

OCR Level 1/2 Cambridge National Certificate in Information Technologies



Entry code R012 - Understanding tools, techniques, methods and processes for technological solutions

- 1 hour 45 minutes written examination
- 80 marks (120 UMS)
- OCR-set and marked
- Exam assessment in June 2018 and then every January and June.

You will be sitting the written exam in January 2021

This will directly assess the learning outcomes titled as 'Understand':

LO1: Understand the tools and techniques that can be used to initiate and plan solutions

LO3: Understand how data and information can be collected, stored and used

LO4: Understand the factors to be considered when collecting and processing data and storing data/information

LO6: Understand the different methods of processing data and presenting information.

You should be reading and revising in order to prepare for your return to school in September

Knowledge Organisers - the following slides break down the different topics.

You should spend time reading them alongside your revision guide and key words.

At least 20 – 30 minutes a day will help to improve our knowledge and understanding.

Spreadsheets

Spreadsheet Uses

Explanation

Spreadsheets are designed to **store**, **process** and **manipulate numerical data**.

The **format** of the **data** can be **set** to meet desired objectives.

Formulas and **functions** can be used to **process** the **data** and provide a user with instant recalculation.

Advantages and Disadvantages

Advantage	Disadvantage
Formulas can automatically recalculate	Model results may not be realistic
Modelling and What if investigations can be carried out	Novice users may struggle with formulas/functions
Data can be presented in a graph to make it easier to spot trends	Text can't be manipulated easily
Data can be shared electronically.	Formula errors can effect the results
Data can be saved and backed up.	Spreadsheets are complex and may take a while to create

Functions

Function	Explanation / Example
IF	An IF statement checks to see if a statement is true or false and then does one of two things depending on the result. E.g. true or false on a spreadsheet quiz
SUM	It is one of the most basic functions of a spreadsheet as it is designed to add up a range of numbers. E.g. Adding up total sales at a bun sale
COUNT IF	A Count if formula will add up numbers only if those numbers meet certain conditions (criteria). E.g. Counting correct examples of a spreadsheet quiz
AVERAGE	Alternatively referred to as the arithmetic mean, an average is the sum of a series of numbers, divided by the total amount of numbers. E.g. to find out an average class score
MAX / MIN	These two functions find the smallest and largest value in an array. E.g. to find out the maximum or minimum scores in a test

Spreadsheet Features

Feature	Explanation
Merged Cells	Merge cell is a function in database software that allows multiple adjacent cells to be combined into a single larger cell
Wrapped Text	While working in a spreadsheet, you may enter more data into a cell than space allows. Wrapped text will set cells to automatically change height to reveal all the cell's contents.
Charts/Graphs	Graphs make use of standard shapes such as lines, columns, XY Scatter and Pie Charts. Graphs normally have at least one vertical axis and a horizontal axis that allows one set of data to be plotted against another
Conditional Formatting	Conditional formatting will alter the appearance of a cell depending on what it contains. For example changing colour if one type of answer is given.
Macros	Macro programming is similar to computer languages, except the instructions are running inside an application.

Database

Validation

<u>Validation Type</u>	<u>Example of Use</u>
Presence Check	When a presence check is set up on a field then that field cannot be left blank, some data must be entered into it.
Format Check	Checks the data is in the right format- A National Insurance number is in the form LL 99 99 99 L where L is any letter and 9 is any number.
Length Check	Checks the data isn't too short or too long. A password which needs to be six letters long.
Range Check	Checks that a value falls within the specified range. Number of hours worked must be less than 50 and more than 0.
Input Masks	An Input mask controls what you can enter in a form field. For example the input mask for a field might be set up like this ###-###

Advantages and Disadvantages

<u>Advantages</u>	<u>Disadvantages</u>
Large amounts of data can be stored	Knowledge and skill with databases are needed to set one up.
Data can be added or edited when needed.	If more than one table is used then relationships need to be created.
Validation can be set on fields to ensure data is entered in the correct format and to minimise input errors	Security procedures need to be implemented if sensitive information is held.
Can be integrated with other software (Word Processing software) to send personalised letters.	Errors in data entry, validation or queries can affect the results

Definitions

<u>Key Words</u>	<u>Definition</u>
Database	A database enables the effective storage of data in a logical and structured way.
Table	A table contains a set of records
Record	A record is made up of one or more 'fields'. For example a name and address database could have one record such as this:
Field	A field is a single piece of data about one person or one thing. A field is usually a single column within a multi-column table.
Form	A database uses form(s) as a way to present data. These allow data to be presented in an easier to understand format to the user. They may also include buttons to move between records, add/delete records.
Query	As a database stores a large amount of information, there may be times when the data needs to be queried . This means to search the data .
Report	A report is a document (paper or electronic) that presents data in an easy-to-read, professional format.

