice	• Twitch: A place for video gamers to meet and chat. • Badoo: Making new friends. • Rawr: Allows chat via a 3D avatar on a mobile device. • ICQ: A chat platform to make new friends.

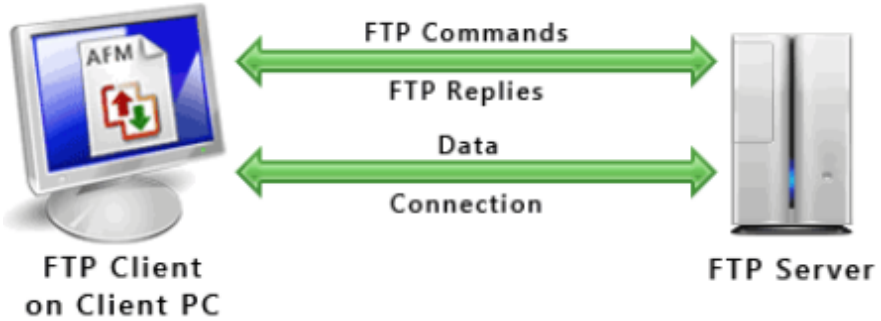
8. CLOUD COMPUTING	
Description – What is it	**Cloud computing** is using storage, software and other resources from remote servers on a network through the internet. 
Simple explanation of how it works	**Cloud computing** offers users and businesses access to digital resources over the internet from anywhere in the world. The most common example of such a resource is a web-based e-mail account such as Yahoo! or Gmail. When accessing these e-mail accounts, a user logs onto a remote server (such as Gmail) to access files and e-mails stored on their server.
Advantages	• **Accessibility**: You can access your documents anywhere from any device as long as internet access is available. • **Cost saving**: No need to install applications, as they are available online. • **Storage space**: No need to use your device's storage space as you will be using the online storage facility. • **Backup**: Cloud computing serves as a backup for your data and information.
Disadvantages	• **Security**: Your information is stored on servers that are accessible to many other users in the world. • **Privacy**: There is a risk that unauthorised users could access your information. • **Downtime**: If a cloud service provider is offline, you will not be able to access your data. • **Internet access**: If there is no internet access, you cannot access the server. • **Data cost**: Since data is used for upload, download and usage, data costs could be high.
Limitations	• **Data usage**: Users need data to upload/download files or access online applications. • **Limited control**: A user has limited control over the hosting server where the information is saved.
Examples of the technology in practice	Refer to: *https://www.youtube.com/watch?v=q2irjDC415I*

9. DOWNLOADING/UPLOADING	
Description – What it is	**Downloading** is the transmission of a file from one computer system to another. From the internet user's point-of-view, to download a file is to request it from another computer (or from a web page on another computer) and to receive it. **Uploading** is the process of moving digital files such as photographs or documents from your computer and placing them on to a central server so that someone else can retrieve them or to a website so that others can see them. 
Simple explanation of how it works	**Downloading** is a process that allows you to access and place a copy of certain files (that were **uploaded** in the server) onto your hard drive. The client requests the file, and the server sends a copy to the client. Broadband **upload speeds** are generally much slower than **download speeds**. The reason for this is that people generally do far more downloading than uploading (most files are located on internet servers), and as such downloading is given priority by Internet Service Providers (ISPs).
Advantages: Download	• If you are paying for software, you can have instant access to be able to download it. • You can download music, videos etc. at any time and you get it (almost) straight away.
Advantages: Upload	• Files could be e-mailed to various recipients, instead of sending it individually through the post office. • Cheap way to transfer files. • Relatively fast method of transferring files.
Disadvantages: Download	• If you are able to download software, there could be a possibility of that software having a virus attached to it. • You could run the possibility of receiving pop-ups that are not appropriate.

Disadvantages: Upload	• Not suitable for large files – Limit on maximum size of attachments. • Restrictions on the number of recipients you can simultaneously send an e-mail message to, as a way of trying to prevent spam.
Relevance and impact on personal lives	• Unauthorised downloads have a negative impact on e.g. recorded music sales, movies etc. • File sharing raises copyright issues and has led to many lawsuits.
Examples of the technology in practice	• Each time you visit a web page on the internet, you **download** the information on the page, including any pictures, to your computer. The term download is often associated with pictures, songs, videos, and programs. • If you want to share something on the internet, or have a personal web page, you would **upload** the files to a computer or server connected to the internet. FTP is the most common method of uploading files.

10. FILE SHARING	
Description – What it is	Alternatively referred to as **file swapping, file sharing** is the accessing or sharing of files by one or more users.
Simple explanation of how it works	File sharing is performed on computer networks as an easy and quick way to transmit data. For example, a user may share an instruction document on his computer that is connected to a network allowing all other employees to access and read that document.
Advantages	• **Convenience**: File sharing makes the task of accessing the piece of information easy, convenient and fast. • **Reduces costs:** Since the organisation is not required to be at the physical location that store, share and maintain the files, the money that would have been used to maintain the building is saved. Therefore the operational expenses of the business are reduces. • **Reduced storage space**: File sharing reduces the amount of storage space that a business should have to have space for all of the files it requires. • **Improved data integrity**: The access of the files via a file sharing location and especially when all the necessary precautions are taken, improves the reliability of the data.
Disadvantages	• **Increased insecurity:** File sharing lends itself to security breaches. This could be in the form of unauthorised access (hacking), worms, viruses and phishing. • **Plagiarism/Violation of Copyright laws:** This is the practice of taking up other people's ideas and using them as your own. • **Loss of privacy:** File sharing may lead to the increased loss of privacy of individuals or the company. Files can be easily accessed by a third party. These pieces of information can be used against the company at a later stage.
Limitations	• The number of items that can be uploaded/downloaded. • The size of the file that can be uploaded/downloaded. • Character limit for files and folders.

Relevance and impact on personal lives	• File sharing apps are used in everyday life to send and receive videos, songs and pictures. • It is also used to download files from the internet via applications such as BitTorrent, uTorrent and FrostWire. • Money is spent on data, thus wasting more money than expected.
Examples of the technology in practice	• ShareIt • BitTorrent • uTorrent • FrostWire • Xender

11. FTP (File Transfer Protocol)	
Description – What it is	FTP is short for File Transfer Protocol. A protocol is a set of rules that networked computers use to talk to one another. And FTP is the language that computers on a TCP/IP network (such as the internet) use to transfer files to and from each other (PSTATZ, 2010).
Simple explanation of how it works	You use an FTP client (software) to log into an FTP server, navigate the server's folder structure, and exchange files (PSTATZ, 2010).
Advantages	• No file size restrictions. • Good security (use of username and password). • Transfer time can be scheduled (for when network is less 'busy'). • Can be faster (esp. for larger files).
Disadvantages/ Limitations	• Often used to share pirated content. • The average user doesn't know how to use FTP. • FTP transfers are not encrypted and can therefo.re be intercepted (FTPS addresses this problem). (Pot, 2016)
Relevance and impact on personal lives	Large files can be sent electronically to another person, as the size is not limited as with e-mail. FTP transfers aren't encrypted, so it's relatively easy to intercept files for anyone capable of packet sniffing. For this reason, many people use FTPS instead. This essentially works in the same manner as FTP, but encrypts everything, meaning prying eyes can't intercept files. (Pot, 2016).
Examples of the technology in practice	Example FTP client: FileZilla. A web browser can also be used to download files off an FTP server (PSTATZ, 2010). Many public servers on the internet allow users to log in and download files via FTP by connecting anonymously. This is a very common practice in the world of open-source and freely distributed software (PSTATZ, 2010).  FTP is, for web developers, a way of moving information from the computer you're working on to the server where a website is hosted. If you want to install WordPress on a web server, for example, you're going to need FTP to copy the files over (Pot, 2016).

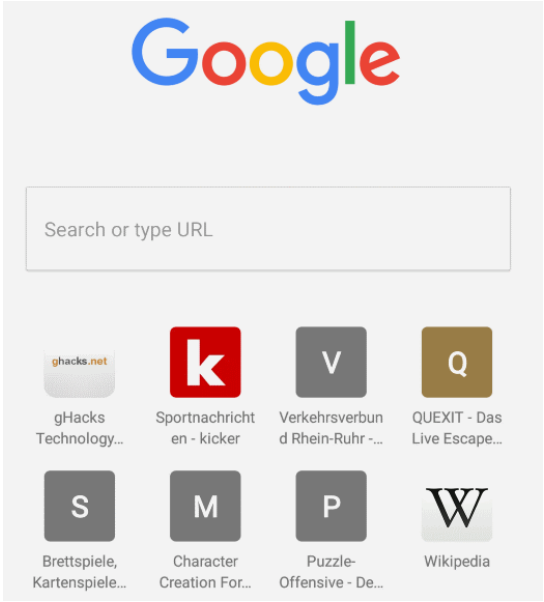
	It's also occasionally used as a way to share files. One person may upload a file to an FTP server, then share a link to it with another person. This sort of usage has become less common in the age of easy-to-use cloud services, but some people prefer to have their files hosted on a home server, and use FTP to enable that (Pot, 2016).

12. GOVERNMENT INTERNET SERVICES AND INFORMATION SUCH AS TAX RETURN, TV LICENSE PAYMENT AND ELECTION INFORMATION	
Description – What it is	Governments of countries provide online services to citizens. This improves the services that governments provide to citizens. The purpose of e-Government is to make government services more accessible online, reduce the cost of accessing those services, streamline administrative processes, improve turnaround times, and strengthen accountability and responsiveness. (Sita, 2017)
Simple explanation of how it works	Some of these internet services include: • Tax returns can be completed and submitted. • Television license renewals. • Election information is available. • Information about education is available on the Department of Basic Education's website. • Banking can be done online. • Matric results are made available.
Advantages	• Communication between government and citizens is easier and quicker. • Citizens can access these services anywhere where internet access is available. • No need to stand in queues. • Immediate feedback is provided. • Information is up to date. (Computers, Part of your life, 2015) • Improvement of green computing.
Disadvantages	• Many people don't own computers, and can't use it. • More data is used. • Not necessarily safer due to many viruses that can be spread through the internet. • Dependent on internet access.

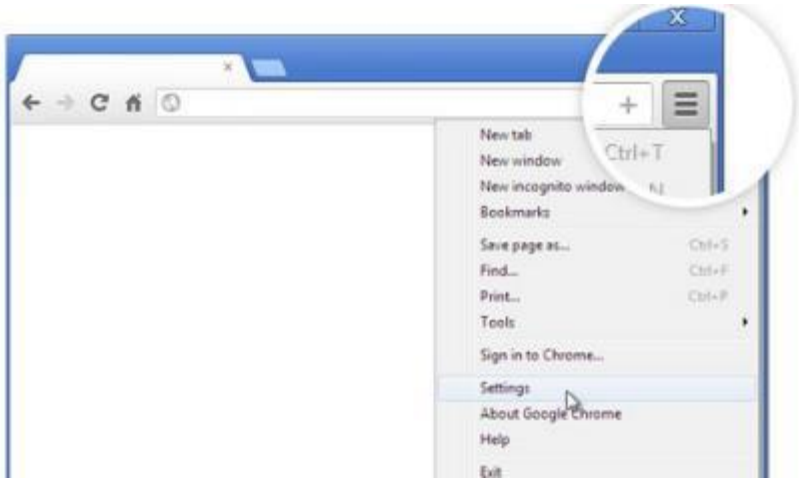
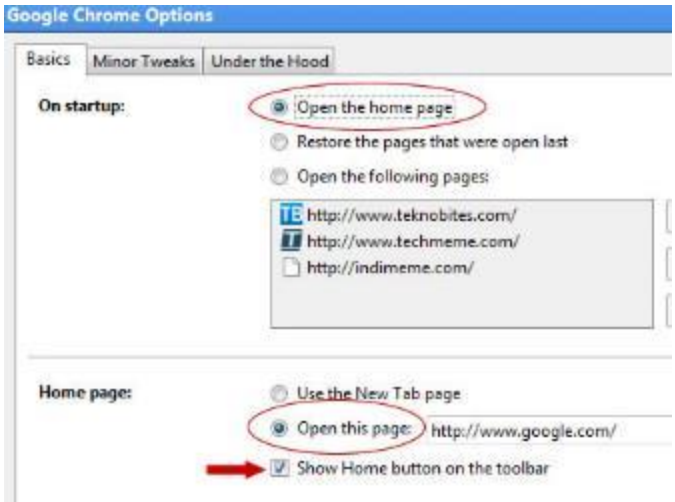
Relevance and impact on personal lives	• For many people it is more convenient to access services on the internet. • The Digital Divide (the difference between people who have easy access to the internet and those who do not) becomes more noticeable.
Examples of the technology in practice	• SARS e-filing • SABC TV Licences

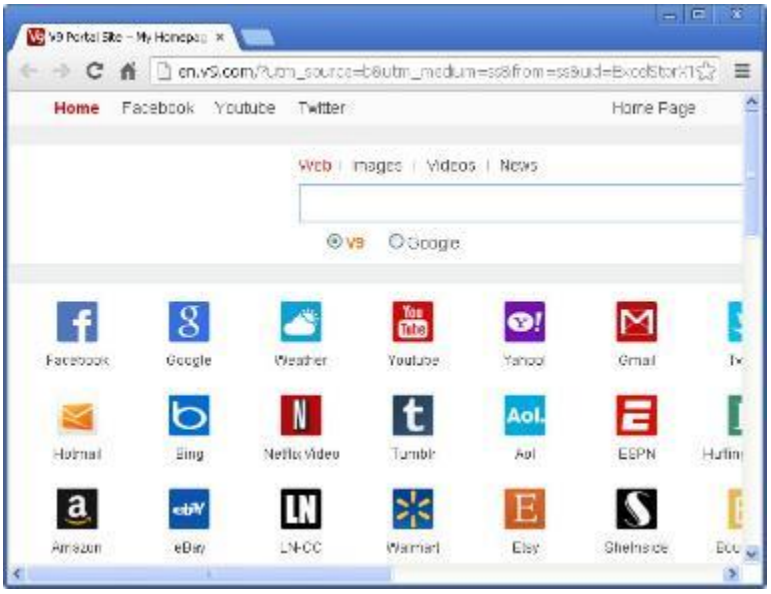
13. GPS (GLOBAL POSITIONING SYSTEM)	
Description – What it is	**GPS** is a device that is capable of receiving information from GPS satellites and then calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions.
Simple explanation of how it works	GPS is a system. It's made up of three parts: satellites, ground stations, and receivers. Each satellite transmits a signal to a ground station to allow GPS devices to decode and calculate the exact location of the satellite. GPS receivers use this information to calculate a user's exact location.
Advantages	• The most attractive feature of this system is its 100% coverage on the planet. • GPS is used for navigation as it shows you direction to reach to your destination. • Depending on which device you use, your GPS may provide weather and traffic alerts. These alerts inform you of adverse weather or traffic conditions. • Due to its low cost, it is very easy to integrate into other technologies like smartphones. • The system is updated regularly. • A GPS can be used produce maps of geographical areas.

