1.	**/**	Used to divide numbers together
2.	**-**	Used to add subtract together
3.	*****	Used to add multiply together
4.	**+**	Used to add numbers together
5.	**<**	Used when something is smaller than something else
6.	**<=**	Less than or equal to
7.	**==**	Used when something is equal to another
8.	**>**	Used when something is bigger than something else
9.	**>=**	Greater than or equal to
10.	**1GB (gigabyte)**	(2^{30} bits)
11.	**1KB (kilobyte)**	1,024 bytes (2^{10} bits)
12.	**1MB (megabyte)**	(2^{20} bits)
13.	**1PB (petabyte)**	(2^{50} bits)
14.	**1TB (terabyte)**	(2^{40} bits)
15.	**2D/3D cutting**	used to cut materials to form 3D objects and are controlled by computers and software (CAD/CAM). Common materials include: glass, crystal, metal, polymers and wood
16.	**2D scanner**	convert hard copy documents into electronic form. They use a scan head that moves across the doc producing an image that is sent to a lens by mirrors. Focused image falls onto a charge coupled device (CCD) which consists of integrated circuits. Then it is changed into a format where the computer can store it. USES: at passport control, can scan the passport and compare it to a photo just taken. Involves facial recognition.
17.	**2D scanner**	They convert hard copy documents into electronic form. They use a scan head that moves across the doc producing an image that is sent to a lens by mirrors. Focused image falls onto a charge coupled device (CCD) which consists of integrated circuits. Then it is changed into a format where the computer can store it. USES: at passport control, can scan the passport and compare it to a photo just taken. Involves facial recognition. Principles: 1) a bright light will illuminate the document to be copied 2) a head moves across the document scanning it to produce an image which is sent to a lens 3) the focused image then falls on to a light-sensitive sheet made up of thousands of pixels which record the light intensity or colour falling on each pixel 4) This information is now stored as an image in the computer's memory
18.	**3D printers**	produce actual solid objects which work they are built up in the printers by very thin layers of varying materials eg. powdered resin, powdered metal, ceramic powder, or even paper Some use binder tech which involves the use of a binder (glue) to form the solid layers They are referred to as additive. USES: making prosthetic limbs assisting reconstructive surgery fashion and art

19. **3D scanners**	scan solid objects and produce a 3D image. They use lasers, magnetic resonance, white light or xrays. CT scanners do this. It splits up the object into a number of very thin slices. The resultant image allows a solid object to be stored as a series of digital values representing each 'slice'. Xrays: CT scanners Radio waves: MRI scanners Gamma rays: SPECT scanners
20. **5 types of registers**	MAR, MDR, ALU, PC, CIR These are in reference to the fetch-execute cycle
21. **A 30 second audio track is recorded and the sample rate is set at 44,000 Hertz (or 44kHz). The resolution is 16 bit. What is the size of the file produced?**	•A 30 second audio track is recorded •The sample rate is set at 44,000 Hertz (or 44kHz) •The resolution is 16 bit •The size of the file produced is: •(44,000 x 16) x 30 = 21,120,000 bits •21,120,000 / 8 = 2,640,000 bytes / 1,000,000 = 2.64MB
22. **A**	10
23. **Actuator**	An electromechanical device used in control applications with sensors. Examples would be relay, solenoid or a motor.
24. **actuator**	used in many control operations involving sensors and ADC/DACs. Electromagnetic device eg. motor that outputs result of sensor operation LED/light bulb: creates light, e.g. display of information Heater: increases temperature, e.g. central heating Cooling unit: decreases temperature, e.g. central heating, AC Motor: spins things around, e.g. robots, washing machines, elevator Pump: pushes air/water through pipes, e.g water cleaning system, process control Buzzer/bell/siren: creates (loud) noises, e.g. fire alarm
25. **ADC**	Analogue to Digital Converter - Converts physical values into discrete digital values. Could be used in speech recognition. Often seen in control technology and examination questions on microprocessors!
26. **Additive Manufacturing**	Used by 3D printers to build up an object layer by layer.
27. **Address bus**	carries signals relating to addresses between the processor and memory; it is uni-directional
28. **Advantages and Disadvantages of Laser vs Inkjet**	Laser: Speed for large print jobs, High quality, Large toner cartridges and Large paper trays unfortunately more expensive Inkjet:Cheap unfortunately Slower in large print jobs, Small ink cartridges, Small paper trays
29. **Advantages and disadvantages of machine code**	Difficult to understand, programmers don't usually write in it, in binary (instructions that a computer understands)
30. **Advantages of OLED vs LEDs and LCDs**	OLED is thinner, lighter and more flexible, OLEDs are brighter than LEDs, No backlighting required, They have a large field of view
31. **Advantages of using LED backlit technology**	- no need to warm up - whiter tint/more vivid colors/brighter image - higher resolution - much thinner monitors possible/lighter weight - more reliable technology/longer lasting - uses much less power/more efficient

32.	**ALU**	A part of the computer that performs arithmetic operations, logic operations and related operations.
33.	**ARQ (Automatic Repeat Request)**	Uses acknowledgement and timeout - this is an error control protocol. There is a check performed on receiving data - this check could be a parity check or a checksum. IF an error is detected, a request is sent to resend the data (This is a negative acknowledgement) The request for re-sending is repeated until the correct data is sent OR the number requests hits its limit
34.	**ASCII**	American Standard Code for Information Interchange is a character set. Each letter on the keyboard has a unique value that can be represented in hexadecimal or decimal.
35.	**assembler**	 this translates assembly language into machine code. Once it has done this, the machine code can be used multiple time without translating it again.
36.	**assembly language**	Code that is specific to a particular hardware, but needs to be translated into machine code before it can run. The code is the closet you can get to the machine's native machine code without being 1s and 0s! Why should I use assembly language? 1) You can manipulate individual bits and bytes as you are close to the CPU and can manipulate registers. 2) It runs very fast 3) It occupies less memory than code compiled from a HLL. Use: 1) Hardware specific code like device drivers which tells the computer how to communicate with specific devices such as printers. 2) Control programs in embedded systems in washing machines, routers, and digital watches. 3) Real time applications that need an instant response; network software, medical software.
37.	**Asymmetric Encryption**	Private and public key are both needed. Encryption keys generated using a hashing algorithm.
38.	**asymmetric encryption**	this is a type of encryption using both a public and a private key. The public key can be seen by anyone, and used to encrypt messages to the receiver. The private key is used by the receiver to decrypt the message sent to them. Therefore, asymmetric encryption (or public-key cryptography) uses a separate key for encryption and decryption. Anyone can use the encryption key (public key) to encrypt a message. However, decryption keys (private keys) are secret. This way only the intended receiver can decrypt the message. Asymmetric keys are typically 1024 or 2048 bits. Though larger keys can be created, the increased computational burden is so significant that keys larger than 2048 bits are rarely used. To put it into perspective, it would take an average computer more than 14 billion years to crack a 2048-bit certificate.
39.	**Asynchronous**	Agreed bit pattern with control bits

40. **Asynchronous Data Transmission**	The data is transmitted in an agreed bit pattern using control bits
41. **asynchronous data transmission**	a data transmission system in which chunks of data are denoted by start and stop bits
42. **Authentication**	Used to verify data is coming from a trusted source.
43. **authentication**	used to verify that data comes from a reliable source; used with encryption to strengthen internet security
44. **automatic repeat request**	a request generated by the client to the sever when a the transmission did not reach or was faulted
45. **B**	11
46. **Bar code Principles of Operation**	1) The scanner shines a light at the barcode 2) Light is reflected back to the scanner 3) White lines reflect light 4) Black lines reflect less light 5) Photoelectric cells in the scanner detect the light 6) The pattern of lines is converted to digital values 7) A microprocessor interprets the data
47. **Barcode Readers**	1. Consist of series of dark and light lines of varying thickness 2. Each digit is represented by a number of lines 3. Can represent other characters than numbers. A light is shone at the bar code 4. 1 = dark 0 = light Sensors detect light levels. White reflects back, black is absorbed. 5. A microprocessor coverts the light levels and interprets the data. Advantages to Managers in supermarkets 1. Easier and faster to alter prices 2. give instantaneous and comprehensive sales trend. 3. No need to price each item 4. allows automatic stock control 5. can check customers buying habits more easily Advantages to customers in supermarkets 1. faster checkouts 2. less chance of errors 3. get an itemised bill 4. cost savings can be passed onto a computer 5. better tracking of sell by dates
48. **Basic tasks carried out by an operating system**	Processor management Memory management Management of users Input/output Handling interrupts Multi Tasking Multiprocessing
49. **Benefits of high level languages?**	Easier to read and understand as the language is closer to human language, easier to write in a shorter time, easier to debug at the development stage, easier to maintain once in use
50. **bi-directional**	What direction is the data bus
51. **Binary System**	Number system with base 2
52. **Binder 3D Printing**	Using a type of glue to stick together layers in a 3D printer