Examples of Database Use

Example

Holding personal data. E.g. About customers

Sending personalised letters using mail merges

Keeping track of all models by car manufactures in case of any recalls/keeping track of service history.

Keeping income tax records in the Government.

SOFTWARE

Desktop Publishing Software: Advantages and Disadvantages

<u>Advantages</u>	<u>Disadvantages</u>
Frames can be used to position text and images in the document	Different DTP software publishers have compatibility issues.
Drag and drop can be used to place images and other components into the desired places	Can be difficult to create very precise layouts unless the user is experienced.
Texts and graphics can be imported from different sources	
Software usually includes a range of templates so a novice user can quickly create a document	

Examples/Uses of Different Software

<u>Word Processing Software</u>	<u>Desktop Publishing Software</u>	<u>Presentation Software</u>
1. Letters	1. Newsletters	1. Creating Presentations to convey information
2. Reports	2. Flyers/posters	2. Rolling presentations for use in receptions/waiting rooms
3. Mail merging	3. Brochures	3.

Presentation Software: Advantages and Disadvantages

<u>Advantages</u>	<u>Disadvantages</u>
Slides can include a range of components (texts, images, graphs)	Too much text on a slide can make the information difficult to read
A template can be used so that all slides in the presentation look the same	Effects such as animations and transitions can become distracting
The message can be delivered to a large audience, in a large space, without the need to print	Presentations may become unprofessional if too many features and effects are used
A speaker can decide when to move to the next slide based on audience involvement, allowing questions to be asked.	

Word Processing Software: Advantages and Disadvantages

<u>Advantages</u>	<u>Disadvantages</u>
Easy to correct mistakes	Files can sometimes become corrupted
Documents can be saved and retrieved later	There may be a limited choice of symbols
Spelling and grammar checks can be used to improve the document	A device with the software installed is needed to create these documents
Document guides are available on how to lay out specific types of document	
Data can be imported from other files	

PRESENTING INFORMATION

The Impact of Distributing Information

Definition	What might happen if/when information is sent out by an organisation
Considerations	What will happen if the information is distributed in a presentation with sound and video or chart on a report? How will this information positively impact on the audience? How will this information negatively impact on the audience?

The Distribution Channel

Definition	The methods that can be used to share information by individuals or organisations
Examples	Messaging Services Email/Social Media/Internal Messaging Websites Blogs/Vlogs/Intranet/Internet Voice over Internet Protocol (VOIP) Skype/Podcast

The Presentation Method

Definition	How the information will be presented by individuals or organisations
Examples	Report Presentation to a board/ customers Graphs/ charts Tables Integrated documents End user documents

Target Audience

Definition	Who the information is aimed at
Examples of types of TA	Gender Age Ethnicity Income Location Accessibility Can the information be accessed easily Disabilities

Content Limitations

Definition	An organisation may specify how they want information presented
Considerations	How to present the information The use of house styles Information that must be included – Contact details etc. Use of existing templates Word limits on reports

The Availability of Information

Definition	How an organisation gets hold of the relevant information they want.
Considerations	Is it real time? Weather/Travel/Traffic/Alexa Current location Accessibility – Connections/Cloud Delayed information Delay in release

Distribution Channel

Messaging Services Advantages	Messaging Services Disadvantages
Wide range of people can be sent or access the data	Security settings need to be considered.
Data can be targeted to specific groups.	Accounts can be hacked, leading to identity theft.
Can be used as a marketing tool to gather feedback	People can post inappropriate material.

Websites Advantages	Websites Disadvantages
Can be used to get feedback	Data can become out of date.
Can be easy to update	You may have to provide your location to access data.
Widely available.	