Disadvantages	• Over time, road names change and new roads appear. Because of this, your GPS may provide incorrect directions. • A smartphone navigation system only works where you have wireless or cellular service. • If you are using GPS on a battery operated device, there may be a battery failure and you may need a external power supply. • Sometimes the GPS signals are not accurate due to interference such as buildings and trees.
Limitations	• Setup errors may cause directions to not be to the need of the user. • The biggest cause of errors in the use of GPS is input errors. It is very easy to transpose two numbers.
Relevance and impact on personal lives	• GPS sensors can be placed on objects to track them. This is useful for fleet vehicle management, experiments and finding missing persons. The horse racing industry uses GPS sensors to deliver real-time data during races. • The ability to set specific coordinates from a remote location helps keep civilians in wartime cities safer as warnings can be issued to evacuate. • Soldiers can navigate themselves away from dangerous situations with suggested routes and maps of specified locations. • As long as a missing person's mobile device is powered on and GPS is enabled, law enforcement can ping the device to obtain a general location. • Updated GPS systems are able to accurately direct a driver on a safe route, without showing roadways that don't really exist or roadways that are not complete. (Agrawal, 2017)

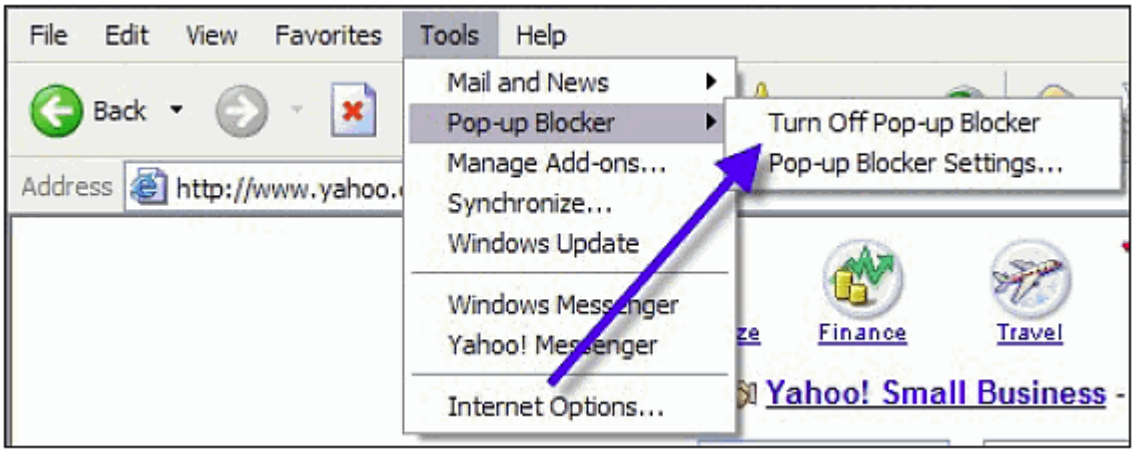
14. HISTORY AND FAVOURITES	
Description – What it is	In computing, the web browsing history is the list of web pages a user has visited recently—and associated data such as page title and time of visit. Because some web browsers save frequently accessed websites as bookmarks, and others as favourites, the terms 'bookmarks' and 'favourites' are often used synonymously. Favourites are also used in other applications besides web browsers. For example, media players often include a favourites list, which allows users to store references to favourite audio and video files in a single location. Windows also has a 'Favourites' folder, which is used to store both favourite webpages and favourite files. You can often identify a Favourites folder by a star or heart icon. Most applications allow you to simply drag items into the Favourites folder to add them to your favourites. The purpose of a favourites folder is always to provide easy access to frequently used items.
Simple explanation of how it works	Every time you go online from your computer, your browser saves a copy of every page that you visit. Whether you use Chrome, Firefox, Safari or any other browser —the browser keeps track of where you've been and a history of the pages you've seen. On all browsers, 'History' is one of the drop-down menu choices across the top of the page, along with other choices such as File, Edit, View, Bookmarks and a few others. The History feature keeps tabs on your internet browsing for as long as you're online.
Advantages	Browser application designers realised that people needed a way of knowing where they'd been and what they'd read or seen online over a long internet session. And over time, they added helpful features to the History feature. Your browser can also be set to display shortcuts to the most recently visited websites when you select a new tab. 

Disadvantages	It can be an invasion of your privacy if someone gets access to your computer and actively (or accidentally) searches your history.
Limitations	• You can choose to browse the web in Incognito or Private mode, but it isn't completely anonymous. Pages you view in Incognito tabs won't stick around in your browser's history, cookie store, or search history after you've closed all of your incognito tabs. Any files you download or bookmarks you create will be kept. • However, you aren't invisible. Going Incognito doesn't hide your browsing from your employer, your internet service provider, or the websites you visit. • There are two types of privacy to consider: local privacy and online privacy. Only your local privacy, what people can see on the computer where your browsing takes place, is effected by switching to incognito mode. Your online privacy is not impacted in any way.
Relevance and impact on personal lives	• You can choose to clear your browser's history or browse privately, but you might not be able to find a Web page again. That could haunt you when you're looking for that ONE recipe you saw the day before for chocolate cake that was the most delicious thing you've ever seen. Good lucking finding it out of the other 10,300,000 recipes for chocolate cake

15. HOME PAGE SETTINGS	
Description – What it is	Home page can refer to the home page of a website or the home page of a web browser. The main page of a website is called the 'Home page'. This page displays navigational links to categories that are part of the site as a whole. This home page gives the user an anchor point from which they can choose to explore the rest of the site and then return to as a starting place when they have found what they were looking for. For a web user, the home page is the first web page that is displayed after starting a web browser like Google Chrome or Firefox. The browser is usually pre-set so that the home page is the first page of the browser manufacturer. However, you can set it to open to any web site. When you access your web browser's home page settings, you will probably choose which website you want as a landing page when you open your browser. You can also choose to open your browser on the last page you visited.
Simple explanation of how it works	 

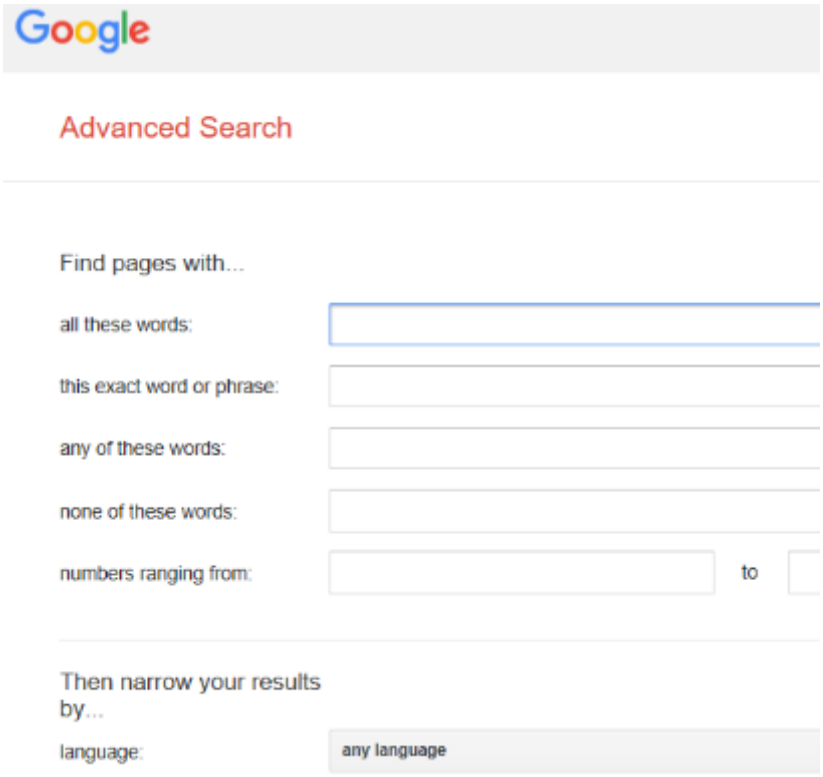
Advantages	• You can customise your web browser to suit your individual needs.
Relevance and impact on personal lives	• When you are signed in to your internet account, your browser can even remember your preferences in terms of language etc.
Examples of the technology in practice	You can also add extensions to your browser or make use of online services to customise your homepage even further. 

16. PODCAST/VODCAST	
Description – What it is	**Podcast**: A podcast is an audio produced, delivered over the internet in a digital format and designed for playback on computers or portable digital audio players, such as the iPod. **Vodcast**: A vodcast is a podcast consisting of video recordings, instead of audio.
Simple explanation of how it works	Podcasts and Vodcasts are digital audio or video files which a user can download and listen to. It is often available for subscription, so that new episodes are automatically downloaded via web syndication to the user's own local computer, mobile application, or portable media player.
Advantages	• Podcasts make information personal. • Podcasts and vodcasts are convenient and easy to use. • Podcasting and vodcasting are time-efficient forms of communication. • Podcasting and vodcasting is an on-demand technology.
Disadvantages	• Those with slower connections may find it difficult to download audio files; depending on the podcast's audio format, it may not be playable on all media devices. • Using or accessing podcasts and vodcasts at work or school could impact on individual productivity.
Limitations	• Some communities and people might not have access to technology to access podcasts and vodcasts. • In educational or other environments, it can be time-consuming to check or verify podcast and vodcast content before publishing. • The audio and video files are not always easily sharable. • Although there are many search engines to do searches it is not possible to search specific content inside a video or audio file.
Relevance and impact on personal lives	• Podcasts and vodcasts seem to be a valuable tool to students to learn new content. It has therefore an impact on student learning as a new and useful tool to facilitate learning. • It is a practical way of distributing technology to share information.
Examples of the technology in practice	• Teachers distributing audio (podcast) or video (lessons) on a weekly basis to their students. • ITunes Podcast – ITunes Charts South Africa. • Successful Dropout Podcast – focus is on incredible young individuals/entrepreneurs from all over the world that are performing well in their area of business and are doing so WITHOUT a university degree.

17. POP-UP BLOCKER	
Description – What it is	A pop-up blocker is software that prevents pop-up windows from appearing on a website.
	
Simple explanation of how it works	Websites advertise products or features while you are busy on your smartphone or browser.
Advantages	• No unwanted advertisements appear. • Protects your computer from viruses. • You can filter what pop-up ads you want to see.
Disadvantages	• You may not be able to move to a next webpage if the website uses pop-ups to move forward or backwards. • Online marketing of shops decrease. • A person only sees and browses what they know.
Examples of the technology in practice	• Pop-Up Stopper • Pop-Up Defender • Pop-Up Zapper

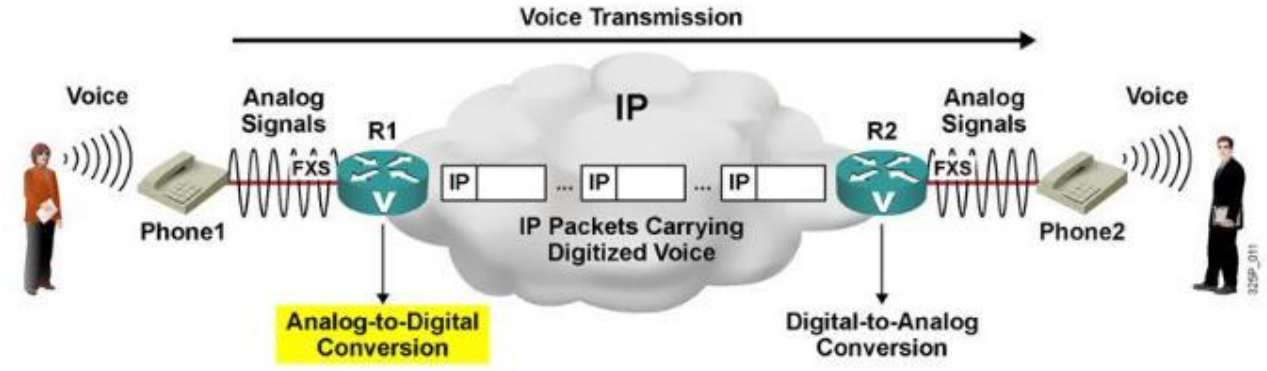
18. RSS FEEDS	
Description – What it is	RSS stands for Real Simple Syndication and it allows users access to updates to online content. They are simple text files that contain updated information on various topics.
Simple explanation of how it works	You can download RSS readers. These readers automatically update, and the new content appears on your browser. Users can decide which sites will send updates.
Advantages	• Saves time as user can quickly scan without visiting website. • Updates automatically. • Unsubscribing is easy. • Good alternative to social media if you only want updates without a social media account.
Disadvantages	• Content easily copied. • Difficult to track subscribers to RSS feeds. • Graphics and photos do not appear on RSS feeds.
Relevance and impact on personal lives	Nowadays RSS feeds have taken a different form of sharing, through social media.
Examples of the technology in practice	• CNN • BBC news • Sports Illustrated

19. SEARCH ENGINES	
Description – What it is	A search engine is a website that allows you to type in a keyword or a phrase and then searches through the internet to find websites that contain the keyword or phrase. A list of websites is then returned to the user.
Simple explanation of how it works	A search engine creates an index of webpages using a program called a 'web crawler'. This automatically browses the web and stores information about the pages it visits. Every time a web crawler visits a webpage, it makes a copy of it and adds its URL to an index. Once this is done, the web crawler follows all the links on the page, repeating the process of copying, indexing and then following the links. It keeps doing this, building up a huge index of many webpages as it goes. (BBC, 2018) The information that the web crawler puts together is then used by search engines. It becomes the search engine's index. Every webpage recommended by a search engine has been visited by a web crawler. Search engines sort results to show you the webpages they think are the most useful. The more hits a webpage gets, the more useful it would seem to a search engine.
Advantages	• A search engine performs searches at high speeds. • Search results provide a huge variety of information. • Advanced search options allow you to refine your results. • Text, audio and video is provided with search engine results. • Knowledge is gained through the use of search engines. • People become more efficient, since information about anything needed is readily available.
Disadvantages	• If searches are not specific, information overload can take place. • People become addicted to search engine, and therefore don't memorise facts. • Results provided are not evaluated for quality. • Results are not sorted by order or relevance, but rather by order of indexing.
Limitations	• Results may not be accurate. • Search engine rankings are frequently inaccurate.
How to perform effective searches	• Use specific keywords. • Use OR, AND, NOT operators to search. • Exclude irrelevant words such as the, and, where, what. • Use synonyms if the search is not successful. • Search for similar words by using the ~ operator, e.g. old~. • Make use of exact phrases. • Use advanced search options or search engines e.g. file types.