53.	**Binder 3d printing**	2 passes: 1st pass sprays dry powder second pass sprays binder (glue) to form layers
54.	**Bit**	Binary Digit. Either 1 or 0, On or Off.
55.	**The bitmap image file called Ducks.bmp is 1000 x 750 pixels** **The image has a bit depth of 24 bits** **Calculate the file size**	•The bitmap image file called Ducks.bmp is 1000 x 750 pixels •The image has a bit depth of 24 bits •Calculate the file size Answer File size = 1000 x 750 x 3 bytes = 2,250,000 bytes = 2,250,000 /10242 MB = 2.145 MB
56.	**Bitmap images**	•Bitmap images are made up of PICture ELement or PIXELS •A pixel is the smallest identifiable area of an image •Each pixel is a single colour and is given a binary value which represents that colour e.g. 11000000 might equal Red •A pixel's colour can be changed by changing this value
57.	**Black, white, and grey hackers**	Black hat hackers are illegally hacking to steal data or with some other criminal intent White hat hackers are ethical hackers, employed by companies to deliberately find holes in their own security Grey hat hackers look for holes in other systems and then contact the companies for payment in return for fixing the problem
58.	**Blu-ray disks**	1. Blue light - DVD is a red light 2. Uses blue light to read-write the data 3. Wave length of blue light is 405nm (shorter than red) they can store considerably more data than a DVD 4. Single polycarbonate disk (unlike DVDs which use a sandwich of two polycarbonate disks) 5. Blu-ray has a faster transfer rate than a DVD (36mbps Vs 10mbps)
59.	**bootstrap**	 the first program loaded from ROM by BIOS; loads operating system from secondary storage
60.	**Botnets**	a set of computers that are penetrated by malicious software known as malware that allows an external agent to control their actions •Computers in a botnet may: •send email spam to other users •store and distribute of illegal material •perpetrate a Denial-of-service (DoS) attack
61.	**Buffer**	A temporary memory area in a device. Used to compensate for the slower operating speed of peripherals when compared to a processor. Buffers allow a processor to carry on with the other tasks whilst, for example, a print job is being carried out in the backround. Another example is when streaming.
62.	**Buffers**	Where contents of processor are dumped during transfer to hardware device so that processor can get back to doing other tasks
63.	**Buses**	Buses move data around the computer and also send out control signals to synchronise internal operations
64.	**Byte**	Smallest unit of memory. A collection of 8 bits.
65.	**C**	12

66.	**Capacitive (Touch) Screen**	Made up of layers of glass that act like a capacitor. Electric fields are created between the layers which changes when touched. Allows multi-touch. Principles: 1) The current is sent/flows from all corners of the screen. An electric field is spread across the screen. 2) When the finger or stylus touches the screen, the current changes - the charge is transferred to the user. 3) The location of the current changes and we can then determine the corrodinates.
67.	**CCFL**	The predecessor to LED in the back-lighting market
68.	**CCFL**	cold cathode fluorescent lamp Old technology used for backlighting - took time to warm up, and produced yellow-ish lighting + required a lot of power
69.	**CD/DVD**	1. Red laser light 2. uses it to read and write the data 3. Has a single spiral track that runs from centre to the outer edge 4. can be '-R' (write once and then can only be read) or '-RW' (can be written to and read several times) 5. DVDs can hold more data than CDs due to dual layering technology (disks have two individual recording layers
70.	**Check digit**	A final digit calculated from all the other digits. Used to identify errors in mis-typing or mis-scanning a bar code.
71.	**Checksum**	Additional value sent at the end of a data block. When block is about to be transmitted, the additional value is calculated and then transmitted. The value is recalculated at the end to make sure they match. If they don't match, an error has occurred. ARQ would then deal with the resending of data.
72.	**checksum**	The sum of all the bytes in a transmission is sent with the data. An algorithm used to verify if the data was correctly transmitted (see textbook for the algorithm). Used with credit card numbers.
73.	**CIR**	Current instruction register, contains the current instruction being processed
74.	**Clock Speed in Cpu**	The clock speed - also known as clock rate - indicates how fast the CPU can run. This is measured in megahertz (MHz) or gigahertz (gHz) and corresponds with how many instruction cycles the CPU can deal with in a second. A 2 gHz CPU performs two billion cycles a second. A faster CPU uses more energy and creates more heat A computer will normally have a maximum clock speed set by default, but it is possible to change this speed in the computer BIOS. Some people increase a CPU clock speed to try to make their computer run faster - this is called overclocking. There are limits to how fast a CPU can run and its circuitry cannot always keep up with an overclocked speed. If the clock tells the CPU to execute instructions too quickly, the processing will not be completed before the next instruction is carried out. If the CPU cannot keep up with the pace of the clock, the data is corrupted. CPUs can also overheat if they are forced to work faster than they were designed to work.
75.	**code of ethics**	this is a set of rules set up by the ACM and IEEE to ensure that computers are used correctly, and to avoid plagiarism.
76.	**Colour of bit depth**	•ach pixel can represent a finite number of colours •Each pixel is represented by a number of bits •This is called the bit depth •A higher bit depth gives a greater range of colour and a better quality of image 8 bits per pixel can represent 28 = 256 colours 16 bits per pixel can represent 216 = 65,536 colours 24 bits per pixel can represent 224 = 16,777,216 colours
77.	**compiler**	this translates HLL into machine code. Once it has done this, the program can be used multiple times without translating it again. Object code is produced.

78.	**compiler**	A program that translates a program written in high level language into machine code, translates one line at a time, distributed for general use, compiled programs are used without the compiler.
79.	**Computer architecture**	How the computer is designed. Usually in reference to the inner workings of the machine.
80.	**computer ethics**	this considers 3 factors; intellectual property rights, privacy issues, and a computer's effect on society. It is a set of principles that regulates the use of a computer
81.	**Concept Keyboard**	A flat board with buttons. Each button can be programmed to do whatever you want. Ideal at a fast-food checkout for example. Think about MacDonalds. The keyboard will have pictures of a big mac or a coke for instance.
82.	**Control bus**	carries signals relating to control and coordination of all activities within computer; can be either bi or uni directional (e.g. read/write functions).
83.	**Control Unit**	Controls the memory, processor and input/output.; it reads instructions based on its address (stored in the PC), interprets them and sends out signals along the control bus to synchronise all computer components.
84.	**Cookie**	A file/packet of information sent by a web server to a web browser. Not a program. Store user preferences and creates anonymous user profile, and used in advertising. Resides on client machine, not server. Why useful? 1) Once you have registered on a website, on your next visit your user ID and password will be remembered and you will not have to retype them 2) You see online advertisements relevant to you and your recent searches Website preferences are saved
85.	**CPU Core**	A CPU can contain one or more processing units. Each unit is called a core. A core contains an ALU, control unit and registers. It is common for computers to have two (dual), four (quad) or even more cores. CPUs with multiple cores have more power to run multiple programs at the same time. However, doubling the number of cores will not simply double a computer's speed. CPU cores have to communicate with each other through channels and this uses up some of the extra speed.
86.	**cracking**	Editing source code with malicious intent. Often used to remove password protection from software.
87.	**CSS**	Cascading Style Sheet. Controls presentation of page. Enable multiple pages or elements on a page to be changed in one go.
88.	**CT Scanner**	Creates a 3D image of a solid object by taking very thin "slices" with X-rays or radio frequencies.
89.	**cypher text**	output from encryption algorithm
90.	**D**	13
91.	**DAC**	Converts digital data in a computer into an analogue item, like what happens in speakers When asked to discuss a control system that involves a sensor and a microprocessor, this is mentioned!
92.	**Dangers of hacking**	Identity theft, gaining personal information Data can be deleted, changed or corrupted
93.	**Dangers of pharming**	Creator can gain personal data Fraud/identity theft
94.	**Dangers of phishing**	Creator can gain personal data Fraud, identity theft
95.	**Dangers of spyware**	Originator gains data Can read cookie data Change user's default web browsers