VOIP Advantages	VOIP Disadvantages
Free if internet connection available	Voice quality needs to be good.
Data can be sent at the same as the VOIP call takes place	Each caller must have the correct hardware and software.
Features such as call forwarding and three way calls can be used.	Voice quality needs to be good.

Multimedia Advantages	Multimedia Disadvantages
Data can be shown or made available to many people	If too many elements are used then message can be lost.
Embedded links to other sites/social media.	Requires specific hardware/software
Different elements can be used – text/image/sound/video etc.	Too much information given.

Cloud Based Advantages	Cloud Based Disadvantages
Files are stored off site so easy to back up	Must have internet access to access files.
Access rights can be given so documents can be shared.	Cloud provider has access to the data.
More cloud storage can be bought when needed.	

Mobile Apps Advantages	Mobile Apps Disadvantages
Features can be included to improve user interaction.	Apps need to be constantly monitored and updated.
Money can be raised from subscriptions/advertising.	Regular maintenance needs to be carried out.
Apps can provide links to social media	App needs to be included on the App Store and promoted so that users know about it.

Presentation Methods

Reports Advantages	Reports Disadvantages
Collated information can be presented as a report	Too much information may mean user doesn't read it fully.
Use of headings and subheadings	If information doesn't flow then user becomes confused
Graph/charts can be included	SPAG issues

Presentation Advantages	Presentation Disadvantages
Can include different components (text, images, graphs, video)	Unprofessional presentations if too many features are used.
Templates can be used	Animations and transitions can become distracting.
Can be presented by a speaker or automatically.	Too much text makes slides hard to read.

Graphs/Charts Advantages	Graphs/Charts Disadvantages
Graphs/charts can help a user visualise information	Poor graphs/charts can cause users to misinterpret data.
Titles and labels can be used to give a context	If wrong data is used then wrong graph will be created
Trends and patterns can be identified.	Using wrong type of graphs can make data hard to interpret.

Tables Advantages	Tables Disadvantages
Information can be shown clearly and in easy to understand format	Headings must indicate what that part of table shows.
Good for summarising data.	Can't provide full details.

Integrated Documents Advantages	Integrated Documents Disadvantages
Components from other documents can be included.	Software may be incompatible so components don't display
Graphs and charts used to help visualise key information	Too many components can distract from the information.

End User Documentation Advantages	End User Documentation Disadvantages
Can help users to install products correctly.	Must be written in an easy to understand language.
Can include diagrams to show a user what to do.	If lots of text then user may be confused.
Can be kept and referred to in case of future issues	Diagrams must be clear and labelled or they become confusing.

HARDWARE AND SOFTWARE

Hardware Definitions

<u>Term</u>	<u>Hardware Needed</u>
Report	Printer and monitor
Presentation	Projector, board and speakers
Graphs/Charts	Projector and board
Tables	Monitor
Integrated Documents	Network cable/ Wi-Fi router
End User Documents	Printer
Video Conference	Webcam, monitor, speakers and microphone

Hardware

<u>Scenario</u>	<u>Software Required</u>	<u>Hardware Required</u>
1. Video meeting taking place between 2 different schools	1. Video conferencing software	1. Webcam, microphone and monitor
2. Presentation on sales figures within a board room	2. Presentation software	2. Board, projector and speakers
3. Creating a brochure to give to potential students coming to a school	3. DTP software	3. Printer

Software Definitions

<u>Term</u>	<u>Software Needed</u>
Report	Database software and word processing software
Presentation	Presentation software
Graphs/Charts	Spreadsheet software and word processing software
Tables	Database software and spreadsheet software
Integrated Documents	Word processing software and web browser
End User Documents	Word processing software
Video Conference	Video conferencing software

Connectivity

<u>Term</u>	<u>Definition</u>
Connectivity	The connectivity requirements to view and use a resource will depend on where it is to be viewed and how it has been distributed
Storage of files	If resource is stored online/cloud then an internet connection is required.
Size of files	Size of resource must also be considered as large files take longer to download
Buffering	If files are too large it can cause delay in presenting information causing buffering

PROJECT LIFE CYCLE

Initiation Phase

<u>Requirements</u>	<u>Constraints</u>
Include Company logo	The timescale for the completion
Maintain company house style	The project budget
Targeted age group	The hardware/software that the final product should develop the product.
The format of the output from the final product	The hardware/software that the final product should be compatible with.