	
Examples of the technology in practice	

20. SOCIAL NETWORKS	
Description – What it is	The practice of expanding the number of your business and/or social contacts by making connections through social media sites.
Simple explanation of how it works	Social networking establishes interconnected online communities which help people make contacts that would be beneficial to their social or professional development.
Advantages	• Social networking allows for worldwide connectivity. Whether you choose to communicate with someone in the next room or someone across the world, social networking makes it possible. • It brings people together who share common interests. Groups are formed between people with similar interest on various social media sites making it easier for them to share their ideas. • Social networking makes the share of information easier and more effective. • It's an inexpensive form of advertising. Since adding contacts on social media is so easy to do on social networking, advertising is literally at your fingertips. An advert posted on social media can be shared countless times within minutes at no additional cost to the advertiser. • News is shared and distributed at a higher speed. A news blog will be shared and distributed much easier than possible in printed form and since even more people use social media than those who watch news on TV, it is even a more effective way of distribution.
Disadvantages	• Since interacting on social media is indirect, it makes bullying and terrorising someone much easier to do. • Children of all ages are exposed to social media and since it is difficult to ascertain the precise age of the user, it is difficult to protect children against the effects of cybercrime and cyber bullying. • Since people tend to put all of their personal information on social media, there is a higher risk of fraud or identity theft. • People tend to waist a lot of time on social media when they could be busy with more protective actions. Many businesses lose a lot of productivity due to people spending time on sites like Facebook, Twitter and Pinterest during working hours. • Privacy is no longer sacred. People post their personal photos, interest, accomplishments and even failures online for everyone to see, making privacy impossible.

Limitations	• Since you can only see what the person on the social media site wants you to see, you never know if what is posted is true. • The information posted on social networking will never be completely secure as any online data is susceptible to cyber terrorism.
Relevance and impact on personal lives	• As we are part of a technologically developed world, social networking forms a part of out daily lives and is impossible to avoid. Staying away from social media does not necessarily protect you as others may post and communicate on your behalf without your knowledge. You can simply do your best to manage and monitor how you use social media, using it to your advantage and staying away from that which may endanger you.
Examples of the technology in practice	• Facebook • Twitter • WeChat • Instagram • Snapchat • Pinterest • YouTube • LinkedIn • Skype • Tumblr • Messenger • Google+

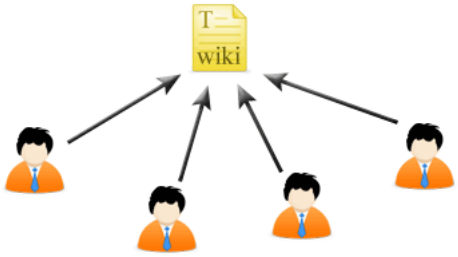
21. VIDEO CONFERENCING	
Description – What it is	An online meeting (or a meeting over distance) that takes place between two or more parties, where each participant can see an image of the other, and where both parties are able to speak and listen to the other participants in real time. Each participant must have a webcam, a microphone and speakers linked to their computers and the necessary software e.g. Skype.
Simple explanation of how it works	If you're sitting in front of a monitor in a video conference and you communicate through that screen, your video and sound is going into the software in analogue form. It is then transformed into digital form. When the digital message (that you sent on its way) gets to the receiving end (the person you are talking to), the message is then transformed back to the analogue form to be heard and seen through the receivers, speakers, and screen. Video conferencing makes use of VoIP.
	
Advantages	• People you are communicating with are visible. • Many people can participate in a video conference simultaneously. • Cheaper than normal phone calls or travelling to a meeting.
Disadvantages	• You need a fast internet connection. • You use a lot of data (cap) especially when using video.
Limitations	• It is still an imperfect substitute for face-to-face communication. • There is a short time lag between speaking and receiving a response that can disrupt the natural flow of a conversation.

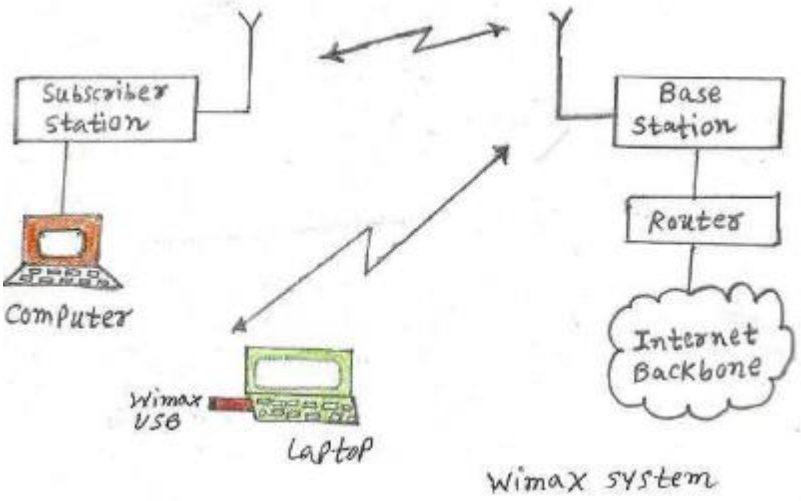
Relevance and impact on personal lives	• **Impact on education**: Video conferencing provides students with the opportunity to learn by participating in a two-way communication platform. • **Impact on employees**: Video conferencing helps reduce employee burn out since employees do not have to travel in order to perform their duties. • **Impact on communication**: It can humanise your communication by eliminating the coldness of e-mail and the often-misinterpreted thoughts of instant messages.
Examples of the technology in practice	• A human resources officer could interview a job applicant • Staff or board meetings which are regularly conducted in multiple locations can benefit from making use of a videoconference.

22. VOIP (VOICE OVER INTERNET PROTOCOL)	
Description – What it is	VoIP (voice over IP) is the transmission of voice and multimedia content over Internet Protocol (IP) networks (Rouse, 2017). This allows you to make telephone (voice) calls over computer networks such as the internet.
Simple explanation of how it works	 VoIP converts audio into data packets, transmits them across an internet Protocol network and converts them back into audio at the other end of the connection. VoIP can be used on dedicated VoIP phones (telephone sets that only needs an internet connection – not a PC/device) or VoIP applications (called a softphone app) running on PCs and mobile devices (Rouse, 2017). To make a VoIP call you need a stable internet connection and a device with a microphone. If you wish to transmit video as well, a webcam is required.
Advantages	• Lower cost than a telephone call/Cost is the same irrespective of the distance. • Can be used on a wide variety of devices/VoIP-capable devices are readily available. • Video can be used during the call/Facilitates video conferencing/Saves travel costs. • Additional functionality of software e.g. file sharing, instant messaging, screen sharing capability of Skype. • Don't need to worry about Service Provider/SIM card issues between different countries and continents.
Disadvantages/Limitations	• Internet connection is required (so although the software and the actual call is free, there are still data costs involved). • Both users need to use the same software. • Call quality is dependent on internet connection speed. • Can use a lot of data (especially if video is used).
Problem solving	• The sound quality of a VoIP call can be improved by limiting bandwidth use of all other applications and devices on the connection (check that nothing else is downloading/streaming in the background). • Video can also be disabled to improve call quality. • (Skype specific) use the test call service to test that your speakers and microphone are working before you make a call. • If the other side can't hear you, check that the correct recording device is selected and enabled (e.g. using the correct microphone – built in on a laptop/stand-alone mic/on a headset/built into a webcam)

Relevance and impact on personal lives	• Many large companies use VoIP to reduce their monthly telephone bill. • Personal individuals use it to stay in contact with family and friends worldwide. • Gamers use it to chat – strategising and staying in contact while they play in teams online.
Examples of the technology in practice	Skype, WhatsApp call, Hangouts, Viber, TeamSpeak, Discord.

23. WI-FI HOTSPOTS	
Description – What it is	• A Wi-Fi hotspot is a **zone** or **area** where you can connect **wirelessly** to a network with internet access. • Many businesses offer Wi-Fi hotspots to attract more customers. • Wi-Fi hotspots are found all over the world at restaurants, shopping malls, airports, inside trains, hotels and other public spaces.
Simple explanation of how it works 	• Most mobile devices will notify you of available Wi-Fi hotspots nearby. • Wi-Fi hotspots are generated by WLAN wireless routers, which are called 'access points'. • Users often have to login or pay before connecting to hotspots. • Once connected to the Wi-Fi hotspot, you will have internet access as long as you remain within range. • Some Wi-Fi hotspots are open (no security code needed), and some Wi-Fi hotspots can only be accessed once you enter a security key.
Advantages	• Many Wi-Fi hotspots are free. • No wires or plugs are needed to connect. • Can access the internet in foreign countries without a local SIM card. • Convenient internet access.
Disadvantages	• Slower than wired networks. • Weak signal strength/limited range. • Devices need Wi-Fi capability to connect. • Cybercriminals can access mobile devices and hardware connected to Wi-Fi hotspots. • In some cases the cap allowed is limited.
Limitations	Wi-Fi hotspot access points have a range of about 20 metres indoors. This can be increased by using devices called 'range extenders' or 'boosters'.
Relevance and impact on personal lives	It has become far easier to 'stay connected' while shopping or travelling due to the availability of public Wi-Fi hotspots all over the world.
Examples of the technology in practice	• A hotel might offer guests free Wi-Fi in their rooms as an added luxury. • You can use your laptop to check e-mails at a coffee shop while connected to their Wi-Fi hotspot.

24. WIKIS	
Description – What it is	A website or database which is created by a community of users, allowing any user to add and edit content.
Simple explanation of how it works	If you are on a wiki page you can read what other people have written and by clicking on 'edit' you can change or add content.  Many wikis work in the form of questions and answers – you are able to 'post' your question and people are able to respond by 'commenting' – very much like social networks.
Advantages	• Allows people with similar interests to share information. • Available on a variety of topics. • Easy to access, make use of and contribute. • Information is updated and current. • Easy to create your own wiki.
Disadvantages	• Anyone can contribute, so information is sometimes accurate. • Internet access is required to access and use. • No-one verifies the accuracy of information. • Anyone can delete information from a wiki. • Language barriers could lead to misinterpretations or incorrect terminology or phrasing used.
Limitations	• Information is not always reliable.
Relevance and impact on personal lives	• Able to find information on just about any topic. • Quick and easy research.
Examples of the technology in practice	• **Wikipedia** – online encyclopaedia • **WikiTravel** – travel guide for destinations, hotels, etc. • **WikiHow** – offers solutions for everyday problems • **WikiBooks** – collection of user-edited, open-content textbooks and guides • **CookBookWiki** – recipes and cooking related
Interesting history	Ward Cunningham created the first wiki on 25 March 1995 called **WikiWikiWeb** which discussed software design patterns.

25. WI-MAX	
Description – What it is	Wi-Max (*Worldwide Interoperability for Microwave Access*) is a wireless communication standard for long-range wireless networking, for both mobile and fixed connections. It is similar to the Wi-Fi standard, but supports a greater range of coverage. A Wi-Max network can cover a range of up to 50 km.
Simple explanation of how it works	A Wi-Max tower is similar to a cell-phone tower. The receiver and antenna could be built into a laptop the way Wi-Fi access is today. 
Advantages	• Single station can serve hundreds of users. • Much faster organisation of new users comparing to wired networks. • Speed of 10 Mbps at 10 kilometres with line-of-site. • It supports very high speed voice and data transfer over longer distances. • It is considered to be cheaper alternative to broadband wired technologies. • Higher speed can be achieved.
Disadvantages	• Line of site is needed for longer connections • Weather conditions like rain could interrupt the signal. • The biggest disadvantage of Wi-Max is its installation and operational cost. Due to heavy structure, tower, antennas etc. makes the Wi-MAX network collectively high cost network. • Other wireless equipment could cause interference. • Wi-MAX is very power intensive technology and requires strong electrical support. • Big installation and operational coast.
Limitations	• If users are on the move like driving the download speed can drop significantly with Wi-Max. • Bandwidth is shared among users in a given range. If there are many users, they will have lower speed.
Relevance and impact on personal lives	• The impact is relatively small. Compared to other networks like fibre optics, satellite and cable, Wi-Max networks are relatively slow by comparison.

Examples of the technology in practice	• There are two types:
	  ○ Fixed Wi-MAX
	  ○ Mobile Wi-Max

SOCIAL IMPLICATIONS

IMPACT ON SOCIETY

1. APPROPRIATE COMMUNICATION ETIQUETTE	
Description – What it is	Appropriate communication etiquette is the way in which you communicate. In business you will have to be more professional. In personal communication you must also use certain ways of communication, for example you should not be rude on social media. In e-mail there are also certain rules to follow during written communication.
Simple explanation of how it works	Rules are followed during digital communications. Few rules of etiquette: **E-mail** • Do not send spam. • Communication should not contain spelling and grammar errors. • Use the appropriate case, e.g. not all words in capital letters. • Ensure documents sent through e-mail do not contain viruses. • Do not sent large attachments. • Be careful who is copied. • Ensure that the subject line is appropriate. • Keep formatting professional. **Social media** • Do not use unknown abbreviations. • Don't post updates every minute on social media. • Keep personal social networks separate from professional ones. • Do not post rude comments on social media. • Keep private information private.
Advantages	• Communication becomes more efficient. • Communication becomes constructive and friendly. • Using etiquette improves your reputation.
Disadvantages	• Not using etiquette rules in communication may have a negative impact on the reputation of a person.
Relevance and impact on personal lives	• Respect and trust is gained from other people when using the correct etiquette.