96.	**Dangers of viruses**	Computer crashes, unresponsive Delete files/data Corrupt files/data
97.	**Dangers of wardriving**	Steal user's internet time Hack wireless network, steal personal details
98.	**Data Bus**	Carries data between the processor, the memory unit and the input/output devices. Bi-directional.
99.	**Denary System**	Number system with base 10 This is our basic numbering system in mathematics
100.	**Denial of Service (DoS) attack**	Attempting to prevent a user from accessing part of a network (usually the server); this is usually temporary, but may be very damaging, or a big security breach. overloads web traffic by sending thousands of requests.
101.	**Describe how a sensor and microprocessor are used to...**	1) a sensor is used to send information / signal / data to a microprocessor 2) ADC converts data / signal so that the microprocessor can understand the process 3) The microprocessor compares the value with a pre-set value 4) Sends a signal to the actuator to control the changes as required 5) The system will loop until it is switched off. Uses ADC Uses actactuators Uses pre-set values
102.	**Describe the FE cycle**	1) The Program counter contains the address of the next instruction to be fetched 2) The address is then copied from the PC to the memory address register using the address bus. 3) The instruction at the memory address in the MAR is then copied onto the memory data register 4) The instruction in the MDR is the copied into the current instruction register 5) The value in the program counter is incremented by 1 so that it points to the next instruction to be fetched. 6) The instruction is finally decoded and executed by sending out signals via the control bus to various computer components.
103.	**Describe the Von Neumann architecture**	This holds Programs in data and memory, data is then sent between the memory unit and the processor and the instructions are then fetched and executed one after another.
104.	**Differences between Laser and Inkjet printers**	Powdered ink is used, Static electricity is used to make text and images, the whole page is printed at once instead of line by line
105.	**Digital Camera**	contains a microprocessor which automatically: 1. adjusts shutter speed 2. focuses 3. operates the flash 4. adjusts the aperture 5. removes 'red eye' 6. reduces handshake etc
106.	**Direct 3d printing**	Inkjet technology used, print head moves left to right and up and down to build up layers of object

107.	**DLP**	light projector using mirrors to produce 1024 different grey shades. A bright white light source passed through colour filter allowing 16million colours to be created. Principles: •DLP systems utilise millions of micro-mirrors on a small microchip within the projector (each mirror corresponds to a single pixel) •When these micro-mirrors are tilted towards the light source, they are in the 'on' status •If they are tilted away from the light source, they are in the 'off' status •The micro-mirrors can switch between 'on' and 'off' thousands of times a second creating different and changing shades of grey light
108.	**DLP**	Digital Light Projector - uses millions of micro mirrors which can switch on when tilted towards the light source or off when tilted away, several thousand times a second, creating various shades of grey. Colour filters allow the grey shades to be converted to colours These are projected onto a large screen, outputting what is on the computer.
109.	**Domain Name System (DNS)**	The system administered by the Internet Corporation for Assigned Names (ICANN) that assigns names to each site on the Internet DNS technology allows you to type a name such as google.co.uk into your web browser It translates the web address google.co.uk into an IP address e.g. www.google.co.uk= 74.125.131.94 Fun facts: •There are 13 DNS "root" servers worldwide which keep a complete database of all names and IP addresses •Other DNS servers lower down the hierarchy hold parts of the database •When a DNS server receives a request not in its database, it will pass the request on to another server until it reaches one with the matching name and IP address •Lower level DNS servers are owned by ISPs
110.	**Dot matrix Printer**	Uses a matrix of pins which strike an inked ribbon (either black or up to 4 colours) to produce characters in a matrix on the paper ADVANTAGES not affected by damp or dirty atmospheres allows use of multi part stationary (carbon copies) allows use of continuous stationary DISADVANTAGES expensive poor quality very noisy and slowFl
111.	**Do Until (Condition)**	A loop that has a condition that has to be fulfilled until the loop can stop running.

112.	**DRAM**	 type of RAM where each chip consists of transistors and capacitors. Not too expensive to manufacture, has high storage capacity, and doesn't consume too much power. Needs refreshing every 15s When comparing DRAM to SRAM: SRAM is faster but more expensive than DRAM, and as such DRAM is preferred for the main RAM of a computer system. However, a small amount of SRAM is placed between the main RAM and the processor and is called the Cache. As such Cache is a smaller and faster RAM (SRAM) that temporarily stores instructions and data so that the processor does not need to access the slower main memory (DRAM)
113.	**DVD-RAM**	1. Nearly obsolescent 2. Uses concentric tracks enabling simultaneous read-write operations to take place. 3. Great longevity, so ideal for archiving of data
114.	**E**	14
115.	**Echo Check**	Data sent to and from another device twice. Essentially the data is sent back to the sender! Sender compares 2 sets of data, if the sets of data are different, an error has occurred.
116.	**echo check**	a resending of the data from the client to the server so that it can check that data to be correct (this method is HIGHLY unreliable for obvious reasons)
117.	**EEPROM**	Electronically erasable programmable read only memory
118.	**ELIF**	Used after an IF statement
119.	**Encryption**	Makes data meaningless unless recipient has the decryption key
120.	**END**	This defines the end of a program.
121.	**Example of interrupt**	Printer jams, or CTRL+ALT+DLT
122.	**Examples of an OS**	Linux, Windows, Android
123.	**Examples of high level languages?**	C++, Delphi, Java, Pascal, Python, Visual basic.
124.	**Examples of what an OS does**	Security (passwords and log on), interrupt handling routines, processor management, file utilities (save, delete etc.), and managing input and output devices
125.	**Explain how DLPs work**	Position of micro mirrors determines resolution. Mirrors are binary where ON is pointing to light source and OFF is away creating a light and dark pixel. 1024 shades of grey can be made by mirrors switching 1000 times a second. This is the grey scale image. Xenon bulb causes bright white light that passes through colour filter. Light is split into RGB. 16,000,000+ colours can be produced. Grey scale is represented by colours.
126.	**Explain how LCD projectors work**	A powerful beam of light is generated. This light is shone on chromatic mirrors that reflect light at different wavelengths corresponding to RGB light. This light passes through LCD and greyscale image is shown in colour using special prism. This image passes through the projector lens onto a screen

127.	**F**	15
128.	**FAT - file allocation table**	a map of where each file is and which sectors on the magnetic disk are free
129.	**Fetch Execute Cycle**	The Fetch: next instruction fetched from the PC then into MAR via address bus and then copied into MDR then stored in the CIR and the PC is then incremented so that the next instruction can be processed. Execute: the instruction in the CIR is decoded. The decoded instruction is then passed as a set of control signals to the appropriate components of the computer system. The instruction in the CIR is executed.
130.	**Fetch Execute cycle**	1) address of next instruction goes from PC to MAR via the address bus. 2) The instruction is obtained and sent to MDR temporarily 3) MDR offloads instruction into CIR 4) PC increments for next address 5) instruction is decoded and sent out via control bus
131.	**Firewall**	Can be software or hardware. Sits between user's computer and an external network and filters information in and out of the computer
132.	**firewall**	This examines traffic between a user's computer and the internet by checking what is/isn't allowed and blocking traffic that does not meet certain criteria
133.	**.FLAC**	lossless compressed music files
134.	**.FLAC**	Lossless compressed music files
135.	**Flash Memory/Memory Sticks**	1. Solid state technology 2. Connect through a USB port 3. Small and lightweight so ideal for transferring files and photos between different computers Principles: 1) Large electric current used to force electrons through a barrier and trap them on the other side 2) They remain on the other side until "flashed" with a new current, hence the name 3) Trapped (charged) or not trapped = 0 or 1
136.	**For i in range**	Used to find the relevant part in an array
137.	**Free software**	Free software is software that comes with permission for anyone to use, copy, and/or distribute, either verbatim or with modifications, either gratis or for a fee. Systems software is sometimes software as well as applications distributed as free software Mozilla Firefox is a free and open-source web browser Free software is not the thing same as Freeware
138.	**Freeware**	Software that a user can download from the internet free of charge. Once it has been downloaded, there are no fees associated with using the software.
139.	**freeware**	Software classified as freeware may be used without payment Commonly permits redistribution but not modification (the source code is not available) The software may have limited functionality or be usable only for a limited time There may be additional restrictions, e.g. the licence may state that the software is only for personal or individual use, academic or educational use
140.	**Full-Duplex Data Transmission**	Data can be sent in both directions at the same time.
141.	**full-duplex data transmission**	a data transmission system in which data can only be sent in both directions simultaneously