Question to be asked

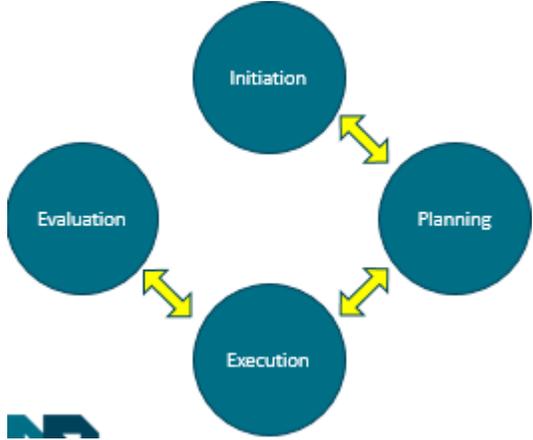
What is the end product?

Who is it for?

Which people are needed to complete the project?

What resources are needed to complete the project?

What is the timescale for the project?



NA

Advantages of the Project Life Cycle

Provides a structured approach

Clearly defined tasks to be completed in each phase

Clearly defined inputs and outputs for each phase

Clearly defined roles and responsibilities of each member of the project team

Resources can be allocated in advance so that issues can be dealt with in advance

Project managers can monitor progress of the project and ensure timely completion

End of phase reviews are used to ensure that the project is meeting success criteria and objectives.

Planning

<u>Stage of the Phase</u>	<u>Explanation</u>
Tasks	Tasks needed to complete the project
Time	Time needed to complete the project
Workflow	What needs to be completed before another task can start.
Contingency	Plan in time needed to still hit the final deadline
Milestones	Key deadlines for tasks to be started/finished by.
Resources	Resources needed to complete each task.

Execution Fill in the blanks

- This is usually the longest phase in the project life cycle and this is where the product is created and tested.
- The **plan** created in the planning phase is used by the project manager to **identify** and **monitor** the **tasks** that need to be completed.
- The **plan** is also used to **mitigate** other risks such as **security**, **ethical**, **moral** and **legal** issues.
- If some of user **requirements** or **risks** may **change** and this could have a **negative** impact on whether the project is delivered on **time** and meets user **requirements**.

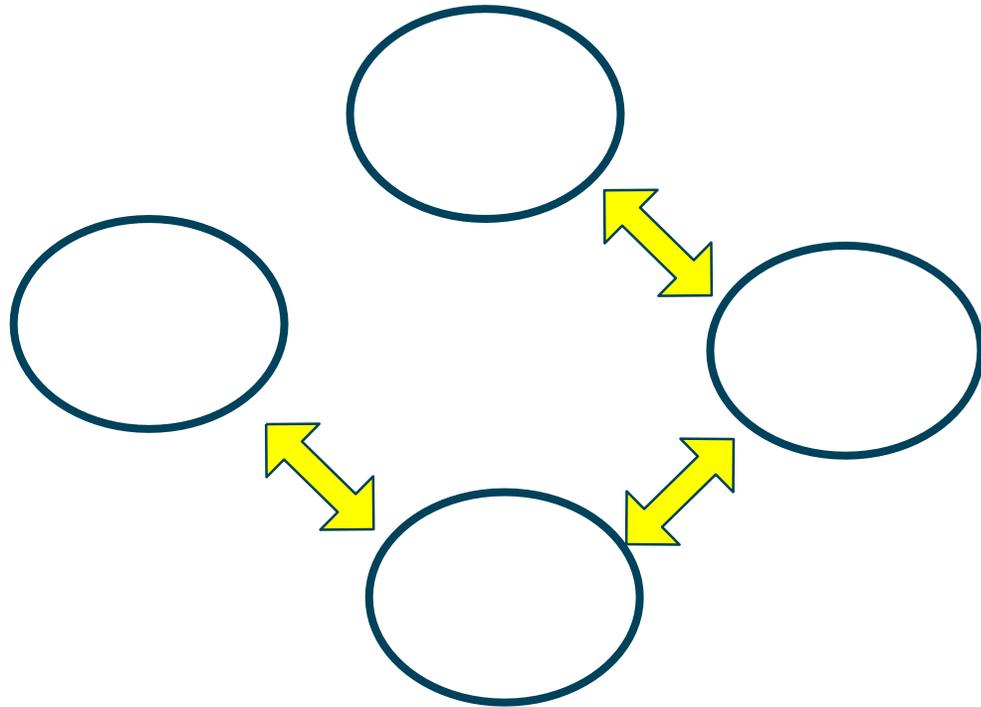
- At the **end** of this stage a phase **review** is carried out to confirm the project is complete before the ~~evaluation~~ **evaluation** phase begins.