2. ARTIFICIAL INTELLIGENCE (AI)	
Description – What it is	Artificial Intelligence (AI) is the development of computer systems that are able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.
Simple explanation of how it works	***AI is a complicated science in which computers are programmed to:*** • recognise patterns and do mathematical analysis of • information that was collected from various sensors or • recognise patterns in big data • and take appropriate action such as to plan, learn, reason, solve problems and be self aware. ***AI is classified according to different levels:*** *Strong Vs Weak* Strong artificial intelligence is the genuine imitation of how humans think. Weak artificial intelligence aims to build systems that imitates humans but cannot think like humans. *Narrow Vs General* Narrow artificial intelligence are designed to perform specific tasks. General artificial intelligence are designed to reason. ***The field of AI encompasses:*** • Robotics • Control systems • Scheduling • Data mining • Logistics • Speech recognition • Biometrics
Advantages	• Machines are able to do calculations with greater accuracy and speed in applications where accuracy is of utmost importance. • Machines can perform work in hostile environments such as outer space and the ocean floor. • Machines do not get tired of repetitive, tedious jobs. • Machines do not needs breaks and do not earn a salary. • Machines can predict what a user will ask, search and do and can therefore act as an assistant.

Disadvantages	• The creation and implementation of AI is expensive. • Machines do not have emotions, moral values or human compassion. • Machines lack creativity and imagination. Large-scale replacements of humans with machines can lead to a high unemployment rate. • Humans can become too dependent on AI. • Is it ethically correct to recreate intelligence in human like robots?
Relevance and impact on personal lives	• IoT (Internet of Things) and home devices that will learn your behavioural patterns and predict your needs. • Robots can change the way we take care of the elderly and the frail. • Precision medicine will change the approach for disease treatment and prevention and will take into account individual variability in genes, environment, and lifestyle for each person. • Combining AI, IoT, driver-less cars and other technologies, we will live in smart cities which anticipates our needs. • Self-driving cars and transport computerisation will reduce the number of car owners, reduce traffic congestion and lessen parking areas. • AI will change the education system to be tailored to each individual's needs.
Examples of the technology in practice	• Gmail uses an application called Boomerang which enables you to control when e-mails are sent and received to take in account time differences. • The trained professionals from Brain.fm uses AI to write music that will put the listener into a specific state of sleep. • Spotify released their Discover Weekly playlist that mixes recommendations with deep learning. By analysing what you've listened to previously, Discover Weekly presents you with a personalised playlist full of music you're likely to enjoy. • Capitan is a smart shopping list application that learns as you use it, to save you time and to avoid those missed items. • Clarke.ai is an AI bot that dials into your conferences calls, takes notes for you and e-mails it to you afterwards. • Apple's Siri, Google Now, Amazon's Alexa, and Microsoft's Cortana are digital assistants that help users perform various tasks, like scheduling, searching the web and sending commands to another app. • Video game characters that learn your behaviour, respond to stimuli and react in unpredictable ways.

	• Prediction of online purchases before they are made such as used by Amazon and Target. • Large financial institutions use AI to detect fraud.

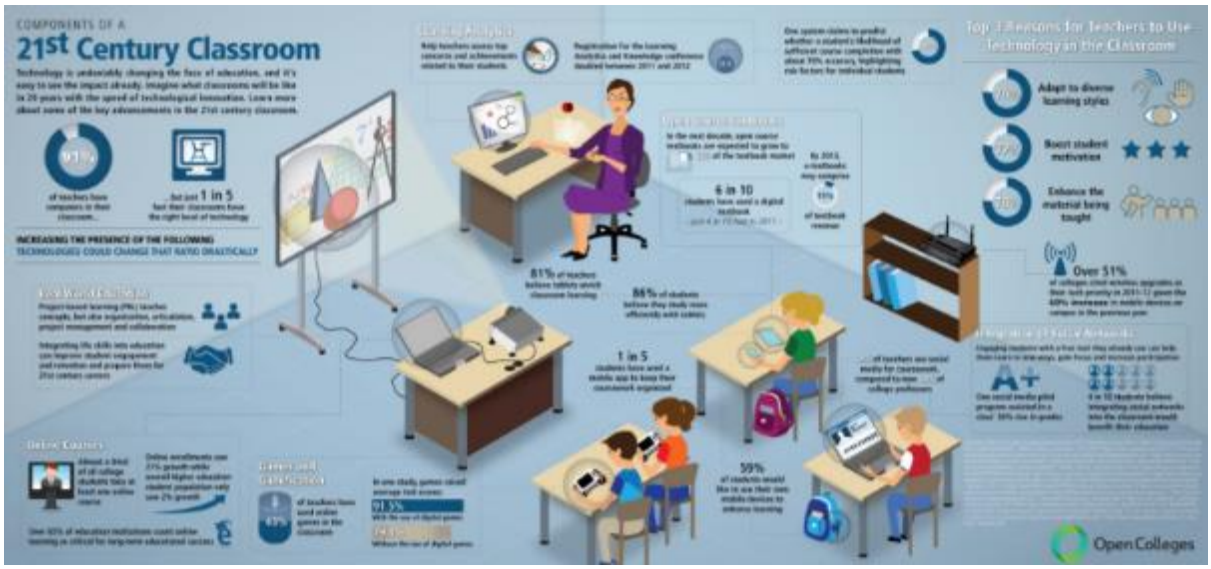


Figure A: https://blogs.technet.com/b/nzedu/archive/2013/01/07/collaboration-and-the-role-of-technology-in-the-21st-century-classroom.aspx

Figure B: https://www.cnbc.com/2017/02/17/lawyers-could-be-replaced-by-artificial-intelligence.html

3. DATA PROTECTION	
Description – What it is	Data protection is the process of protecting data from being corrupted or lost. It aims to strike a balance between individual privacy rights while still allowing data to be used for business purposes.
Physical protection of data	• Control access to physical data through biometric input. • Keep computers with private information locked in secure rooms. • Switch off computers when not in use. • Make backups offline and store it in a different location. • Do not let portable storage media lie around.
Protection of data with software	• Add usernames with passwords. • Control internet access. • Do not allow unlawful wireless access to a computer. • Encrypt data. • Make cloud backups. • Make regular backups. • Password protect documents. • Secure wireless transmission. • Protect data against viruses.
Protection of documents	• Add passwords to files. • Restrict editing to documents. • Protect, cells workbooks and worksheets.
Advantages	• If the computer becomes infected with a virus, no data is lost. • No need to pay a ransom if data is locked. • Valuable information is secure.
Disadvantages	• May cost money. • Data recovery may take time. • May need a lot of storage space.

4. DISTRIBUTED COMPUTING POWER	
Description – What it is	Distributed computing power uses a **network** of many computers, each accomplishing a portion of an overall task, to achieve a result much quicker than with a single computer. Distributed computing is any computing that involves multiple computers remote from each other that each have a role in a solving a problem or information processing. Distributed computing can be found anywhere: Intranet, internet or mobile computing (laptop, smartphones, smart watches). It includes hardware and software systems, that contain more than one processing/storage and run concurrently. Grid computing is an example of distributed computing.
Simple explanation of how it works	If a computer is not powerful enough to process a big task, the processing of the task is divided between many computers, for example thousands of computers connected to the internet. Each computer does a section of the processing. The combined processing power allows the processing of the task without buying expensive equipment. In distributed computing the computers are connected to a network and resources are managed by the single computer. Unlike grid computing, where the computer's resources are controlled by a powerful server.
Advantages	• Sharing of resources (saves time and energy). • Combination of cheap processors are often more cost-effective than one expensive fast system.
Disadvantages	• Multiple points of failures: the failure of one or more participating computers can result in disaster. • Security concerns – many computers will have access to the data.
Limitations	• Many different computers working together are difficult to manage especially if they don't run the same software. • Different processing speeds can lead to a bottleneck, as all computers will have to wait for the slowest computer.
Relevance and impact on personal lives	Most computers spend large percentages of their time in 'downtime', which means that they are not being used as effectively as they could be. By making use of a distributed computing system network, they will take that time and make it useful again by assigning large tasks that may take one computer many hours or days to complete and dealing with the task overnight. This will have a positive impact on our lives as the vast amount of data available becomes useful information without requiring any extra resources.
Examples of the technology in practice	• Grid computing and cloud computing are forms of distributed computing. • Seti@Home https://setiathome.berkeley.edu/ SETI@home is a scientific experiment, based at UC Berkeley, that uses internet-connected computers in the Search for

	Extraterrestrial Intelligence (SETI). You can participate by running a free program that downloads and analyses radio telescope data. • PrimeGrid http://www.primegrid.com/ PrimeGrid's primary goal is to advance mathematics by enabling everyday computer users to contribute their system's processing power towards prime finding. By simply downloading and installing BOINC and attaching to the PrimeGrid project, participants can choose from a variety of prime forms to search.

5. IMPACT AND USE OF SOCIAL NETWORKING SITES AND TECHNOLOGIES	
Description – What it is	Social media is the use of websites and applications to interact with other users, or to find people with similar interests to one's own.
Simple explanation of how it works	The most basic feature of a social networking site is the ability to create and share a personal profile. This profile page typically includes a photo, some basic personal information (name, age, gender, location) and extra space for listing your favourite bands, books, TV shows, movies, hobbies, web sites, etc.
Advantages	• People are developing social ties with the world that revolves around them. • People through active participation also raise their voices in order to express their opinions and views on social issues. • Keeping in contact with family and friends. • For professionals and academics, social networking sites allow users to create networks of like-minded people. • Communication costs are vastly reduced.
Disadvantages	• Social sites can also be a great distraction to employees and students who may show more interest in what their friends are posting than in their work, tasks and studies. • People may become addicted to social media and therefore neglect their personal and professional lives. • You can become victim of hacking. • Through fake profiles you can be victimised by cybercriminals. • Children may be vulnerable to the practice of cyberbullying driving some to suicide. • Social media sites can make it more difficult for us to distinguish between the meaningful relationships in the real world, and the numerous casual relationships formed through social media. • Inappropriate images posted may disadvantage employees if an employer does a background check (privacy) on social media.
Limitations	• Users are prone not be as careful on social media as they are in real life. • Posts are permanent. • Though users can control who see their postings, such limitations can be difficult to control.

Relevance and impact on personal lives	Social media has changed the way people interact. In many ways, social media has led to positive changes in the way people communicate and share information; however, it has a dark side, as well. Some of the negative impacts include: • Negative effects on personal communication. • Many people become addicted to social media. • Some people may confuse their social media life with their real life. • Negative health consequences of prolonged practice of social media. • Encouraging poor grammar and spelling. • Allowing the spread of misinformation. • Exposing children to online predators. • Creating a culture in which a poorly thought-out comment can cause irreparable harm to someone's reputation. • Decreasing productivity as workers check social networking sites when they should be working. • Providing information that increases the risk of identity theft • Creating a platform for cyber bullying.
How to stay safe on social networking sites	• Always use maximum privacy settings. • Be cautious about what you share on social networking sites. • Minimize the time you spend social networking. • Monitor children's social networking use and friend lists. • Make household rules about social networking and enforce them. • Educate peers about the potential hazards of social networking. • Do not allow strangers to be your friends on social networks. • Remind yourself that Facebook is not an accurate representation of reality. • Build online networks of people you also interact with face-to-face. (Reed)
Effects of social media in practice	https://www.youtube.com/watch?v=HffWFd_6bJo https://www.youtube.com/watch?v=yrln8nyVBLU https://www.youtube.com/watch?v=KRsix3biojU https://www.youtube.com/watch?v=oEFHbruKEmw https://www.youtube.com/watch?v=mmf5OJ6KM9Q

6. INFORMATION OVERLOAD (IO)	
Description – What it is	Stress experienced by receiving more information than can be handled (or that can be understood and absorbed in the time available) and by attempts to deal with it. Information overload happens in a situation where you receive too much information at a time and cannot think clearly about it.
Advantages	• The internet makes research easy – we have a world of information at our fingertips. • Hundreds of articles/blogs/books are available on a single topic. • People stay in touch with world news, new trends, politics, weather and so much more.
Disadvantages	• Often an info overload can be distracting. For example, e-mail spam can become unmanageable. • Social media has resulted in social information overload. • Day-to-day activities are increasingly being interrupted by an overload of information. • Productivity is decreased due to the attempt to manage information overload.
Overcoming information overload	• Be clear of the kind of information you seek. • Find sources that are trustworthy and seek information from them. • Do not send unnecessary information. • Do away with paper. • Become organised.
Relevance and impact on personal lives	• The use of search engines such as Google helps a user to find lots of info on almost any subject – however information found online may not always be reliable due to the lack of a compulsory accuracy check before it is published. • People have to crosscheck what they read and this takes up more data and more time. • People tend to consume the info that they find interesting, share it multiple times with friends/family online causing it to spread faster. This creates cheap, popular information.

7. SOFTWARE BUGS	
Description – What it is	A software bug is an error, flaw, failure or fault in a software program that causes the software to produce an incorrect or unexpected result, or to behave in unintended ways.
Simple explanation of how it works	A bug is not caused by external interference like malware. Rather, it is an error caused due to a programming error in the source code. A software program malfunctions only when many bugs mutually interfere with its performance.
Advantages	• Finding bugs in software improves effectiveness. • Identifying and fixing bugs before the software becomes operational, can reduce the risk of failure. • Certain software is not always compatible with other software. Finding and correcting bugs improves compatibility. • Users are happier when bugs are fixed and are more likely to use the software.
Disadvantages	• Can cause software to malfunction. • Can cause compatibility issues. • Disasters and deaths can be caused by errors in software.
Relevance and impact on personal lives	• Software developers release a beta version of software so that people can test it before it gets released. Software bugs are then corrected before the official software gets released. • Bug testing software can be used to find software bugs.
Examples of the technology in practice	• The Year 2000 bug, aka Y2K Bug or Millennium Bug, was a coding problem predicted to cause computer problems. • The Pentium chip's math error (1993): Intel's famous Pentium chip turned out to be pretty bad at math. The actual mistakes it made were fairly small (beyond the eighth decimal point) and limited to certain kinds of division problems. • A computer programming flaw caused early release for 23 prisoners by bumping down sentences for Michigan state prisoners.