142. **Functions of operating system**	- User Interface - Memory Management - Peripheral Management - Multi Tasking - Security
143. **Gigabyte (GB)**	1024 megabytes. 2 to the power of 30 bytes.
144. **Hacking**	The act of gaining illegal access to a computer system
145. **Half-Duplex Data Transmission**	Data can be sent in both directions but only one at a time. e.g. walkie talkies
146. **half-duplex data transmission**	a data transmission system in which data can only be sent in both directions but not simultaneously
147. **Handshake Protocol**	Permits the website and user to authenticate and make use of encryption algorithms which only the user and website know.
148. **HDD**	Non-volatile secondary storage used for storing most files
149. **HDD**	Hard Disk Drive 1. Uses circular platters coated in magnetic. 2. Read-write heads are used so that all the surfaces can be accessed. 3. Data is stored in sectors and tracks in blocks. 4. Access to data is slower than RAM 5. Latency is when some applications require read-write heads to move in and out several times. It is the time taken for a specific block of data on a track to rotate around to the read write head
150. **Hexadecimal System**	Number system with base 16. Examples of use include: HTML colour schemes, MAC addresses, Assembly language, debugging
151. **high level language**	 portable language designed with the programmer in mind - it is easy to understand and debug, but it needs to be translated in order for a computer to understand it
152. **How do blu-ray disks work?**	Blue laser reads and writes data on a single polycarbonate disk
153. **How do CDs/DVDs work?**	Red laser writes and reads data held in a single spiral track running from centre to outer edge
154. **How do HDDs work?**	Circular platters are coated in magnetic material with data stored in sectors and tracks in blocks being accessed by several read-write heads
155. **How many binary bits does one character in hexadecimal represent?**	4
156. **How many bytes are in a kilobyte?**	1024
157. **How many times more data (approximately) can a QR code hold compared to a barcode?**	200

158.	**How many types of scanners are there?**	5
159.	**How much smaller are MP3 files in comparison to the same files on CDs?**	Up to 90% smaller
160.	**How to does Secure Socket Layer work?**	1. The user's web browser sends a message so that it can connect with the required website which is secured by SSL. 2. The web browser then requests that the web server identifies itself. 3. The web server responds by sending a copy of its SSL certificate to the user's web browser. 4. If the web browser can authenticate this certificate, it sends message back to the web server to allow communication to begin. 5. Once this message is received, the web server acknowledges the web browser, and the SSL-encrypted two-way data transfer begins.
161.	**HTML**	HyperText Mark-up Language. Used to write and develop webpages to present text. Uses tags.
162.	**HTML Presentation**	how the document looks/sounds This is the formatting/style of the web page e.g. the colour that is applied to some text example of tag, such as <font-color>
163.	**HTML Presentation**	The style of the document - how the document will appear on the user's computer screen.
164.	**HTML structure**	Essential part of the HTML document; it includes the semantics (meaning) and structural mark-up of the document It is the layout options such as placing an image next to some text
165.	**HTTP - hypertext transfer protocol**	HTTP (hypertext transfer protocol) is used for accessing and receiving web pages in the form of HTML files on the Internet The protocol requests the web server to upload the requested web page to the user's browser for viewing. •HTTPS (secure protocol) encrypts the information so that it cannot be hacked...
166.	**HTTP(S)**	A set of rules to be followed when transferring files across the Internet. The S is for secure with private data.
167.	**HTTPS**	a SECURE set of rules which must be followed when transferring files across the internet
168.	**Infra red**	TECHNOLOGY: uses glass and can either detect heat, or uses infra red sensors to detect touch Microprocessor works out where the screen was touched based on heat/infra red data BENEFITS allows multi touch can use bare fingers, gloved hand, or stylus durable DRAWBACKS relatively expensive heat sensitive only allows bare fingers to be used

169. **Infra-Red (Touch)Screen**

Uses glass as the screen material. A grid of sensors work out the co-ordinates being touched from the change in temperature. Allows multi-touch.

Principles:

1) Has an invisible grid on the screen (pattern of infra-red beams)
2) Sensors detect the where the screen has been touched through a break in an infra-red beams.
3) The position where the screen is touched is calculated.

170. **Inkjet Printer**

Relies on a liquid ink system which sprays ink onto the paper line by line as the paper advances; the ink system uses either thermal bubble or piezoelectric technologies.

Principles:

1) Data to be printed is first sent to the printer driver is then puts data into a format that the printer can process
2) Printer driver checks the status of the printer (e.g. is it out of paper etc.)
3) Data is sent to the printer and is stored in a printer buffer
4) Sensor checks whether there is any paper in the paper tray

5) Sheet of paper is fed into the printer using a roller.
6a)When the paper is in the correct position, the print head moves over the page; the 4 ink colours are used in the correct amounts to give required colour
6b)The technology to get the ink out of the nozzle could be thermal bubble or piezoelectric.
7) At the end of each pass, the paper is advanced to allow the next line to be printed
8) Once the printer buffer is empty, the printer sends an interrupt to the processor requesting for more data to be sent
the printer buffer is empty

Whole cycle continues until the entire document has been printed

Piezoelectric:Electrical current is applied to a crystal
- which makes it vibrate
- which forces a droplet of ink through the nozzle

Thermal Bubble: Ink is heated
- and expands/evaporates into a bubble
- Bubble is pushed through the nozzle on to the paper
- then the bubble collapses

ADVANTAGES
high quality of printing
good at printing photos
cheap to buy
DISADVANTAGES
ink is expensive and quickly runs out
small paper trays
noisy compared to laser printer

171. **Input device**

Device that allows a computer to receive data from the outside world.

These can be categorized as manual and automated input devices.

172. **Interactive white boards**

Allow computer images to be displayed using a digital projector
allow users to write on the board and the text/images created can be stored in the memory

173.	**Internet Protocol**	Number which gives the location of a device on the internet
174.	**internet protocol address**	an address given by the router to a connected device so that it knows from and to where it should send and receive information
175.	**internet service provider**	a company (such as BT or Virgin) that provides internet access to its clients
176.	**interpreter**	This translates HLL into machine code one line at a time. This allows for line by line error checking before object code is produced; therefore, no object code is produced!
177.	**interpreter**	A program that reads a statement from a program in a high-level language, performs the action specified and then does the same with the next statement over and over, doesn't produce a translated program, used when a program is being developed, interpreted programs cant be used without the interpreter
178.	**Interrupt**	A signal sent from a device (or some software) to the processor to requesting its attention. It will cause the processor to temporarily stop what it is doing to service the interrupt. Ex: paper jam in a printer, pressing Ctrl+Alt+Del, other software errors.
179.	**Interrupt handlers**	Ensure tasks can carry on at the same time, by saving the running of the current task
180.	**IP**	Internet Protocol - each device is given an IP address as soon as it accesses the internet. It changes every time that the device goes on the internet
181.	**IP address**	A unique string of numbers separated by periods that identifies each computer using the Internet Protocol to communicate over a network.
182.	**IP (internet protocol) address)**	 assigned by ISP, unique to each internet session Every computer and other device connected to the Internet has an IP address •E.g. 81.101.137.12 •Packets are labelled with the sender's and the destination IP addresses •Packets are sent across the Internet separately via different routes and reassembled at the end
183.	**ISP**	Internet Service Provider - a company that provides a user with access to the internet. They usually charge a monthly fee. The ISP will give a user an account and an email address China Telecom for instance.
184.	**ISP (internet service provider)**	company charging monthly fee that provides internet access

185.	**John Von Neumann Architecture**	Holds programs and data in memory. Data moves between the memory unit and the processor. This is the Stored Program Concept The program is stored in secondary storage. Data and instructions are moved memory / RAM. Data and instructions are stored in the same memory / RAM. Data and instructions are moved to registers to be executed. Instructions are fetched one at a time.
186.	**Joint Photographic Experts Group**	JPEG files use a lossy format file compression method, and so its used to store photos as a reduced file size
187.	**JPEG**	Joint Photographic Experts Group 1. LOSSY 2. Photograph compression to a reduced size. 3. Rely on properties of the human eye (inability to see certain colour differences etc)
188.	**JPG**	Lossy image file. Common for website images. Used for photos due to the size. A good example when asked for a lossy compression file format!
189.	**Keyboard**	Each character pressed is converted into a digital signal interpreted by the computer. RSI can result from too much use.
190.	**Keyboards**	1. most common input device 2. keys are pressed that complete a circuit and a signal is sent to a microprocessor which interprets which key has been pressed 3. Since entering data by keyboard is a relatively slow process, most computer systems use a keyboard buffer which prevents the microprocessor waiting for keys to be pressed. 4. although little training is needed to use a keyboard there is a risk that people who use it too much get RSI
191.	**Kilobyte (KB)**	1024 bytes. 2 to the power of 10 bytes