<u>Feature</u>	<u>Explanation</u>
Installation Guide	installation guide which allows the user to reinstall the product in case of any hardware upgrades
User Guide	A user guide is also created for the client to use alongside the product and if any problems occur, they can rectify them.
Success of the Project	Measured against the success criteria and user requirements.
Deviations	Any changes from the original plan.
Effectiveness	The effect of processes and resources on creating the product
Maintainability	Including any future developments to the product

Final Evaluation Report

Definition	This review considers all aspects of the project throughout all phases.
Measure of Success	Measure success against the criteria/objectives
Review Of Changes	Review any changes from the original plan – including timescales
Evaluate Success	Evaluate the effect of processes and resources on delivering solutions
Assess Maintainability	Assess maintainability – does the system need further development?

Phase Recap



INPUTS AND OUTPUTS OF THE PROJECT LIFE CYCLE

Identify examples of inputs and outputs for each phase.

Phase	Inputs	Outputs
Initiation	User Requirements User Constraints	Feasibility Report Legislation Implications Phase Review
Planning	Feasibility Report Legislation Implications	Project Plan Test Plan Constraints List Phase Review
Execution	Project Plan Test Plan Constraints List	Deliverable Product Test results Phase Review
Evaluation	Deliverable Product Test results	Release of Deliverable Product User Documentation Final Evaluation Report

User Requirements	
Definition	Document must define what the client wants to achieve
Generic	Produce reports about products
Specific	Produce reports generated by product, fit onto A4 letter headed paper.

User Constraints	
Definition	Given to the project manager by the client for them to stick to .
Timescale	Tasks must be completed before specific deadlines.
Budget	Tasks must be completed on or under cost specified.
Hardware	Is there enough, and is it capable of completing the task
Software	Does it do what is required, is it able to be installed.

Feasibility Report	
Definition	Document that includes all of the answers and possible solutions to questions asked during the Initiation Phase
Constraints	Factors that will hinder the project
Requirements	Factors that are needed for the project to be successful

Legislation Implications	
Definitions	Consideration is given to which Acts/Laws/Regulations need to be adhered to.
Data Protection Act	controls the way information is handled and to give legal rights to people who have information stored about them.
Copyright	Protects original creators of content.
Computer Misuse Act	Hardware and Software within a company is protected under law.

Project Plan	
Definition	Document created by Project Manager to form the basis of the project
Area to include	Breakdown of tasks
Area to include	How the tasks link together
Area to include	Milestones and end date of the project

Test Plan	
Definition	testing to see if user requirements have been met .

Constraints List	
This is created from the User Constraints in the <u>initiation</u> Phase.	
It provides <u>further</u> detailed <u>information</u> about each constraint.	
It is regularly referred to ensure <u>constraints</u> are <u>adhered</u> to.	

Deliverable Product	
Definition	This is the product that has been created and tested .

Test Results	
Definition	This is the results of tests undertaken in the Execution Phase to make sure that every part of the product has been tested .

Release Of Deliverable Product	
When the product has been completed and checked against <u>requirements</u> and <u>constraints</u> then it is ready to hand over to the client.	
It will be installed onto their <u>Machine/network</u> where it will be checked again to see if it is working as intended.	

User Documentation	
Definition	Documents given to the end user to familiarise and fix issues.
User Guide	A user guide showing how to use the product
Installation Guide	An installation guide , to be used in future if the product needs to be reinstalled.
Test Plan	Test plans showing the results of tests carried out
Security Details	Security details showing built in security and how it was set up.