8. TELECOMMUTING/TELEWORKING	
Description – What it is	Telecommuting (also known as working from home, or e-commuting) is a work arrangement in which the employee works outside of the office, often working from home or a location close to home (including coffee shops, libraries, and various other locations).
Simple explanation of how it works	Rather than traveling to the office, the employee 'travels' via telecommunication links, keeping in touch with co-workers and employers via telephone and e-mail. The employee may occasionally enter the office to attend meetings. However, with many options for distance conferencing, there may be no need to visit the office.
Advantage	Advantages for the employee • **Higher productivity** Often, working from home can make you more productive, because you do not have the distractions of an office space and reduced time for travelling. • **No travelling/traffic** Telecommuting can save you anywhere from minutes to hours every day, which you can spend doing things you enjoy, like sleeping, spending more time with family, going to the dog park, or any other activity you'd like to have more time for. • **Increased independence** Telecommuting allows a worker greater freedom regarding his or her work hours and work location. Having a high degree of self-control and self-discipline is essential to being a productive telecommuter. • **Increased savings** Most people who work from home have very little need for professional clothing, which not having to buy can save lots of money every year. • **More flexibility** It gives the employee more flexibility to balance work and personal obligations. If you need to go grocery shopping in the middle of the day, you can. IF you are a morning person or a night owl, you can adjust your work schedule accordingly. • **Fewer sick days** Working in a traditional office exposes you to many people's germs, but if you work from home, you have less exposure to people, and therefore, to their germs. It is much easier to take care of yourself while sick and still get some work done when you're at home, meaning you'll probably take fewer sick days. Advantages for the employers • Allowing workers to telecommute often makes them more productive, which benefits the company. • Telecommuters are also likely to be happier in their jobs and are therefore more likely to stay with the company.

	• Telecommuting saves companies money for office expenses.
Disadvantage	• You have to be extremely self-motivated, or else you may easily get distracted. • You need to find a productive place to do work, such as a home office or coffee shop. • Some people also find working from home to be a bit isolating, because you are not around your co-workers. • Increased risk of network privacy and security loss. When employees remotely access documents located on a company's internal network, privacy and security can be compromised.
Limitations	• Internet access should be available

LEGAL, ETHICAL AND SECURITY ISSUES

9. ADWARE	
Description – What it is	Adware is software that is free to download but it automatically displays advertisements through banners or pop-ups while a user is online.
Simple explanation of how it works	• Adware keeps displaying adverts while the program is running. It is not necessarily malware, as the ads are not malicious. • Sometimes adware can pop-up while a user is browsing the internet. These windows are hidden below the browser.
Advantages of adware	• Companies don't have to spend a lot on traditional marketing strategies. The companies are advertising through adware. • Spyware could be coupled with adware to assist a user when searching for specific products.
Relevance and impact on personal lives	• Adware is more of a nuisance than a danger. • Ad-blocking software can reduce the overall number of adverts. • Free mobile software often contain adware. These programs use a lot of data and battery power. • Adware could slow down a computer.
Preventative measures	• Do not click on links in pop-ups. • Do not download unnecessary free software. • Change the browser settings to not allow automatic download of software. • Do not visit unknown websites.
URL for picture: https://guides.wikinut.com/img/1_vt_q.kwoizmr6u/Adware	

10. AVOID SECURITY THREATS	
Description – What it is	There are intentional and unintentional threats. **Unintentional threats** are considered to be human error, environmental hazards, and computer failures. Most people don't purposely cause harm. **Intentional threats** refer to purposeful actions resulting in the theft or damage of computer resources, equipment, and data. Most intentional threats are viewed as computer crimes.
Examples in everyday life of its impact	Intentional threats include viruses, phishing, hacking, denial of service attacks, theft of data and identity and destruction of computer resources**.**
Protection against security threats	• This forces companies and individuals to put security measures in place. • **Threat Management** ☠ firewalls – blacklists for IP addresses and URLs ☠ screening routers – e-mail checks, file screening, phishing protection • **Encryption** is a method for securing data by using special mathematical algorithms to convert the data into scrambled code before transmission. • **Anti-Malware Apps** provides malware protection. • Ensure that the **network connection** is only available to the people intended.
Examples of the technology in practice	• A **cracker** is a term used to describe someone who intentionally breaches security to break into someone else's computer or network for a malicious purpose. • A **hacker** is actually a term used to describe a computer programmer with advanced knowledge of computers and computer networks. A hacker finds weaknesses in a computer or a network so that they can be corrected.
References	www.itscolumn.com/2012/06/how-to-avoid-security-threats/ www.tomsitpro.com/articles/threat_management-it_security-firewall-it_certification-network_security,2-477.html

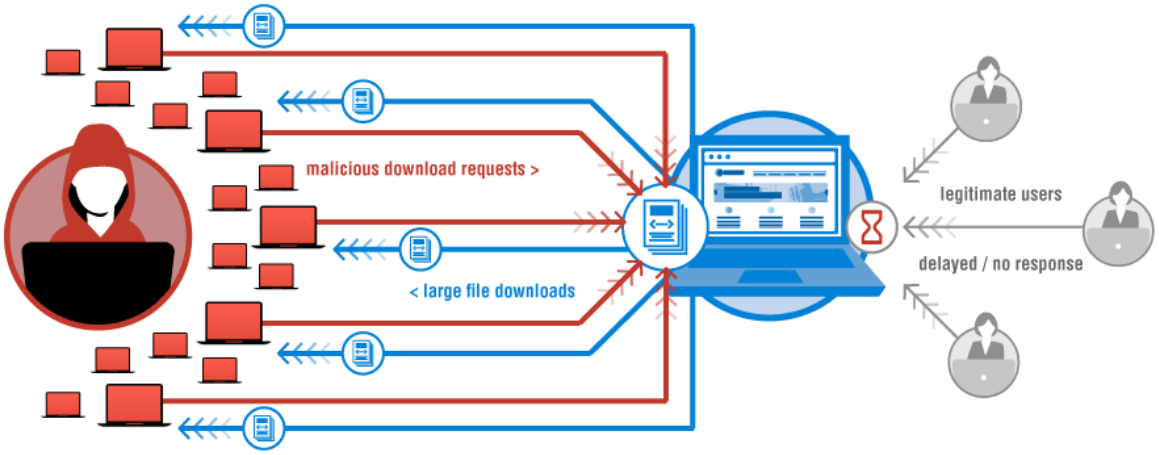
11. COMPUTER CRIMES IN RELATION TO HARDWARE, SOFTWARE, INFORMATION, IDENTITY, BANDWIDTH THEFT, THEFT OF TIME AND SERVICES	
Description – What it is	**Computer crimes:** Any crime related to the use of computers/computer systems or technology
Simple explanation of how it works	Computer crimes related to: Hardware: • The stealing of computer hardware. Software: • The misuse of software to steal information. • Damage computer information. • To gain unauthorised access to computers/systems. Information: • To use information without permission. • To gain access to personal/unauthorised information. • To distribute information without permission. • To change or manipulate data without permission. Identity: • The misuse of personal information. Bandwidth theft: • Bandwidth refers to the amount of data transferred from a web site to a user's computer. When you view a web page, you are using that site's bandwidth to display the files. • 'Hotlinking' is direct linking to a web site's files (images, video, etc.). An example would be using an <img> tag to display a jpg image you found on someone else's web page so it will appear on your own site. Theft of time and services: • Use of an employer's computer resources for personal work/entertainment.
Relevance and impact on personal lives	Hardware theft: • People are subject to more theft due to devices such as smartphones being quick and easy to steal. • A person will need to spend a lot of money replacing stolen technology. • Schools computer centres are targeted for theft. Software: • People are vulnerable to cyber-attacks due to malware and viruses targeting computers.

	• People are scammed through false ads or misleading information. • A person might be a victim to phishing, spam, hacking and malicious software. • A person's private information is vulnerable to be being exposed or exploited. Bandwidth theft: • A person's work or intellectual property might be at risk of piracy. Theft of time and services: • A person's resources such as internet could be misused for other purposes that it was not intended for. • A person might be subject to loss of income due to high data fees or the inability to use their resources due to other user's misuse.
Examples of the technology in practice	• Smartphones, laptops and other portable devices are susceptible to higher levels of theft. • Computer devices are vulnerable to being hacked through malicious software. • Privacy is in danger due to camera's and cloud storage being targets of cyber attacks. • Keylogging could track a user input and gain access to usernames and passwords through monitoring user inputs. • Spyware is software that aims to gather information about a person without their knowledge. • Torrents and streaming from devices like a KODI box (a device that turns TV's into android devices) could use bandwidth and slow internet down to unusable speeds. • Torrent download software and websites such as PirateBay, downloading often pirated content without users permission.

12. CYBER/COMPUTER FRAUD	
Description – What it is	Computer fraud is using a computer to access something that is private.
Simple explanation of how it works	Types of computer fraud vary. Simple types of fraud might include the following: • Sending hoax e-mails intended to scare people. • Illegally using someone else's computer or posing as someone else on the internet. • Using spyware to gather information about people. More serious computer fraud include scams, hacking, identity theft, breaking security codes. Even using someone else's computer to create hoaxes and use it for bullying.
Relevance and impact on personal lives	• Identity theft of unsuspecting users • Invading of user privacy
Examples of the technology in practice	**Various types computer fraud**: • E-mail spoofing: Using a sender's e-mail address to pretend that the e-mail comes from a legitimate source to fool the recipient into thinking someone legitimate sent the message. • Phishing scams: Fraudsters attempt to get information such as usernames, passwords, and credit card details by disguising themselves as someone trustworthy in an electronic communication. • Malware: (Malicious Software) is software designed to disrupt a computer, gather sensitive information, or gain unauthorised access to computer systems. • Spyware: A type of malicious software installed on computers that collect information about users without their knowledge. • Keyloggers: Tracking the key strokes performed on a keyboard, to gather sensitive information.

Ways of safeguarding yourself	• Do not give out personal information to anyone they have never heard of before, e.g. the full name, address, phone number, banking details, identity number. • Individuals should not pay attention to get rich quick schemes. • E-mail users should not open messages from strangers. • Have antivirus software and spam blocking software installed. • People should never download attachments from people they don't know. • Children should be taught about safe communication on the internet to protect them from predators. • Individuals should not keep passwords on their computers. • Do not use common passwords like the names of kids, birthdays, or other guessable words. • Never give a password to someone else.
References	www.legal-dictionary.thefreedictionary.com/Computer+fraud www.smallbusiness.chron.com/types-computer-fraud-crime-78730.html www.computerhope.com/jargon/s/spoof.htm

13. CYBER ATTACKS	
Description – What it is	A cyberattack is deliberate exploitation of computer systems and networks. Cyberattacks use malicious code to alter computer code, logic or data, resulting in disruptive consequences that can compromise data and lead to cybercrimes, such as information and identity theft.
Simple explanation of how it works	Cyber attacks might be broken down into two broad types: attacks where the goal is to disable the target computer or get it offline, or attacks where the goal is to get access to the target computer's data and perhaps gain admin privileges on it.
Examples of cyber attacks	• Spam • Phishing e-mails • Viruses • Trojans • Spyware • Malware • Ransomware • Rootkits • Password decryption • Denial-of-service (DoS) attack

14. DDoS ATTACK (DISTRIBUTED DENIAL-OF-SERVICE ATTACK)	
Description – What is a DDoS attack	**DDoS attack** is a cyber-attack where the attacker tries to make a computer (usually a host) unavailable to its users by disrupting the services it provides. An attacker networks computers together and makes them all contact a specific server or site repeatedly. This rush in traffic either makes the site load very slowly, or it completely shuts down.
	
Simple explanation of how it works	A **DDoS attack** will attempt to make a website or online services unavailable by flooding it with unwanted traffic until the website crashes or the online service is no longer available. An attacker uses many infected computers (zombies) which creates a botnet. The attacker can then control and manage the botnet to do whatever he wants.
Symptoms of DDoS attack	• Usually slow network performance • Unavailability of certain websites • Inability to access any website • Increase in the number of spam e-mails received • Possible disconnection of internet connection • Long-term denial of access to the internet
Examples of the technology in practice	Refer to: https://www.digitalattackmap.com/understanding-ddos/

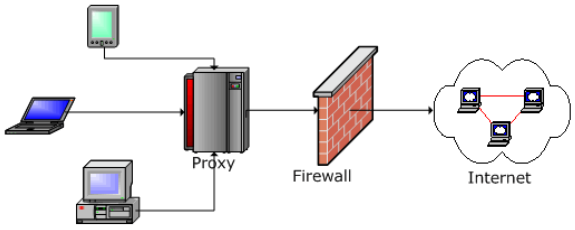
15. E-MAIL SPOOFING	
Description – What it is	E-mail spoofing is the forgery of an e-mail header so that the message appears to have originated from someone or somewhere other than the actual source. E-mail spoofing is a tactic used in phishing and spam campaigns because people are more likely to open an e-mail when they think it has been sent by a legitimate source.
Simple explanation of how it works	The word 'spoof' means 'falsified'. A spoofed e-mail is when the sender purposely alters parts of the e-mail to pretend as though it comes from someone else. Commonly, the sender's name/address and the body of the message are formatted to appear from a legitimate source, as though the e-mail came from a bank or a newspaper or legitimate company. In many cases, the spoofed e-mail is part of a phishing attack. Dishonest users will alter different sections of an e-mail so as to disguise the sender as being someone else. Examples of properties that are spoofed: 1. FROM name/address 2. REPLY-TO name/address 3. RETURN-PATH address 4. SOURCE IP address
How to identify a spoofing e-mail	• Don't trust the display name • Hover your mouse over any links in the body of the e-mail. If the link address looks weird, don't click on it • Check for spelling mistakes • Don't give up personal information • Don't click on attachments • Don't trust the header from e-mail address

16. FAKE NEWS	
Description – What it is	Fake news can be defined as: False news stories that are disguised as legitimate news but are fabricated and cannot timeously be verified by facts, sources and quotes. It is created with the intent to mislead and deceive the reader and damage the reputation of a public figure, entity or institution. Fake news is distributed via traditional news and online social media.

Simple explanation of how it works	***Fake news is part of the larger picture of misinformation and disinformation.***
	• ***Misinformation*** is false or inaccurate information that is mistakenly or accidentally created or spread; the intent is not to deceive.
	• ***Disinformation*** is false information that is deliberately created and spread in order to influence public opinion or obscure the truth.
	
	Fake news can be used to:
	• Create revenue by
	  o attracting attention together with advertising or
	  o clickbait (someone that aims to create attention, and encourages visitors to click on a link)
	• increase readers
	• amuse and entertain by jokers
	• spread political propaganda and agendas
	• provoke emotional response and outcry
	
	Fake news is generated by
	• Unethical or untrained journalists
	• Online computer bots
	• People who share unreferenced information
	
	Fake news has become widespread because of:
	• the ease and speed with which any individual can copy and share content online on:
	  o social media sites,
	  o blogs and
	  o other social media apps
	• via mobile technology such as smartphones and tablets.
	
	How can I recognise fake news?
	• Verify the article by cross-referencing the content with those of:
	  o Reputable news sites
	  o The citations and references given
	  o Fact-checking websites such as snopes.com
	• Consider the source, the heading and content
	• Was the article written by a reputable author?