192.	**Laser Printer**	0)relies on positive and negative charges on the print drum and paper; toner sticks to the paper in only certain area and is permanently fixed to the paper by the fuser 1) Data to be printed is first sent to the printer driver 2) Printer driver puts data into a format that the printer can process 3) Printer driver checks the status of the printer (e.g. is the printer out of toner?) 4) Data sent to printer and then stored in a printer buffer 5) Printing process starts by giving printer drum a positive charge 6) As printer drum rotates a laser beam scans across it, removing the positive charge in certain areas; this leaves negatively charged areas which match the text or images to be printed 7) Printer drum is coated with positively charged toner; it only sticks to the negatively charged parts of the drum 8) Negatively charged sheet of paper is then rolled over the drum 9) Toner on the drum now sticks to the paper producing exact copy of the text and images 10) To prevent paper sticking to the drum, electric charge is removed once the page has been printed 11) To prevent paper sticking to the drum, electric charge is removed once the page has been printed 12) At the very end of the printing process, a discharge lamp removes the electric charge from the drum making it ready for the next page ADVANTAGES very high quality cheap to buy large toner cartridges and large paper trays fast printing DISADVANTAGES can be expensive to maintain (fuser) produces health hazards such as ozone or toner particles in the air
193.	**LCD**	Liquid Crystal Display/Diode
194.	**LCD**	A screen with the front layer made up of liquid crystal diodes. 3 or 4 of these diodes together make up pixels.
195.	**LCD and LED monitors**	Modern LCD (liquid crystal display/diode) monitors are back lit using LEDs rather than CCFLs (cold cathode fluorescent lamps). LCD monitors need to be back lit because they don't produce their own light. ADVANTAGES OF LED > CCFL 1. reach maximum brightness much faster 2. give a whiter light making image more vivid 3. has brighter light, improving colour definition 4. displays can be thinner and lighter in weight 5. LEDs last a very long time 6. consume much less power, therefore run much cooler Newer monitors and tvs use OLEDs (organic LED) ADVANTAGES OF OLEDs > LEDs allow for thin and flexible screens which are very light weight much brighter don't need back lighting much larger field of view
196.	**LCD projector**	use chromatic-coated mirrors which reflect light at different wavelengths. The light components pass through three LCD screens which are recombined using a prism to produce the colour image which is projected onto a large screen.

197.	**LED**	Used for backlighting a monitor/tv - they are thin, produce a white light, and do not require much power Advantages: Reaches maximum brightness quickly colours are vivid Good colour definition and contrast Screens are thinner More reliable as they last longer Consumes less energy
198.	**LED**	A screen lighting technique which provides better contrast and brightness than CCFL.
199.	**Light projectors**	two main types DLP and LCD
200.	**List 3 uses of 3d printing**	custom prosthetic limbs, precise reconstructive surgery, wings and other plane parts, making parts for items that are no longer produced like old car parts
201.	**List the 5 steps to create a solid object in a 3d printer**	1. A design is made using Computer aided design or CAD 2. The drawing is imported into a software that formats it so a 3d printer can understand it 3. The 3d printer is set up to print 4. The object is built up layer by layer 5. Object is removed and prepared. This involves washing away support jelly and even removing excess plastic powder.
202.	**Logic Circuits**	These are made up of several logic gates and are designed to carry out a specific function.
203.	**logic error**	An error where the program doesn't do what the programmer wanted it to do
204.	**Logic Gates**	These take in binary inputs and produce a binary output using gates to regulate the output
205.	**Lossless Compression**	Compresses the file, but all the data from original file is reconstructed when file is uncompressed.
206.	**Lossless image compression**	Find groups of repeating data. Records the data once and the number of times it was repeated.
207.	**Lossless text compression**	Finds patterns in original text. Encodes each pattern in a dictionary
208.	**Lossy Compression**	Permanently removing data when compressing a file. .JPG is an example!
209.	**Lossy Compression**	Unnecessary data from original file is permanently eliminated. the file can't be reconstructed to create the original file
210.	**loudspeaker**	output device that produces sound using voltages at different levels which vibrate a cone in speaker housing
211.	**Loudspeakers**	convert analogue voltages into sound. If output is from a computer the digital signals are first converted into analogue signals using a DAC The rate at which the DAC can operate is called the sampling rate usually 44100 Hz/samples per second in a typical 16 bit system

212.	**low level language**	 language relating to specific architecture and hardware of a particular device - can refer to assembly lang or machine code
213.	**MAC**	Media Access Control - a unique code that identifies a device on the internet. It consists of two parts, the first half (6 hex characters) is the manufacturers code, and the second part (6 hex characters) is the unique code. Usually doesn't change, but can be UAA or LAA
214.	**MAC address**	A Media Access Control (MAC) address is assigned to each Network Interface Card (NIC) by the manufacturer •Your computer may have more than one MAC address, e.g. one for ethernet and one for wireless And a mobile phone may have two different MAC addresses - one for wireless and one for bluetooth A MAC address looks like this: 3B:14:E6:39:0A:2C Every networked device in the world has a unique MAC address There are 248 possible addresses - enough for 40,000 NICs per person with a world population of 7.125 billion!
215.	**MAC address**	 number which uniquely identifies a device - 1st half = manufacturer, 2nd = device itself - made up of 6 groups of hex digits
216.	**machine code**	the binary code that is specific to a machine and does not need translating in order to run
217.	**magnetic media**	secondary storage with mechanical parts which move over the surface to read and write data magnetically e.g. a hard disk, tape or floppy disk •Magnetic tape is a serial access medium. This means it has to be read starting at the beginning of the tape •It has a large capacity but is slow to transfer data •It is mainly used for "cold storage" for storing large volumes of data offline which will seldom be accessed •It is very cost-effective for large volumes of data and doesn't take up much storage space
218.	**MAR**	memory address register, where addresses of instruction are stored

219.	**Materials used in 3d printing**	Powdered resin, Powdered metal, paper, ceramic powder
220.	**maximum bit rate of a USB**	10000 megabits per second
221.	**maximum length of a USB (according to Cambridge iGCSE)**	5 meters
222.	**MDR**	memory data register, where the actual instruction is stored
223.	**media access control address**	an unique 24-bit identifier of every single device (the first 12 bits are given by the manufacturer, the next twelve by the computer itself)
224.	**Megabyte (MB)**	1024 kilobytes. 2 to the power of 20 bytes
225.	**Memory Dump**	Output of memory contents onto the printer or screen. Usually represented in hexadecimal.
226.	**Memory Unit**	Consists of addresses and registers. Each address will uniquely identify every location within the memory map.
227.	**Metadata regarding images is:**	•Metadata is data about data •This includes the: •Filename •Author •Date created and last modified •Bit depth, word count or resolution •File size •Metadata increases file size and therefore explains why manual calculations aren't always accurate
228.	**Methods to reduce the security risk**	- Use of anti-spyware software - The user should always be alert and look out for clues that their keyboard activity is being monitored - Using a mouse to select characters from passwords rather than typing them in using a keyboard can help reduce the risk
229.	**Methods to remove the risk of hacking**	- Use firewalls - Use of strong passwords and user IDs - Use of anti-hacking software
230.	**Methods to remove the risks of viruses**	- Install anti-virus software - Don't use software from unknown sources - Be careful when opening emails/attachments from unknown senders
231.	**Microphones**	Used to input sound into a computer. When it picks up the sound, a diaphragm vibrates producing an electric signal A sound card in computer converts the signal into digital so it can be stored in memory.
232.	**MIDI**	Musical instrument digital interface 1. system is associated with the storage of music file. 2. DOES NOT STORE SOUNDS, so size is relatively SMALL 3. Form of communications protocol allowing musical instruments to interact 4. consist of commands on how to produce a note, eg on/ff, pressure etc
233.	**MIDI**	A set of instructions for digital instruments to play synthesised sounds. Musical Instrument Digital Interface.
234.	**Modem**	Modem stands for Modulator / Demodulator It is needed to convert the digital signal from the computer to an analogue signal used by telephone lines A second modem at the receiving end converts the signal back to digital
235.	**Mouse**	A pointing device which is moved around an area by a user.