PROJECT CONSIDERATIONS

Smart Targets

Smart	Definition
Specific	Ensure targets are clear so that they are easy to monitor and measure success against.
Measurable	Targets should be measurable so the project manager can judge whether they are being achieved.
Achievable	Targets must be able to be met , otherwise the project would fail instantly.
Realistic	A realistic target is one that the project manager and team are able to work towards and achieve .
Timely	Add a timescale to the target so that the project doesn't just keep going.

Examples of Success Criteria

Examples
Target audience
Hardware platform that the product is to be installed on
Software platform that the product created with
How the product is to be accessed(network/cloud)
Components to be used
Input and output formats

Definitions

Key Words	Definition
User Requirements	User requirements are criteria put forward by the client that they wish to have included in the final product
Phase Review	This is undertaken at the end of each Project Phase to identify the current status of the project. The Project Review identifies the deliverables which have been produced to date and determines whether or not the project has met the objectives set
Monitoring	To observe and check the progress or quality of (something) over a period of time; keep under systematic review.
Initiation Stage	Initiation Phase is the 1st phase in the Project Management Life Cycle, as it involves starting up a new project. You can start a new project by defining its objectives, scope, purpose and deliverables to be produced
Success Criteria	Success criteria are the standards by which the project will be judged at the end to decide whether or not it has been successful in the eyes of the stakeholders

Constraints/ Limitations

Why are these constraints?	
Time	Projects will need to be completed within a certain time limit to ensure that objectives don't become outdated or gets too expensive.
Resource	Each project will only have a certain budget that they will have to stick to. They may also not have all software and hardware required for the project.
Regulations/ Laws	They will have to ensure they follow the different rules such as Data Protection Act, Copyrights and Computer Misuse Act to ensure.
Security/ Risk Management	They will have to ensure that they use physical and logical methods of stopping any security breaks. Such as locking doors and installing anti virus software.
Mitigation of Risk	Ensuring that they do not do anything which could cause risk to the project by lowering the chances of it occurring.

PLANNING TOOLS

Key Components of Gantt Charts

Date/Days along the top

Tasks down the left hand side

Blocks to represent the time allocated

Key milestones highlighted as shapes

Dependant tasks

Concurrent tasks

Advantages and Disadvantages

Tasks are shown against an estimated time schedule

Can be too simple for a complex project

Resources for each task can be shown

Task time is estimated so the plan may be unrealistic

Key Components of Visualisation Diagrams

Multiple images/graphics

Annotations

Size and position of images/graphics

Fonts

Position and style of text

Colours/themes

Advantages and Disadvantages

Information and data can be understood quickly, by non specialists

Not appropriate for large and complex projects

Emerging trends and patterns can be spotted quickly

Key Components of Task Lists

Tasks

Sub-tasks

Start Date

End Date

Duration

Resources

Advantages and Disadvantages

Can help focus on the tasks to be produced

Should not be used for large and complex projects

No tasks will be missed out.

Complete the gaps for Critical Path

The _____ is the _____ path that the project should take to be completed.

It _____ the tasks that are _____ and works out the time needed to complete all of them.

The critical path is used by the _____ to the project and to make sure that every task is running to _____.

Key Components of Flow Charts

Start point	Directional arrows
End points	Connecting lines
Decisions	Processes
Advantages and Disadvantages	
Can be useful for smaller projects with a small number of tasks and decisions	Does not show time allocated for each event
Does not need any specialist project planning knowledge to understand the flow chart	Tasks shown sequentially so does not show concurrent tasks obviously.

Key Components of Pert

Nodes

Sub-nodes

Time/duration links

Task **sequences**

Dependant tasks

Concurrent tasks

Can show a **critical path**

Advantages and Disadvantages

Can show slack time so resources can be reallocated

Needs skill and knowledge to be able to create

Tasks can be scheduled as dependant or concurrent

Can be limited in large and complex projects

Key Components of Mind Maps

Nodes	Key words
Sub-nodes	Colour
Branches/connecting lines	Images
Advantages and Disadvantages	
Easy to add tasks/ideas at any time	No time schedule
Can help focus on tasks and the links between them.	Can be difficult for others to understand
Shows dependant tasks	Does not show concurrent tasks

Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or output.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.