	• Poor grammar and spelling usually is an indication that the news is false • Biased content that provokes emotional reactions
Relevance and impact on personal lives	We live in a technological age in which we are bombarded with an overloaded of information. During our daily tasks we have to make thousands of decisions about the food we eat, the clothes we wear (and therefore the companies we choose to support), the places we choose to stay, where we send our children to be educated, etc. In order to make sound and workable decisions that will determine our daily actions and the quality of our future, we need to be able to distinguish between relevant and irrelevant information that could be influenced by 'fake news'. ***You can stop the spread of fake news by*** • evaluating the information at hand, before you share it online • reporting suspect entries to the management of the social site/blog • not getting involved in article comments/discussion/word flaming
Examples of fake news from Snopes.com	Questionable Quotes **Did Melania Trump Plagiarize Michelle Obama's Statement on Women's History Month?** 5 March 2018 - A meme suggesting that Melania Trump plagiarized her Women's History Month statement from Michelle Obama is based on paraphrased and inaccurate quotes. *Figure B: Example of fake news regarding M Trump* Fact Check › Technology **Does Facebook's Green 'BFF' Prove Your Account Is Secure?** 22 March 2018 - A Facebook status update meme claims that a green "BFF" in typed comments is an indicator of account security; it isn't. *Figure C: Example of Fake news regarding Facebook*

Figure D: Claire Wardle of FirstDraftNews.com has created this image to help distinguish mis- and disinformation.

17. FIREWALL	
Description – What it is	• A firewall is a security measure that protects or guards against unauthorised incoming or outgoing access to a computer or a computer network from unauthorised access. • A firewall can be software, hardware, or a combination of both configured to manage and regulate data flow between networks of different trust levels by permitting or denying data. 

Simple explanation of how it works	• A firewall is a program or hardware device that filters the information coming through the internet connection into your network or computer
	• A firewall allows or prevents traffic based on certain rules
	• A firewall constantly monitors all incoming and outgoing traffic. If an incoming packet of information is marked by the filters, it is not allowed through
	• Without a firewall, the connection to the internet is open and a hacker would be able to make a connection to a computer in a network (Wi-Fi or cabled)
	• Hardware firewall:
	  ○ The **Router** acts as a hardware firewall (alone standing devices)
	  ○ The **Proxy** acts as a hardware firewall (networked devices)
	• Software firewall
	  ○ Specific software designed to filter traffic on a network

Advantages	• A firewall blocks harmful packets of data and does not allow it to reach the location where it can do harm • Provide functions that make it possible to scan incoming e-mails to block certain domains while allowing others pass through to the inbox • You can set up the level of internet security using the built-in features of the router
Disadvantages	• A firewall might disable particular applications from accessing the network and block or allow URL's from loading • A software firewall may decrease speed because it will evaluate every packet of information • A firewall may be difficult to maintain
Limitations	• Firewalls don't prevent virus attacks but they can stop viruses from sending information from an infected computer • Firewalls cannot enforce your password policy or prevent misuse of passwords

	• Firewalls are ineffective security risks such as social engineering • A firewall cannot prevent users or attackers with modems from dialling into or out of the internal network, thus bypassing the firewall and its protection completely • Firewalls cannot stop internal users from accessing websites with malicious code • Firewalls cannot protect you when your security policy is too lax
Relevance and impact on personal lives	• Monitors traffic • Blocks trojans • Stops hackers • Stops Keyloggers
Examples of the technology in practice	▪ E-mail firewalls ▪ Network firewalls
Reference:	www.compukiss.com/tutorials/firewalls-explained www.lifewire.com/definition-of-firewall-817568 www.wisegeek.com/what-is-an-e-mail-firewall.htm www.itstillworks.com/benefits-firewall-security-3806.html

18. HOAXES	
Description – What it is	A **computer hoax** is a deceitful message warning the recipients of a non-existent computer virus. The message is usually a chain e-mail that tells the recipients to forward it to everyone they know.
Simple explanation of how it works	Most hoaxes are sensational in nature and easily identified by the fact that they indicate that the virus will do nearly impossible things, like blow up the recipient's computer and set it on fire, or less sensationally, delete everything on the user's computer. They often include fake announcements claimed to originate from trustworthy computer organisations together with media. These false sources are quoted in order to give the hoax more credibility. Typically, the warnings use emotive language, stress the urgent nature of the threat and encourage readers to forward the message to other people as soon as possible.
Disadvantages	• Virus hoaxes are usually harmless and accomplish nothing more than annoying people who identify it as a hoax and waste the time of people who forward the message.

19. INTERNET ATTACKS (CYBER ATTACKS)	
Description – What it is	An internet attack is attacking a computer from anywhere on the internet. Cyber criminals use malicious code to alter computer code that disrupts a computer so that data is compromised and leads to cybercrimes, such as information and identity theft.
Simple explanation of how it works	Cyber attacks are attacks carried out primarily through the internet, the goal is to disable the computer, force it to go offline or gain access to the computer's data and admin privileges.
Disadvantages	• Identity theft • Malware, pharming, phishing, spamming, spoofing, spyware, Trojans and viruses • Denial-of-service and distributed denial-of-service attacks • Breach of access • Password sniffing • System infiltration • Intellectual property (IP) theft or unauthorised access
Limitations	Methods for attacks have become more sophisticated, making it difficult to detect them.
Relevance and impact on personal lives	• Businesses can suffer loss of clients and money. • Loss of intellectual property. • Data breach. • Cloud data is stolen. • Theft of personal information. • Cyberstalking and cyberbullying increases.
Examples of the technology in practice	• WannaCry took over infected computers and encrypted the contents of their hard drives, then demanded a payment in Bitcoin in order to decrypt it. • A massive hack of Yahoo's e-mail system in 2013, only became clear in October 2017 with all Yahoo e-mail addresses affected. Stolen information included passwords and backup e-mail addresses.

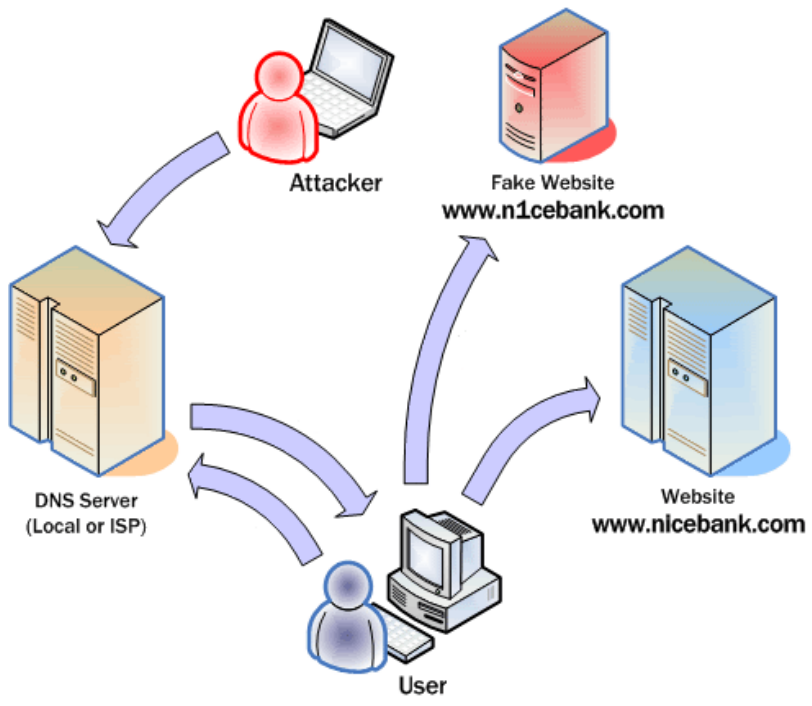
20. INTERNET-RELATED SCAMS	
Description – What it is	Internet scams are dishonest schemes that seek to take advantage of unsuspecting people to gain a benefit such as money, or access to personal details using internet services and are mostly or completely based on the use of the internet.
Simple explanation of how it work	Scammers can send you an e-mail that looks like it is from a reputable institution such as your bank. You are then asked to click on a link in the e-mail or on the attachment which opens a fake website that looks exactly like the real thing. Or they use messages on smartphones instead of e-mails. The message is usually about something urgent, for example your credit card has been stolen, and instructs you to go to a certain web site or call a phone number to verify your account information.
Disadvantages	• Identity theft • Money theft • Stealing personal details • Data theft
How to prevent internet scams	• Verify the sender of an e-mail/Don't open suspicious e-mails • Check the safety of the websites • Be sceptical about free offers • Change passwords regularly • Keep your browser and operating system updated • Always update antivirus software and antispyware programs • Do not give out personal information to anyone you don't know • Only install programs from a trusted source
Relevance and impact on personal lives	Internet fraud ranges from e-mail spam and phishing messages to online scams. There are different types of scams that criminals are using and some include: • unexpected prize scams • money scams • deposit refund scams • dating scams • threats • jobs scams • identity theft • fake news scam • make money fast scams (economic scams) • SMS Scams (smishing)

21. MALWARE	
Description – What it is	Malware is software written with 'malicious' intent and to act without the user's knowledge.
Simple explanation of how it works	This means that it is created to disrupt the normal functioning of a computer. Examples include ransomware, viruses, spyware and keyloggers.
Disadvantages	• Some applications won't start. • Disrupts operations. • Steals sensitive information. • Allows unauthorised access to the system. • Slows computer or connection speeds. • Creates problems or disrupts network connection. • Causes frequent freezing or crashing. • Creates unwanted pop-ups. • Redirects web browser searches. • Changes computer settings.
Relevance and impact on personal lives	Effects of malware: • **Financial implications**: Software must be purchased to protect the user from malware. Ransomware has a negative impact, since data can only be accessed once a ransom fee is paid. • **Loss of productivity**: When computers are infected, time is lost while trying to remove the malware and that time could have been used to complete work. • **Personal implications**: Affected users stop trusting ICTs. Lives become complicated because so many passwords need to be remembered. Time is also wasted while trying to sift through spam or sort out identity theft.
Preventative measures	• Install anti-malware or anti-virus software. • Scan e-mails for malware. • Keep your anti-malware or anti-virus software updated. • Use strong passwords. • Do not click on unknown links. • Be careful when using open wi-fi. • Keep your personal information safe.
Examples of the technology in practice	• Identity theft • Credit card theft • Ransomware • Keyloggers
Picture URL:	https://antivirus.comodo. com/blog/computer-safety/shadowpad-malware-strikes-netsarang-products/

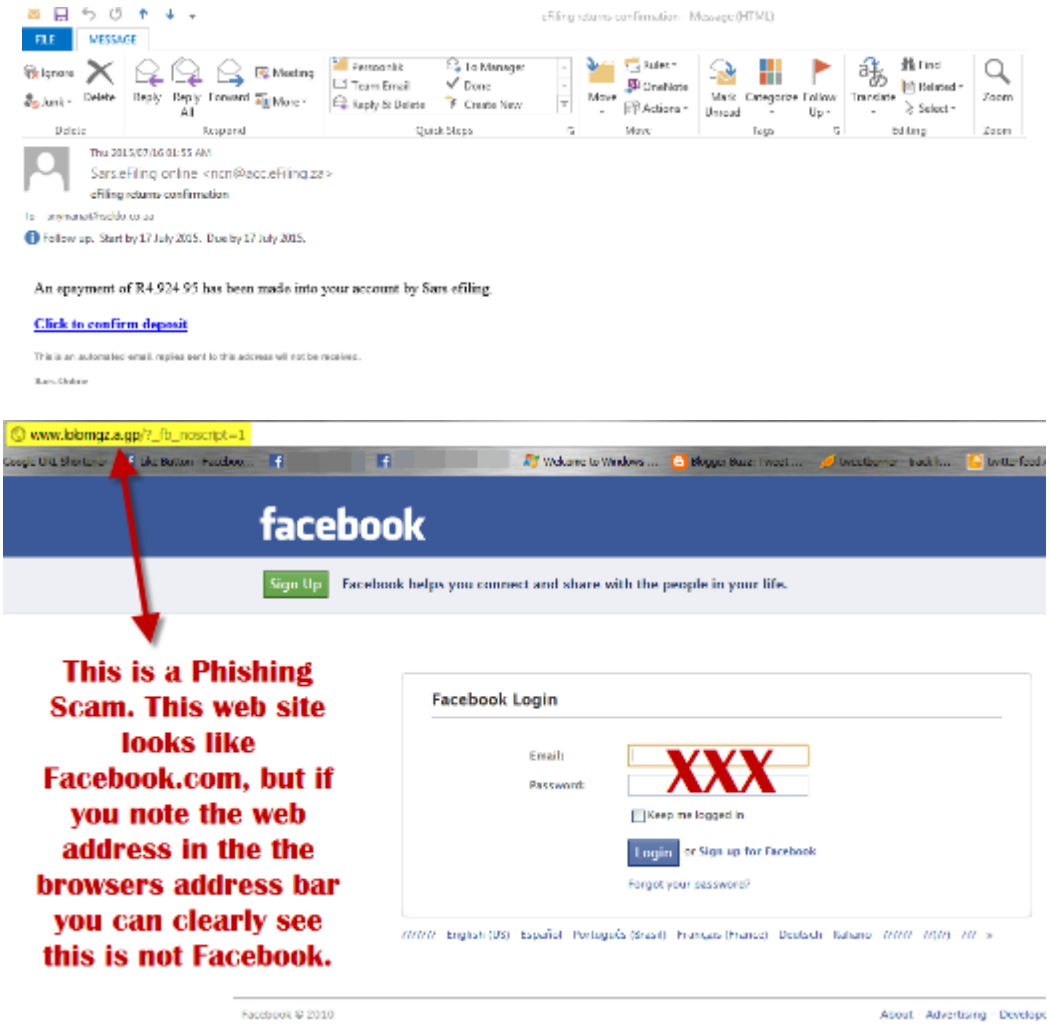
22. MISUSE OF PERSONAL INFORMATION	
Description – What it is	The invasion of privacy which includes: • the breach of personal data • the distribution of personal data • This can be both private or cooperate abuse of personal information. • The misuse of personal information could make you vulnerable to theft, excessive advertising (SPAM), stalking victim or identify theft. **Personal information includes:** • Names and surnames • Address • Relationship status • Salaries • Bank statements • Contact details • Browsing trends and history • Accounts/Insurance/investments • Username and passwords • Photos
Simple explanation of how it works	**Personal information is valuable to companies and some individuals for various reasons:** **Crimes include:** • Stalking • Identify theft • Theft – stealing from bank accounts for example • Distribution of personal details to other individuals or companies • Creating untrue information **Stalking:** People might be stalked should their address/location be given out. Celebrities are especially vulnerable to this. By giving living/work locations out people are vulnerable to becoming victims of people who wish to cause emotional/physical harm or have their privacy invaded. **Identity theft:** People may pretend to be someone else. They do this to perhaps gain access to personal information/areas etc. To use/open accounts in another person's name

	Theft: Personal information such as passwords and usernames could be used to access account and buy items or transfer money to a criminals account **Distribution of personal details:** Companies in recent years have been accused of selling personal data to other companies. This is a problem because companies a person has entrusted to keep personal information safe are now profiting from your personal information making a person more valuable to specific advertising or potential victims to scams, theft or abuse. **Creating untrue information:** A person may have information about them manipulated either done by themselves or by another person/company. People have been known to change personal information to give themselves an advantage or change their history i.e. creating false accreditations like degrees or previous work experience Example of people or companies creating untrue information: A person might try to put someone at a disadvantage for their own personal gain i.e. to get a job by making another person look bad. Companies might do it to abuse the person in some way i.e. to make a person a higher risk case to increase charges on premiums on insurance.
Relevance and impact on personal lives	People who are affected by the misuse of their personal information may become vulnerable to various forms of abuse, theft, fraud or SPAM. Some extreme cases may cause people to: • lose all their belongs • have a criminal record against their name • be abused • lose their privacy • be vulnerable to theft • be vulnerable to fraud
Avoid becoming a victim of misuse of personal information	• Do not give personal information, such as account numbers, over the telephone, through the mail, or over the internet, unless you know the person. • Protect your PINs and other passwords. Avoid using easily available information as passwords, such as names, surnames. • Protect sensitive data on your computer. • Serve the internet incognito. • Do not click on unknown links.