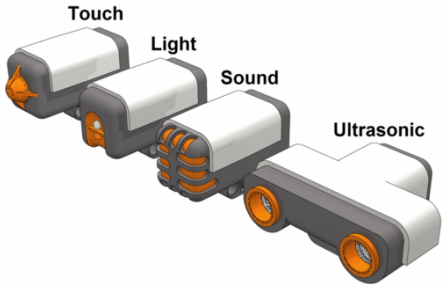
236.	**MP3**	MPEG-3 1. uses audio compression 2. store music in MP3 format 3. 90% smaller than CD music files 4. Lossy 5. Quality of sound retained by using perceptual music shaping.
237.	**MP4**	MPEG-4 1. Store multi media rather than just music (music, video, photos and animation)
238.	**Name three things hexadecimal can be used for.**	MAC addresses, Memory dumps, HTML colour coding
239.	**Name two types of projector**	LCD and digital light projectors
240.	**Nibble**	4 bits or half a byte
241.	**non-volatile**	memory that doesn't lose its contents when the power is off e.g. hard disk Offline storage and secondary storage are examples of non-volatile memory.
242.	**OCR**	Used with scanners to convert scanned text into a text file format
243.	**Off-line Storage**	CD/DVD/DVDRAM (all optical) , blu ray disks (optical media), flash memory/memory stick/SD XD cards (solid state devices) and removable HDDs (magnetic media
244.	**off-line storage**	storage that can be physically moved away from a device and stored somewhere else e.g. CD, USB stick, DVD Usually non-volitile Easily connected to a computer. Not directly accessible by the CPU

245.	**OLED**	Organic LED (OLED) technology New technology used for tv/monitor screens, using a cathode and anode. Flexible, no backlighting required. Principles: 1) Electrons flow from the cathode towards the positive anode 2) 'Holes' represent a space for a missing electron 3) When the 'holes' meet electrons they cancel each other out and emit energy in the form of light 4) A set of red, green and blue OLEDs works like an LCD pixel OLED screens are much thinner and lighter than traditional LCD or LED screens •Plastic, rather than glass also makes them flexible •The light emitted from an OLED system is much brighter than the LCD or LED screens Why so good? •OLEDs generate their own light so there is no need for the complexity of back lighting •Much less power is consumed; this has a clear advantage when producing screens for battery operated devices (e.g. mobile phones, tablets and smart watches); it also means little heat is produced (reducing fire risks) and running costs are also reduced •They have a larger field of view than LCD screens - and this is further enhanced when the screen is curved Why not so good? •Increased production costs •OLED layers wear out about four times faster than LCD or LED screens •OLED screens are affected by water and other contaminants
246.	**Operating System**	Software running in the background of a computer system. It manages many of the basic functions. Functions: User Interface- Memory Management- Peripheral Management- Multi Tasking- Security
247.	**optical media**	secondary storage that is read using lasers e.g. CD, DVD Principles: 1) Data is stored as pits and lands burnt into a spiral track circulating outwards from the centre 2) A laser beam passes over the pits and lands the level of reflection is measured 3) From this signal, 0s and 1s can be derived from reflections or no reflections •Advantages: •Cheap, very easily portable, takes up little space physically •Disadvantages: •Less storage capacity compared to other types •Easily damaged / scratched, requires a CD reader •Slow write speeds •Uses: •Songs, videos and other multi-media storage, backup and archiving of data •Capacity: •CD-ROM - up to 720Mb •DVD - up to 8.4Gb •Blu-Ray - up to 50Gb

248.	**Outline process of sound being created in a speaker/headphones**	Sound comes from computer, digital data passes through a DAC and the then through an amplifier the sound then comes out of a speaker. Different sounds come from different voltages vibrating a cone at different frequencies and amplitudes
249.	**OUTPUT**	Used if the program is going to display something
250.	**Output device**	piece of hardware used to communicate results of data processing carried out by a computer. Computer converts the digital version into a human readable form.
251.	**Packet Switching**	Suppose you want to send a large file across the Internet The file is broken up into data "packets" of 512 bytes Each packet is given a header containing: •The IP (Internet Protocol) address it is going to •The IP address it has come from •The sequence number of the packet •The number of packets in the whole communication
252.	**Parallel data transmission**	A transmission technique in which multiple bits are transmitted across multiple transmission lines simultaneously. Possible crosstalk: This occurs when a signal from one line gets transferred to another line Possible skew: Each wire in a parallel cable has slightly different properties - they may all travel at difference speeds hence distance needs to be short!
253.	**parallel data transmission**	a data transmission system in which several bits (usually one byte) are sent down several channels/wires at the same time. Risk of skew when bits arrive out of sync
254.	**Parity bit**	Set to 1 or 0. Sent with a byte of data to make the total number of 1s odd or even for each byte.
255.	**parity bit**	when an even or odd parity is set the parity bit must be either a one or a zero to make the number of ones even or odd as per the agreed transmission method
256.	**parity byte**	each bit of this byte when placed under the corresponding of other seven bytes transmitted check in the same method as a parity bit
257.	**Parity Check**	Uses parity bits. Odd Parity / Even Parity agreed between sender and receiver. If it is not the agreed number, an error has occurred. Parity checks can be odd or even
258.	**parity check**	a check used to see if data was correctly transmitted according to the even or odd agreed-upon parity transmission convention
259.	**PC**	Program counter, contains the address of the next instruction
260.	**Petabyte (PB)**	1024 terabytes. 2 to the power of 50 bytes
261.	**Pharming**	Malicious code installed on a user's hard drive or on the web server; the code will send the user to a fake/bogus website without their knowledge - used to gain personal information
262.	**Phishing**	Sending out a legitimate-looking email. When the recipient clicks on a link in the email, they are sent to a bogus/fake website - used to gain personal information
263.	**Piezoelectric**	A crystal is located at the back of the ink reservoir for each nozzle. The crystal is given a tiny electrical charge causing it to vibrate. The vibration forces ink to be ejected and at the same time more ink is drawn up.
264.	**Pixel**	A group of 3-4 Diodes of colours Red, Green, Blue and sometimes Yellow
265.	**plain text**	text/data before it has gone through encryption algorithm.
266.	**PNG**	Lossless picture file format that uses alpha channel to keep transparent backgrounds.

267.	**Pointing Devices**	Mouse and Tracker ball - used to controll cursor on the screen Normally has two button, one for selection and one for other functions Trackerballs are balls on a device that are rotated to control a cursor, you are less likely to get RSI from tracker ball than mouse
268.	**Primary memory**	RAM, ROM
269.	**Primary storage**	Includes RAM, DRAM, SRAM, and ROM
270.	**Print head in Inkjet Printers**	Nozzles that spray droplets of ink on to the paper to form characters
271.	**Processor**	contains ALU (Arithmetic and Logic Units) which allows logic and arithmetic to be carried out
272.	**program**	our way of telling a computer what to do, how to do it, and when to do it
273.	**proxy server**	this filters web traffic, keeps the IP address secret, and, using a cache, speeds up access to websites that have been visited before
274.	**QR codes**	Quick response codes. Type of barcode but can hold much more data than a barcode They are read by built in cameras in smart phones or tablets using an app and can be read from any angle. Traditional barcodes have to be lined up to be read. Once it has been scanned it will send info back to the phone eg a website link or general info.
275.	**" " (Quote marks)**	Used when printing something
276.	**RAM**	Volatile primary storage that is read=write enabled and volatile, used for storing data, programs or parts of the OS currently in use. Used as main memory in computer systems
277.	**RAM**	Random access memory 1. Volatile/tempory 2. Stores data, programs or parts of OS currently in use 3. Can be written to or read from 4. Can be DRAM or SRAM 5. Directly accessible by the CPU. DRAM - needs to be constantly refreshed to retain the data, uses millions of transistors and capacitors. SRAM - doesn't need to be constantly refreshed to retain its data, uses flip flop
278.	**Record Protocol**	Can be used with or without encryption
279.	**Register**	High speed storage in a computer
280.	**Resistive**	TECHNOLOGY: uses upper layer of polyester and bottom layer of glass when top layer touched, it completes a circuit microprocessor works out coordinates of where the screen was touched BENEFITS relatively cheap can use fingers, gloved hand, or stylus DRAWBACKS poor visibility in strong sunlight doesn't allow multitouch screen vulnerable to scratches

281.	**Resistive (Touch)Screen**	One upper layer of polyester and a bottom layer of glass. When top layer is touched it completes a circuit which is interpreted by a microprocessor to determine the co-ordinates. Allows multi-touch. Principles: 1) Uses multiple layers of material that transmit electric currents 2) When the top layer is pushed onto the lower layers, the electric current changes and the location of the touch is found.
282.	**ROM**	memory that is hard coded at time of manufacture. Stores start-up programs, bios and BOOTSTRAP This is primary memory and is non-volatile in nature.
283.	**ROM**	Read Only Memory 1. Non-volatile/permanent 2. Used to store start up procedures or BIOS (basic input/output system) 3. Can only be read and not written to.
284.	**Router**	A device that transfers data from one network to another in an intelligent way. A router is a hardware device that allows you to connect several computers and other devices to a single Internet connection, in a home network
285.	**RSI**	An injury created by frequently using devices like a keyboard. Often associated with gaming or repetitive office jobs or manual labour.
286.	**Sampling rate**	How fast a DAC can transfer digital to analogue signals
287.	**Sampling rate**	The rate at which the DAC takes samples of a sound. Correlates with sound quality.
288.	**secondary memory/storage**	long-term, non volatile storage media e.g. hard disk 'USB' is not a storage device!
289.	**Secondary storage**	Includes HDDs & SSDs, and off-line storage (CDs, DVDs, DVD-RAM, and blu-ray disks)
290.	**Secure Socket Layer (SSL)**	A type of protocol that allows data to be sent and received securely over the internet
291.	**Secure Sockets Layer (SSL)**	When a user logs onto a website, it encrypts the data. Only the user's computer + web server can make sense of what's being said. A green padlock in the status bar.