Data Type	Example	Description and how it can be used
Text	Hello	Any given character. To store names, Phone numbers.
Alphanumeric	37IR	Use of letters and numbers together. Postcodes
Integer	37	A whole number to be calculated. To store amounts of items.
Real	0.37	Numbers that use a decimal point. To store heights and weights.
Currency	£37.99	Money. Uses currency symbols £ \$...etc. Stores price information.
Percentage	37%	Used with a % sign to show percent of a whole amount. Could be used to show discounts.
Fraction	3/7	Used in spreadsheets to show fractions of whole amounts. Used to store results of calculations.
Decimal	0.3	Show an exact number using a decimal point. Used to store more accurate results of a calculation.
Date/Time	03/07/1990	Stores dates and times. Used to show a date or time.
Limited Choice	Drop down box	Limited choice of options. Used to store a specific answer. Validates it to always be a correct choice.
Object	Graphs	To store additional components, usually a chart in a spreadsheet.
Boolean	YES/NO	Two Choices of Data. Store answer to a closed question

	Data	Information
Definition	Raw facts and figures	Data given context and meaning.
Example	37 58 DH RW	Scores in the Test DH: 37 RW: 58

Are the following describing Data or Information	
Not Processed	Has no structure
Processed	Has a structure
Does not have a context	Has a context
Data	Information
Not Processed	Processed
Does not have context	Has Context
Has no structure	Has a structure

Validity means how **believable** the **data** and information **collected** is. One example of non- valid data and information could be that of “**fake news**”.

Incorrect data and information can be assumed to be wrong, out of date or **inaccurate**. The **reliability** of data taken from **secondary sources** can be sometimes **difficult to establish**. If data is taken from a **published source**, like a book, then it is **likely** to be **reliable**.

Biased data and info only gives **one point of view** or perspective. **Information** that may be **biased** may include; personal **opinion**, a statement that does not contain any fact, prejudiced either for or against a person, product or idea. There are several ways to **check** the **bias** of information, for example:

- Consider whether the information is **worded simply**, or **generalised**.
- Consider whether the information is based on **emotions**, rather than **facts**.
- Consider whether the information focuses on just **one side** of

DATA COLLECTION METHODS

Loyalty Scheme

Definition: In return for belonging to the scheme customers get different points or benefits. This scheme collects information for businesses to spot trends.

Advantages

Disadvantages

A loyalty scheme can keep customers using the business.

Some customers may feel that the data collected is an invasion of privacy.

Data is collected every time a purchase is made so customer shopping habits can be collected.

Consumer Panels

Definition: Groups of people who are asked by a business to give their opinions about products or services

Advantages

Disadvantages

The cost of consumer panel feedback can be low if online feedback methods are used.

If a product needs to be provided to the panel, there may be a delivery cost for this.

The feedback is specific to a product or service

Needs a range of people on the panel to avoid biased feedback.

Response rates are high as participants have agreed to take part.

The format of the feedback needs to match the processing that is to be carried out.

Email

Definition: Information can be sent and collected using email with an attached interactive form

Advantages

Disadvantages

The same email can be sent to many people at the same time.

Emails may be diverted into Spam/Junk folders

The results from emails can be automatically input into software for analysis

If fields don't match then the data being collected may be worthless

Questionnaires/Surveys Definition: Questionnaires/Surveys can be used to collect statistical data that can be processed to provide useful information.

Questionnaires/Surveys: Types of Questions

Open questions

Range questions

Closed questions

Rank order question

Advantages of Questionnaires/Surveys

Disadvantages of Questionnaires/Surveys

Large numbers of people can be asked to fill in the same questionnaire/survey

If the questionnaire/survey is online, people need the technology to be able to complete it.

Comparisons are easy to formulate (E.g. 75% think this...)

A badly designed question may not get the required data in the right format

Cheaper than interviews for a large number of people

Sensors definition: A sensor is device that responds to a change from the environment around it.

Sensors: type of sensors.

Heat

Light

Motion

Pressure

Infra red

Advantages of Sensors

Disadvantages of Sensors

Once set up, no human interaction is needed as data can be sent electronically.

The position of sensors need to be carefully considered to gain accurate data.

The data collected is usually more accurate than if it was collected by a person

Sensors may stop working.