Examples of the technology in practice	Data breaches have become more common in recent years. This is done by hackers exploiting security flaws in systems and then distributing the information so that they can make money. Companies selling information to other companies without your permission. People stealing personal information from bank statements or other personal documents and using it against a person.

23. PHARMING	
Description – What it is	Pharming is a scamming practice in which malicious code is installed on a personal computer or server, misdirecting users to fake websites without their knowledge or consent.
Simple explanation of how it works	The attacker uses several ways to carry out pharming attacks, one of the most popular way is to modify the Host file. The pharmer hijacks your computer and takes you to a forged website. Your browser may display the legitimate URL, but you will not be on the legitimate server. This, in most cases, is a page that looks identical to that of your bank, financial institution or online shopping websites like, eBay, or Amazon. Here, the attacker seeks your confidential information like credit card numbers, account passwords, etc.
How to prevent pharming attacks	• Use a trusted, legitimate Internet Service Provider • Install an antivirus program • Keep computer updated • Double-check the spelling of a website • Check the 'HTTP' address • Look for PadLock • Check URL
	

24. PHISHING	
Description – What it is	A type of online identity theft. It uses e-mail and fake websites that are designed to steal your personal data or information such as credit card numbers, passwords, account data, or other information.
Simple explanation of how it works	Phishing is a form of social engineering that attempts to steal sensitive information. An attacker's creates a fake website or e-mail that looks exactly like the original and asks a user to enter personal information.
Disadvantages	• Phishers can use the data to access a victim's account and withdraw money • Identity theft
How to prevent phishing attacks	• Never give your password or personal details • Use anti-phishing toolbars • Use a firewall • Verify the security of websites
Relevance and impact on personal lives	Sometimes phishing e-mails are obviously malicious, but other times they are pretty convincing. It is important to keep in mind the context of the e-mail. If you did not request to be 'added to a project', you shouldn't be receiving an e-mail.



25. POP-UPS	
Description – What it is	Pop-up windows, or pop-ups, are small windows that appear automatically without your permission while you are on the internet. They vary in size but usually don't cover the whole screen.
Simple explanation of how it works	A pop-up is a GUI display area that suddenly appears in the foreground of a browser window while a user is browsing the internet. Pop-up advertisements are forms of online advertising on the internet. A variation of the pop-up is a pop-under advert where a new browser window opens under the active window. They do not interrupt the user immediately, but will show when the user closes the top window. This makes it more difficult to determine which website created the pop-up.
Advantages	• Some pop-ups are necessary for some websites to function properly. These websites however, will not disrupt the current page to display the pop-up. For example, these pop-ups might be necessary to provide guidance when filling in a form on a webpage. • They demand attention from users and the company gets immediate feedback from the user. • Companies use them for advertising and consumers are continuously aware of new offers.
Disadvantages	• It is distracting and irritating. • It slows down loading time. • It uses bandwidth. • It can be scamming advertisements. • They force users to take action and can therefore stop users from continuing to another webpage.
Relevance and impact on personal lives	• Most users of websites continuously experience unwanted pop-up advertisements. Normally users respond by using the 'close' or 'cancel' features of the window. • Authors of pop-up adverts know that people will respond like this and therefor they create on-screen buttons that look similar to 'close' or 'cancel'. If the user clicks on these buttons an unexpected action follows, such as downloading an unwanted file or opening a new pop-up. This is called 'fake close buttons'. • Certain types of downloaded files like some images and free music can cause pop-ups and should not be trusted.

Examples of the technology in practice	Pop-up advertisements can pose a threat because it can be a scam, for example a gift card offer from a certain company or prizes to customers from well-known companies may indeed be a scam to get your personal information.

26. RIGHT TO ACCESS	
Description – What it is	The right to access can include more than just the right to use a computer or the internet. It involves the right to information, music, social media sites and websites.
Simple explanation of how it works	Companies will direct you to a 'sign in' or 'register' page where you have to either create an account or sign into your account in order to access the website.
Advantages	• Companies can keep track of who is on their website. • The information on the website can be set up according to the individual's preferences and what they want to see. • You can use a nickname/username to identify yourself and protect your information.
Disadvantages	• Anyone can create a profile without it needing to get verified. • People can create more than one account and act as different people. • Websites like torrents make it easy for anyone to get ('seed') music/movies/series/books and for people ('leaches') to get the files, without them having an account.
Limitations	Companies try to ensure that only registered employees/students/ users can use the website. They will employ people to set up coding on the website to ensure that whoever enters the site is a legitimate registered user.
Relevance and impact on personal lives	• Many people have Facebook accounts where they have to sign in before they get to their profile and newsfeeds. • Some schools have a domain where only the learners of that school can sign in and acquire information regarding the school, their subjects and resources. • People of certain professions can register with websites that will provide them with tools and resources to use in their profession.
Examples of the technology in practice	• A government website that contains 'secret' information will only be accessible to the employees. • Only registered students have access to use the domain, created by the university, for the use of their library resources and published articles. • If you registered on a certain website, only you have access to all the services and/or products on that particular website.

27. RIGHT TO PRIVACY	
Description – What it is	The right to digital privacy declares that no one will be exposed to any form of interference with his/her family, home or any form of communication. Attacks on his/her reputation is also against the law, because everyone has the right to be protected by the law against any cyberattacks. You have the right to: • Keep any information about yourself and your family private. • Apply settings on applications and social media sites that protects your information. • Withhold any information from someone who you feel/think might want to use it for a malicious act. • Upload any form of documents that you created or pictures of yourself/family and choose who can have access to view or read it.
Simple explanation of how it works	When you sign up for competitions or sign in on a website, you can withhold certain information about yourself. If you do not trust the source or the site, do not give them your information. You can create an e-mail address that you do not use for your banking and other personal things and give that up as the address where they can contact you.
Advantages	• People are encouraged to speak their mind on forums, groups and sites where any topic can be discussed. • It encourages innovation and new ideas can be created from something that someone saw on the internet. • It becomes easier to ignore/'unfollow' people who are negative.
Disadvantages	• Information taken from the internet must be cross-referenced and verified, especially if that information is being used in an article/research assignment. Not everything on the internet is true or can be trusted for anyone can write an article and share it. • People assume the identity of other people. Anyone can take your unprotected personal information or information and steal your identity to commit a crime.
Limitations	Information can leak if companies do not protect the things you put online. Once a leak happens, that company's name and reputation is compromised, since it is their job to ensure your privacy and protect your information.

Relevance and impact on personal lives	• Some people post information about other people on social media without their permission. Permission should be obtained first. • It gives a platform to malicious people to bully others. Comments left on posts can be harmful to the person who posted something, because the abuser has the ability to hide behind the computer. • Advertisements about certain products that pop up is not just coincidental. Some companies put cookies into their sites to see what you look at and then they send advertisements to you about those things.
Examples of the technology in practice	• Internet privacy can be set up in any application that you are using. Facebook is the widely used social media site where the protection of your information is a priority. You can choose who can see what on your profile. • Banks and other financial institutions ensure that your privacy is protected, also your personal information or your banking details. • Websites where you can buy products/services from also has security in place to protect your privacy. It goes from protecting your identity when you buy products, to making sure it is safe to supply them with you credit card details.

https://www.geneva-academy.ch/joomlatools-files/docman-files/ReportThe%20Right%20to%20Privacy%20in%20the%20Digital%20Age.pdf
https://brandongaille.com/12-Internet-privacy-pros-and-cons/

28. SAFEGUARDS AGAINST CRIMINALS, VIRUSES AND THREATS	
Description – What it is	**Safeguarding computers and communication in different aspects:** **Against criminals and threats:** Identification and access Encryption Protection of software and data **Against viruses:** Anti-virus software Anti-spyware software Firewall
Simple explanation of how it works	**AGAINST THREATS** **Identification and access** Computers authenticate your identity by determining: • **What you have:** o Credit, debit and cash machine cards have magnetic strips or built in computer chips that identify you to the machine, they may request you to display your signature. o Computer rooms may be guarded by security officers. o Keeping a lock on personal computers. • **What you know** o Use of PIN (Personal Identification Number). o Use of passwords. o Use of digital signature. • **Who you are: (The physical traits)** o Biometric devices that read fingerprints (computerised), voice, blood vessels in the back of the eyeball, the lips, one's entire face. **Encryption** • Altering of data so that it is not usable unless the encryption is unlocked. • Use of encryption programs such as PGP (pretty good privacy). • Useful in some organisations especially concerned with trade secrets, military matters etc. **Protection of software and data** • **Control of access** o Access to online files is restricted only to those who have a legitimate right to access. Example, some organisations have a transaction log that notes all accesses or attempted accesses to data.

	• **Audit controls** ○ Many networks have audit controls that track which programs and servers were used, which files opened. Creates audit trails, record of how a transaction was handled from input through processing and output. **AGAINST CRIMINALS** • **Use a good anti-virus an anti-spyware and ensure firewall is upn** Always be sure to activate your firewall settings. Furthermore, installing anti-virus and anti-spyware software will protect your computer from various forms of malware, viruses, Trojan horses and other malicious software used to obtain your personal details. • **Ensure you use strong passwords and good password policies** By changing your login details, at least once or twice a month, you can cut down your chances of being a target of cybercrime. • **Keep software up-to-date** • **Manage social media settings (privacy settings)** Make sure your social networking profiles (e.g. Facebook, Twitter, YouTube, MSN, etc.) are set to private. Check your security settings. Be careful what information you post online. Once it is on the internet, it is extremely difficult to remove. • **Secure home networks (Wi-Fi)** Be aware of what you do while using public Wi-Fi Hotspots, while these access points are convenient, they are far from secure. Avoid conducting financial or corporate transactions on these networks. • **Protect your data – encryption** More often than not, we leave our mobile devices unattended. By activating the built-in security features, you can avoid any access to personal details. Never store passwords, pin numbers and even your own address on any mobile device. Protect your Data Use encryption for your most sensitive files such as tax returns or financial records, make regular back-ups of all your important data, and store it in a different location. • **Be aware of latest scams** Always think before you click on a link or file of unknown origin. Do not feel pressured by any e-mails. Check the source of the message. When in doubt, verify the source. Never reply to e-mails that ask you to verify your information or confirm your user ID or password. • **Protect your e-identity** Be cautious when giving out personal information such as your name, address, phone number or financial information on the internet. Make sure that websites are secure (e.g. when

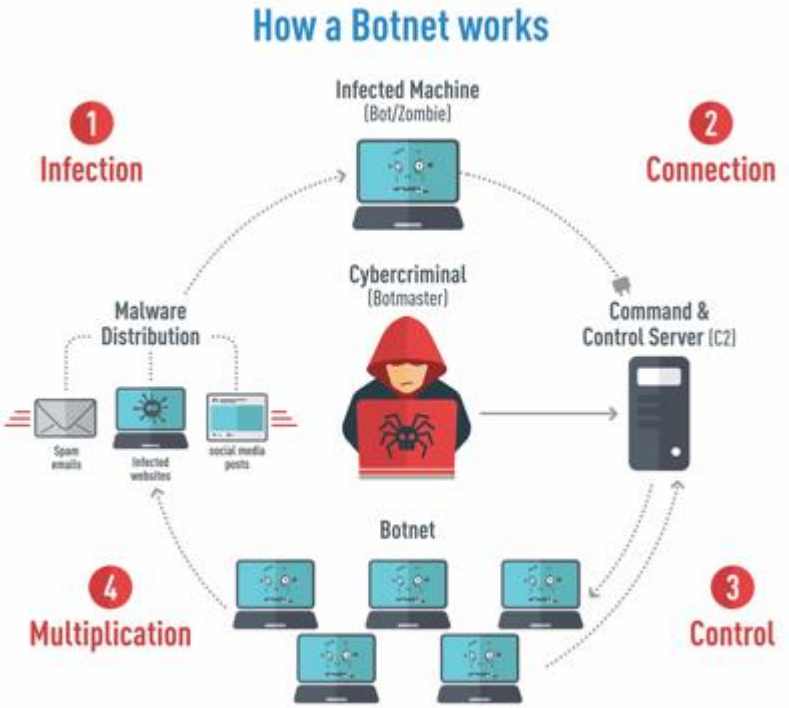
	making online purchases) or that you have enabled privacy settings.
Relevance and impact on personal lives	Cybercrimes are very common at the moment as it is an easy way to steal as it is hard to trace back to a person. Many people can suffer financial loss, as well as personal loss due to ID theft etc. where their reputations are ruined. Criminals may be employees, outside users, hackers, crackers and professional criminals.
Examples of the technology in practice	**Crimes using computers and communication** • Theft of hardware: shoplifting an accessory in a computer store, removing a laptop or telephone service from someone's car, stealing shipments of microprocessor chips off a loading dock (professionals). • Theft of software: stealing someone's diskette or disks with software, copying programs, counterfeiting a well-known software programs. • Theft of time and services: using your employees computer to play games, tapping into cellular networks and dialling for free. • Theft of information: stealing confidential personal records and selling, stealing credit information. **Computer criminals** • Employees • Use IT for personal profit, or steal hardware or information to sell • Frauds: involves credit cards, telecommunication, employee's personal use of computers, unauthorised access to confidential files and unlawful copying of copyrighted or licensed software. **Outside users:** • Suppliers and clients may gain access to a company's information technology and use it to commit crime. **Hackers and crackers:** • Hackers are people who gain unauthorised access to computer or telecommunication systems for the challenge or even the principle of it. • Crackers also gain unauthorised access to information technology but do so for malicious purposes (financial gain, shutdown hardware, pirate software or destroy data). **Worms and viruses** • A worm is a program that copies itself repeatedly into memory or onto disk drive until no more space is left. • A virus is a 'deviant' program that attaches itself to computer systems and destroys or corrupts data. **Viruses may be passed through** • E-mails, internet, flash drives or memory cards and • Network **Types of viruses** • Boot sector virus

	Replace the boot sector instructions with its instructions and get loaded into main memory before operating system and be in a position to infect other files. • File virus Attach themselves to executable files i.e. those files that begin a program e.g. .exe • Polymorphic virus, can mutate and change form. **Trojan horse:** Places illegal, destructive instructions at the middle of a legitimate program. **Logic bombs:** Set to go off at a certain date and time.