292.	**Sensors**	 Send data from world to computer often require an ADC converter Infr-red temperature sound/acoustic moisture pressure carbon dioxide / gas Magentic field
293.	**Serial Data Transmission**	Data is sent one bit at a time over a single channel/wire. Good over longer distances.
294.	**session caching**	this is used in TLS to avoid using too much computer time; TLS is able to attempt to resume an existing session, which increases speed.
295.	**shareware**	Software that users are allowed to try out, free of charge, for a certain period of time. It often lacks certain features that can be downloaded in the full, paid version. Characteristics: •The software is copyright •After the trial period, it must be paid for •Users are sometimes allowed and encouraged to make and share copies of trial versions, which helps to distribute it •The source code is not available and you cannot modify the software
296.	**Simplex**	Data sent in 1 direction only
297.	**simplex data transmission**	a data transmission system in which data can only be sent in one direction only e.g. computer to printer
298.	**solid state/flash memory**	secondary storage with no moving parts; used in memory sticks, cameras and phones •Basic features: •Solid-state storage use non-volatile flash memory to store information •Very fast read/write speeds due to data being physically close and easy to recover •No mechanical or moving parts Principles: 1) Large electric current used to force electrons through a barrier and trap them on the other side 2) They remain on the other side until "flashed" with a new current, hence the name 3) Trapped (charged) or not trapped = 0 or 1
299.	**Speech recognition**	uses microphones converts speech pattern into digital form Digital image is broken up into phonemes which are compared to words stored in the built in dictionary.

300.	**Spyware**	Software that gathers information by monitoring key presses on the user's keyboard; the information is then sent back to the person who sent the software
301.	**spyware/key logging software**	Spyware is software that covertly gathers information from your computer It can collect usernames and passwords, email addresses or credit card details It can also install more spyware on your machine to read your cookies and change your system preferences The information is all sent back to the spyware author who can use or sell the data for advertising or crime including identity theft
302.	**SRAM**	type of RAM that has 'flip flops' to hold each bit of memory. Does not need constant refreshing. When comparing SRAM to DRAM: SRAM is faster but more expensive than DRAM, and as such DRAMis preferred for the main RAM of a computersystem. However, a small amount of SRAM is placed between the main RAM and the processor and is called the cache. As such cache is a smaller and faster RAM (SRAM) that temporarily stores instructions and data so that the processor does not need to access the slower main memory (DRAM)
303.	**SRAM**	 type of RAM that has 'flip flops' to hold each bit of memory. Does not need constant refreshing.
304.	**SSD**	Solid State Drive 1. no moving parts 2. All data is retrieved at the same rate so latency isn't an issue 3. Most SSDs use NAND chips to control movement of electrons. 4. Some SSDs use EEPROMS (electronically erasable programmable read only memory) which use NOR chips ADVANTAGES to SSD vs HDD 1. more reliable and robust (no moving parts) 2. Lighter in weight and also thinner 3. Consume less power and run much cooler 4. no need to wait for it to 'get up to speed' and it has a faster data access rate
305.	**SSL**	this is used on web browsers to allow data to be sent/received securely. It encrypts data so that only the sender and receiver can understand the information being transmitted
306.	**symmetric encryption**	this uses a secret key, applied to the message, file that could be a combination of characters. The same key is needed by both sender and receiver to encrypt and decrypt the message.
307.	**Synchronous Data Transmission**	A continuous stream of data which is accompanied by timing signals generated by an internal clock
308.	**synchronous data transmission**	a data transmission system in which data is sent at specific continuous intervals generated by an internal clock. there are no control bits and the data is reassembled into bytes

309.	**Tasks carried out by a firewall**	Examining traffic between computer and network Checking whether data meets set of criteria If not, will block the traffic and give user warning Logs traffic to allow interrogation by user Criteria can be set to prevent access to undesirable sites, the firewall can keep a list of all undesirable IP addresses Warns user if software is trying to access data
310.	**•TCP (Transmission Control Protocol)**	provides reliable, ordered, and error-checked delivery of a stream of packets on the internet. TCP is tightly linked with IP and usually seen as TCP/IP in writing. Principles: •Breaks up messages sent over the Internet into small chunks called packets •Reassembles the packets at the other end •Detects errors •Resends lost messages
311.	**Terabyte (TB)**	1024 gigabytes. 2 to the power of 40 bytes.
312.	**Text and number file formats**	Text: 1. stored in ASCII 2. Lossless Numbers: 1. stored as real, integer, currency etc 2. Lossless because accuracy is v important
313.	**Thermal Bubble**	Tiny resistors create heat that vaporises ink. This makes the ink form a bubble. As the bubble expands some ink is ejected from the print head to the paper. The bubble then collapses and the small vacuum sucks in new ink. This goes on till the printing cycle is complete
314.	**Thrashing**	It takes time to copy files in and out or RAM, and after a while the computer operates noticeably slower When RAM is really full and the user keeps swapping between tasks, the computer spends more time moving files around than getting on with processing.
315.	**Three types of buses**	Address bus, data bus and control bus
316.	**Three Types of Printers**	laser inject and dot matrix
317.	**TLS - Transport Layer Security**	this is a form of secure data transmission made up of 2 layers: the record protocol, and the handshaking protocol. It is very secure and fairly new, and can make use of session caching, which improves performance. It involves many complicated encryption algorithms. prevents third party hacking into communication between web server and the user's computer.
318.	**Touch Screens**	allow selections to be made by touching an icon or menu on a screen Can be used as a virtual keyboard. Main types are capacitive, infra red, or resistive
319.	**Trackerball**	A pointing device where a ball on top of the device moves the cursor. Ideal for environments with little space. Users are less likely to suffer injuries such as RSI.
320.	**translator**	program that changes higher level language into machine code.
321.	**Truth Tables**	Logically work out the output of a logic circuit by writing a table.
322.	**Two examples of freeware**	Skype/Adobe Flash Player

323.	**Two types of encryption**	Symmetric and Asymmetric
324.	**the types of cables in a USB**	pin 1: vbus pin 2: data - pin 3: data + pin 4: earth
325.	**Uniform Resource Locator**	Web address, three parts: Protocol (http) Server name (www.hoddereducation.co.uk) File name (igcse_computer_science)
326.	**UPS**	uninterruptable power supply
327.	**URL**	Web address. Consists of protocol, web server name and file name.
328.	**URL - uniform resource locator**	used to find/identify a webpage on the internet - essentially it is the address of the webpage in standard English. 1. webserver name 2. file name 3. protocol
329.	**USB**	universal serial bus
330.	**Use of buffer**	Loading a video stream
331.	**virtual memory**	Part of the hard disk that is programmed to work as an extension of main memory. Often when primary memory is running low. Example: You now want to open a browser to search the Internet. The browser software needs more memory than you have free in RAM! A program that is in RAM, but not currently being executed, is moved out to hard disk to make room for the browser When RAM is almost full, programs and data are constantly being swapped out to disk and back into RAM as soon as the user needs them Hard disk space used in this way is called virtual memory Extra: Swapping (also called paging) is the process the OS uses to move data between RAM and virtual memory. The OS moves data from processes that are not immediately needed out of the RAM and stores them in virtual memory. It copies the data back into RAM when the process is needed again.
332.	**Virus**	program/software that replicates/copies itself - can delete or alter files/data stored on a computer - can make the computer "crash"/run slow
333.	**Virus**	Program or program code that can replicate/copy itself with the intention of deleting or corrupting files, or cause the computer to malfunction
334.	**Voice recognition**	Voice recognition uses microphones. It compares wave patterns from a person's voice with wave patterns stored in memory, if they match the person is identified
335.	**volatile**	memory that loses its contents when the power is off eg. main memory such as RAM
336.	**Wardriving**	The act of locating and using wireless internet connections illegally; it only requires a laptop (or other portable device), a wireless network card and an antenna to pick up wireless signals