29. SOCIAL ENGINEERING TRICKS	
Description – What it is	Social engineering is tricking people so they give out their confidential information. Criminals try to trick you into giving them your passwords or bank information, or access your computer to secretly install malicious software, that will give them access to your passwords, bank information and control over your computer. The person that performs the trick is called a social engineer.
Simple explanation of how it works	Users are normally targeted by the following ways: • **By phone**, criminals pose as employees of an organisation like a bank, and after going through some typical questions and statements in order to gain the trust of the potential victim, they will then ask for login credentials and passwords. • **Phishing** is the most common fraud technique on the internet. Users reveal data because they think they are on a trusted website. • **E-mail** have attachments from people known to the victim. Malware is used to attack users' address book and send e-mails with the attacker's file attached to all their contacts.
How to avoid falling victim to social engineering	• Never reveal your passwords or login credentials to anyone. • When you enter your details on a website, make sure the website is safe. • Never open strange-looking files or attachments, even if they come from someone you know. • Do not use the same username and passwords. • Use two-factor authentication.
Types of social engineering tricks 	• Phishing (attackers trick people through e.g. e-mails, false websites to provide personal information) • Tailgating (also known as 'piggybacking', involves an attacker seeking entry to a restricted area which lacks the proper authentication) • Watering hole (injecting malicious code into public webpages of a site that the users visit) • Baiting (focuses on peoples' curiosity where they are promised something in return for providing personal information) • Pretexting (attackers create a fake identity and use it to manipulate the receipt of information)
How to identify social engineering tricks	• Fake phishing e-mails with spelling errors. • Receiving e-mails from unknown recipients indicating that you must react urgently. • People following you to assist you to draw money. • Social engineers disguise scams as well known or trusted sources.

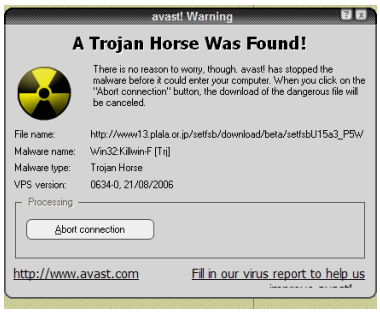
30. SPAM	
Description – What it is	Spam is electronic junk mail or junk newsgroup postings. Some people define spam even more generally as any unsolicited e-mail. Spam is generally e-mail advertising for some product sent to a mailing list or newsgroup.
Advantages	• Advantage of marketing with advertisements for certain companies
Disadvantages	• It is annoying • It fills up e-mail space
How to prevent spam	• Install anti-spam software

31. SPYWARE	
Description – What it is	Any technique or software that tries to monitor and track the way you use your computer and sends it to a third party.
Simple explanation of how it works	Spyware is software installed on a user's computer without their knowledge and collects information, sending it to the creator of the spyware. This could be for malicious purposes or for a legitimate reason. For example, spyware record web searches and provide options based on previous searches thus assisting a user with his/her search. Keyloggers can capture a user's keystrokes on the keyboard and reveal usernames and passwords. Spyware is also used to monitor a user's internet activity and user profiles are sold to marketing companies.
Disadvantages	• Spyware can slow a computer down. • The startup time of your computer may take longer. • Some programs on your computer will not run correctly or even become corrupt.
Relevance and impact on personal lives	• If usernames and passwords are revealed, online banking and security can be compromised. • The chance of your computer being attacked by virus is higher.
Preventative measures	• Install anti-spyware software. • Be careful when on the internet. • Do not click on strange pop-ups. • Keep the operating system updated. • Have the latest patches installed on software. • Switch on the firewall.
URL for picture: https://www.scnsoft.com/blog/chasing-spyware-siem-apt	

32. TAKING OVER PC'S, E.G. BOTNETS, BOTS, ZOMBIES	
Description – What it is	A **botnet** is a group of computers connected in a coordinated fashion for malicious purposes. Each computer in a botnet is called a **bot**. These bots form a network of compromised computers, which is controlled by a third party and used to transmit malware or spam, or to launch attacks. A **zombie** is a computer that has been compromised by a hacker. A botnet may also be known as a zombie army.
Simple explanation of how it works	Bots are used to take over computers. Once many computes have been infected by bots, they are called botnets, or a bot network. The computers that are controlled are called zombies. 
Advantages	• Bots are good at performing repetitive tasks.
Disadvantages	• Bad bots perform malicious tasks allowing someone to take over your computer remotely. This machine is now called a zombie. • Bots gather personal information. • Bots launch DDoS attacks.
How to know if a computer has been infected by bots	• Internet access is slow. • The computer crashes for no apparent reason. • The fan works without stopping even when the computer is not working. • The computer takes a long time to shut down, or does not shut down correctly. • Pop-up windows and advertisements appear even when you aren't using a web browser. • Friends and family receive e-mail messages you did not send. • Computer programs are running slowly. • Settings have changed, and cannot be reversed.

How to protect computers from bots	• Install firewalls to block malicious attacks and never turn them off. • Use a password that contains numbers and symbols. • Never use the same password for multiple programs. • Install anti-malware software. • Ensure software is up to date, and never ignore system updates. • Refrain from using external drives on an infected computer.

https://us.norton.com/Internetsecurity-malware-what-are-bots.html
https://www.techopedia.com/definition/384/botnet

33. TROJANS	
Description – What it is	A trojan horse is a malicious software program that hides inside other programs. It enters a computer hidden inside a legitimate program, such as a screen saver. Then it puts code into the operating system that enables a hacker to access the infected computer. Trojan horses do not usually spread by themselves. They are spread by viruses, worms, or downloaded software. It's a form of social engineering.
Simple explanation of how it works 	The user usually receives an e-mail with an attachment. The attachment looks relatively unsuspicious and in many ways like a useful application. Once the user opens the attachment and attempts to install the seemingly useful application, a malicious program is installed on the users' hard drive. Once they're installed, the program will infect other files throughout the system and potentially wreak havoc on your computer. They can even send important information from your computer over the internet to the developer of the trojan. The developer can then control your computer, slowing your system's activity or causing your machine to crash. Unlike computer viruses and worms, Trojans are not able to self-replicate.
Malicious and other uses	• Once the user installs the application, the distributer of the Trojan gains access to the information on the user's computer device. • Some Trojans are designed to be more annoying than malicious (like changing your desktop, adding unnecessary desktop icons). • They can cause serious damage by deleting files and destroying information on your system. • Trojans are also known to create a backdoor on your computer that gives malicious users access to your system, possibly allowing confidential or personal information to be compromised.
Limitations	• The Trojan can only be activated once the application is opened and installed by the user.
Relevance and impact on personal lives	• Ransomware attacks are often carried out by using a Trojan.
How to avoid a Trojan	• Always keep an up to date backup of your data. • Never open unsolicited e-mails, even if it is sent by friends. • Never download or install programs on your computer unless you completely trust the source of the link sent to you. • Beware of hidden file extensions. • Never enable features on your computer which will allow programs to automatically install on your computer device. • Regularly update the anti-virus, anti-spyware on your computer. • Install the latest patches available of your operating system.

	• Scan CDs, DVDs or any external storage devices before using it. • When you download any program from the internet always scan it first.
Examples of the technology in practice	**Backdoor** A backdoor Trojan gives malicious users remote control over the infected computer. Backdoor Trojans are often used to form a botnet that can be used for criminal purposes. **Exploit** Exploits are programs that contain data or code that takes advantage of a vulnerability within application software that's running on your computer. **Rootkit** Rootkits' main purpose is to prevent malicious programs being detected. **Trojan-DDoS** These programs conduct DoS (Denial of Service) attacks against a targeted web address. By sending multiple requests from your computer and several other infected computers the attack can overwhelm the target address leading to a denial of service. **Trojan-Ransom** This type of Trojan can modify data on your computer so that you can no longer use specific data. The criminal will only restore your computer's performance or unblock your data, after you have paid them the ransom money that they demand.

34. VIRUSES	
Description – What it is	A computer virus is a type of malicious software program ('**malware**') that spreads from one computer to another and interferes with computer operation. A computer virus might corrupt or delete data on a computer, use an e-mail program to spread the virus to other computers, or even delete everything on the hard disk.
Simple explanation of how it works	A virus is a small piece of software that attaches itself on real programs. For example, a virus might attach itself to a program such as a spreadsheet program. Each time the spreadsheet runs, the virus runs, too, and it has the chance to reproduce (by attaching to other programs) or create disorder. It requires an action from the user, e.g. clicking on a file.
Advantages	• A virus can be a way for a hacker or programmer to show off his ability.
Disadvantages	• **Corrupt files** • **Generates instability in performance** • **Computer becomes slower** • **May damage hardware – Hard drive, etc.** • **Deletes important files** • **Loss of Software Functionality** When a virus infects your computer, it is will alter your system so that you will no longer be able to access certain functions. • **Exploitation** Some computer viruses are created by internet criminals seeking to make money out of people. The virus will display messages stating there is a problem with the computer, and suggest that this can be fixed by providing a payment to a repair company.
How to prevent viruses	• Install anti-virus software • Keep your anti-virus software up to date • Run regular scans with your anti-virus software • Do not open an e-mail attachment from somebody that you do not know • Do not click on a link in an unwanted e-mail • Scan attachments before you open them • Do not give out personal information
Symptoms of a computer infected with a virus	• Hardware problems • Computer freezes • Slow performance • Slow startup • Files go missing or are hidden • Disks are not accessible • Unusual messages

Examples of the technology in practice	Malicious software, worms, trojans and computer viruses are on the increase, as hackers and identity thieves seek new ways to steal information that can be used to empty bank accounts.

35. WORMS	
Description – What it is	A computer worm is a standalone malware computer program that replicates itself in order to spread to other computers or through a network.
Simple explanation of how it works	Computer worms are self-replicating programs which take advantage of security holes in networking software and hardware. The worm exploits these vulnerabilities automatically, which is why a user doesn't need to take any action to be infected.
Disadvantages	• A worm causes different kinds of damage on a computer system
How to prevent worms	• Keep the computers' operating system and software up-to-date. These updates often contain security patches designed to protect computers from newly discovered worms. • Avoid opening e-mails that you don't recognise or expect. • Do not open attachments and clicking on links from untrusted sources. • Set up a firewall and use antivirus software to be further protected from computer worms. Software firewalls will keep the computer protected from unauthorised access.
Symptoms of a computer infected with a worm	• Slow computer performance • Freezing • Programs opening and running automatically • Irregular web browser performance • Unusual computer behaviour (messages, images, sounds, etc.) • Firewall warnings • Missing/modified files • Operating system errors and system error messages • E-mails sent to contacts without the user's knowledge

HEALTH AND ERGONOMIC ISSUES

36. ERGONOMIC CONSIDERATIONS	
Description – What it is	Ergonomics refers to the study and design of the workplace for the comfort and safety of people in work environments.
Advantages	• Increased production. • Less medical costs because of fewer injuries. • Less absenteeism.
Preventative measures	• Sit correctly. • Ensure that the table's/seat's height is comfortable. • The lighting should be acceptable. • There should be ventilation in the room. • The monitor should be at the correct height and distance. • Do eye exercises. • Take regular breaks.
Examples of the technology in practice	Ergonomic equipment may include: • chairs that support the back • desks that have variable heights • computer monitors that can be adjusted • mouses that support the wrists • keyboards that allow for arm rest

37. USER-CENTRED DESIGN (UCD)	
Description – What it is	UCD (User-centred design) is a method of computer program design which focusses on the user's specific needs and requirements.
Simple explanation of how it works	The entire process revolves around the end-user in terms of what they need the software to do, what their level of knowledge/expertise is, what tasks they perform and what the final product/outcome should be.
Advantages	• Programmers have a better understanding of what the finished product should be able to do. • Allows for quicker testing of the product and error corrections. • Final product is more effective and user-friendly. • Able to meet users' needs better.
Disadvantages	• It can be very expensive. • Difficult to convert some processes into code. • Product takes more time to develop.
Examples of the technology in practice	• Company specific software used in various industries e.g. production, manufacturing, insurance, pharmaceuticals are created to meet user specific needs.

ENVIRONMENTAL ISSUES

38. ENVIRONMENTAL ISSUES	
Description – What it is	The environment is negatively affected by the manufacturing, use and disposal of digital devices and computer equipment.
Simple explanation of how it works	Electronic waste is being generated that influence the environment in various negative ways. This waste would contain toxic chemicals such as lead, arsenic and cadmium, dumped in landfills sometimes. Electricity generated and used in the manufacturing processes releases huge amounts of greenhouse gasses into the air.
Ways to save the environment	• More energy-efficient equipment should be used. • Conserve energy by using energy-efficient equipment. • Become paperless. • Recycle old computer equipment. • Turn off computers not in use. • Use more energy efficient display equipment. • Encourage telecommuting.
Advantages of practising green computing	• Reduced energy usage causes lower carbon dioxide emissions. • Conserving resources means less energy is required to produce, use, and dispose of products. • Saving energy and resources saves money.

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