337.	**Wardriving**	Using wireless internet connections illegally through a portable device.
338.	**Wardriving**	To locate and use wireless internet connections illegally. Needs a laptop, wireless network card and an antenna to pick up the signals.
339.	**wardriving**	stealing someone's WiFi by being mobile and searching for unprotected WiFi which you can join.
340.	**.WAV**	uncompressed music files
341.	**.WAV**	Uncompressed music files
342.	**Ways to eliminate the chances of getting a computer virus:**	Use a firewall Use a proxy server Do not share or download software/files from unknown sources Do not share offline storage Do not open or take care upon opening attachments Do not connect your computer to a network Limit the access to the computer.
343.	**Ways to improve the security of their website.**	Alerts Biometric Security protocol Encryption Firewall Anti-virus
344.	**Ways to prevent accidental loss of data**	- Use of back-ups in case data is lost or corrupted through an accidental operation - Save data on a regular basis - Use of passwords and user IDs to restrict access to authorized users only
345.	**web browser**	Software that allows a user to display a webpage on their screen - they interpret html code and show the result Principles: •The user types a web address (URL) into the browser's address bar •The web browser forwards this request to the web server to access the web page •The web server acknowledges the request and sends the HTML source code for the web page to the user's computer •The source code is rendered (translated) into a viewable web page
346.	**What 4 colours do Inkjet Printers use**	Blue, Yellow, Magenta and Black
347.	**What advantages do SSDs hold over HDDs?**	- more reliable and robust - lighter and thinner - consume less power and run much cooler - no need for SSDs to get up to speed and faster data access rate
348.	**What are 3 automatic adjustments that a microprocessor in a digital camera make?**	Shutter speed, aperture size, size of image
349.	**What are the 3 types of touchscreen?**	Capacitive, Infra-red, Resistive
350.	**What are the most common types of sensors?**	Monitoring and Control
351.	**What are the three types of storage medium technology?**	Magnetic: Mechanical parts move over the disk's surface to read and write data magnetically Solid State: Data is recorded onto solid memory chips without any moving parts Optical: Lasers read and write data using light

352. **What are the two most common pointing devices?**	Mouse and trackerpad
353. **What are the two types of RAM?**	DRAM (dynamic) and SRAM (static)
354. **What are the two types of software?**	system software and application software.
355. **What are two external factors that affect the quality of the photograph?**	Type of lens and lighting
356. **What are two ways that control sensors are used on the street?**	Street lighting and traffic light control
357. **What base is hexadecimal?**	Base 16
358. **What component of a machine is responsible for controlling systems in control applications?**	Actuators
359. **What determines the file size of a photograph?**	Number of pixels
360. **What did Von Neumann architecture change about computers**	Memory and data were to be stored rather than fed through every time
361. **What direction is the address bus**	Unidirectional
362. **What direction is the control bus**	Both unidirectional and bi-directional
363. **What does an assembler do?**	Translates a program in assembly language or machine code so that it can be used by a computer to perform a required task, distributed for general use, assembled program can be used without the assembler
364. **What does each partition of a memory unit contain?**	An address and its contents
365. **What does latency refer to?**	The time taken for a specific block of data on a track to rotate around to the read-write head
366. **What do instructions during a boot up do?**	Check hardware, processor, internal memory and BIOS (basic input output system)
367. **What do most computer systems use to prevent the microprocessor waiting for keys to be pressed?**	Keyboard buffer
368. **What do off-line storage devices include?**	CD, DVD, DVD-RAM, blu-ray disks, flash memory, memory sticks, SD-XD cards, and removable HDDs
369. **What do some types of SSDs use to control the movement of electrons?**	EEPROM, which uses NOR gates
370. **What do the most common types of SSDs use to control the movement of electrons?**	NAND gates
371. **What happens when a runtime error occurs**	Error that occurs during the execution of a program. Indicate bugs in the program or problems that the designers had anticipated but couldn't do anything about. Running out of memory could cause a runtime error.
372. **What injury are users prone to who do a lot of typing?**	Repetitive Strain Injury (RSI) Common issues such as Carpel tunnel syndrome.
373. **What is a bus**	These are connections which move data around the computer and send out control signals to synchronise operations.
374. **What is an address**	This is the location of where data can be found in computer memory

375.	**What is a register**	A register is a high speed storage area within a computer
376.	**What is a single user multitasking OS?**	Only one user can use it at one time, but they can run several applications at once. e.g. windows
377.	**What is OLED**	It is much more flexible and lets you bend the screen giving a good picture from every angle No backlighting is needed as electrodes give off their own light Organic material make semiconductors
378.	**What is the control unit?**	The control unit controls the operation of the memory, processor and input/ output devices
379.	**What is the data bus?**	This sends data between the processor and the memory unit and the Input/Output devices
380.	**What is the definition of an Input Device?**	Any device that allows a computer to receive data from the outside world
381.	**What is the most common environment for where trackerballs are used?**	Control rooms
382.	**What is the name of the cell that light passes through the lens onto in a digital camera?**	Light-sensitive cell
383.	**What is the role of an address bus?**	This carries signals relating to addresses between the processor and the memory
384.	**what is the role of the control bus?**	This carries signals relating to the control and coordination of all activities within the computer
385.	**What is the stored program concept?**	Holds programs and data in memory. Data moves between the memory unit and the processor. This is the Stored Program Concept The program is stored in secondary storage. Data and instructions are moved memory / RAM. Data and instructions are stored in the same memory / RAM. Data and instructions are moved to registers to be executed. Instructions are fetched one at a time.
386.	**What is WIMP interface?**	Windows, Icons, Menus, Pointers
387.	**What kinds of devices are MIDI files suitable for?**	Devices with limited memory, like mobile phones
388.	**Whats a syntax error?**	Where a program statement doesn't obey the rules of the programming language
389.	**What technology does DVD-RAM employ?**	Concentric tracks allowing for simultaneous read-write operation
390.	**What two varieties do CDs/DVDs come in?**	R or RW (read or read-write)
391.	**What type of scanner is used at airports to read passport pages?**	2D Scanners
392.	**When a computer is turned on instructions are loaded to memory from where?**	ROM (read only memory) The ROM stores the factory settings and start up routines required to boot the computer.
393.	**When using machine code, do programmers use hexadecimal or binary? Why?**	Hex, because it is easier to read with less symbols.
394.	**Where is a proxy server situated?**	Between the user's computer and the web server
395.	**Where is the ALU?**	In the processor

396. **Which base do computers scan when carrying out commands?**	Binary, base 2
397. **Which type of RAM doesn't need to be constantly refreshed?**	SRAM
398. **Which type of RAM must be constantly refreshed to retain data?**	DRAM
399. **Which type of RAM uses flip flops to retain data?**	SRAM
400. **Which type of RAM uses millions of transistors and capacitors?**	DRAM
401. **Why are ethic important?**	1. Help to stop the misuse of computers 2. Use of computers needs to be governed 3. Help keep users safer when using computers 4. Provides rules for using computers 5. Helps stop intellectual property theft 6. Reference to laws 7. Reference to security issues
402. **Why are LEDs used**	LCD does not emit light so it needs to be backlit by LEDs
403. **Why can blu-ray disks hold more data than CDs/DVDs?**	Wavelength of blue light is shorter than of red light
404. **Why can DVDs hold more data than CDs?**	Dual layering technology
405. **Why do people use low level languages**	To make use of special hardware, to make use of special machine-dependant instructions, to write code that doesn't take up a lot of space in primary memory, to write code that performs tasks quickly
406. **Why do text files use lossless data compression?**	Accuracy of data for these purposes is very important
407. **Why is DVD-RAM suitable for archives?**	Great longevity
408. **Why specifically LEDs not CCFL**	LEDs reach maximum brightness almost immediately, They have whiter light making more vivid images, Monitors are much thinner, LEDs last longer and are much more reliable, LEDs are more power efficient and produce less heat
409. **Why use a GUI in an OS?**	Make it user friendly
410. **With SDDs, why is latency not an issue?**	SDDs have no moving parts so data is retrieved at the same rate
411. **Would hexadecimal mainly be used in a high-level language or a low-level language?**	Low-level