Research Methods types

Primary Definition		Secondary Definition	
Research Methods- Examples			
Primary		Secondary	
Research Methods			
Advantages		Disadvantages	

Statistical Report

Definition:	
Advantages	Disadvantages

Scenario	Collection Method	Why?
Local business wanting information from their small customer base.		
International company wanting customer feedback on a new product.		
New upcoming tech company wants to test a new gadget and get	Interviews	

Definition:	
Advantages	Disadvantages

COLLECTION TECHNOLOGY

The Cloud

Definition	It is made up of a lot of servers and has a large storage capacity and this can be accessed from anywhere providing you have an internet connection
Examples/Providers	Dropbox, Microsoft One Drive, GoogleDrive
Advantages	Cloud storage allows for large files like music, videos and image collections to be stored online . Meaning they can use less storage on their devices
Disadvantages	An issue that might arise with cloud storage is security . Accounts could be hacked , so it is wise to consider what exact data is put into the cloud.

Hard Disk Drive

Definition of a Hard Disk Drive	Hard Drives uses spinning magnetic disks to store huge amounts of data . Modern devices use HDDs measured in GB and TB
How are files handled?	Files can be read, edited, re-written or deleted but they have the potential to break , due to their moving parts .
Uses of a HDD	Storing the operating system Storing files/software when the computer is not in use or turned off.
Negative issue	Can break if reader snaps inside.
Measured in	GB's and TB's

Barcode and QR Readers

Barcode readers scan unique barcodes on products. They can help retailers to identify products and control stock. Some retailers operate a "shop and scan system" whereby customers can scan their items into their trolley as they pick them off the shelves

QR codes are 2D barcodes and can store more data than standard barcodes. They are generally used in advertising as they can be read more quickly and can be scanned by most smart phones. The information contained within a QR code may be contact details, web addresses or discount vouchers.

Spreadsheet Features

Technology	Explanation/Definition	Examples?
Web Based Surveys	Web based surveys allow questionnaires or surveys to be completed electronically . When a survey has been completed the results of it are generally entered into the spreadsheet or database automatically , ready for processing .	Amazon asking for feedback after purchasing a product from them.
Wearable Technology	Wearable technology refers to smart electronic devices that can be worn .	Activity trackers Smart watches Headsets Glasses
Mobile Technology	Mobile technology refers to any device that can be transported by the user.	Smart phones Tablets GPS devices Ebook readers

STORAGE TECHNOLOGY

Optical Devices

Definition	Optical devices are CDs/DVDs/Blu-Rays that allow data to be stored onto them.
Two different suffix's for types of disk, and meaning	CD-R means that it can be read CD-RW means it can be read and written on
Uses	

What is the ascending order of data sizes from Bit to Terabyte?

Bits bytes kilobytes megabytes gigabytes Terabytes

Solid State Drives

Definition of Solid State Drive	Solid state drives uses flash memory to store software and large amounts of data
How are SSD different to HDD	There are no moving parts , which means that they are faster and more robust than hard drives.
Uses of SSD	Storing the operating system Storing files/software when the computer is not in use or turned off.
Measured in	GBS

Scenario

Total Rough Storage Amount

Storage Technology

Back up all data/work done over a 4 year course

GBS

Cloud

Important customer data for a month

MBS

Cloud

Photographer saving photos from a wedding.

GBS

Flash memory

Flash Memory

Definition	Flash memory is used in memory sticks or memory cards .
Two main devices that use it	They are used to store and transfer data between computers and between devices like cameras to computers
Uses	Saving small files onto memory sticks Saving photographs on cameras Saving contact details in phones.

BIG DATA

Lifestyle

Area	How they use data
Cars	SOS systems, and car trackers.
Energy	Solar panel locations. Smart Meters for accurate bills.
Security	Door locks to report to owners, insurance and security companies.
Social Media	Companies collect data based on likes, shares, retweets, comments, subscribers, views, tags...etc. Companies will use this massive amount of data to target adverts and specific people.

Big Data

Definition

Big Data is the term given to these **large sets of data** that is being **collected, processed and stored** is growing on a daily basis.

Size measured in

petabytes or **exabytes**.

Using Data

Advantages	Disadvantages
Large amounts of data can be found using a range of data stores	It is not always possible to know if the data is correct, if it has been gathered by somebody else.
Searches can be made to find the specific data required	Errors in the data can have a negative impact on people.
Time does not have to be wasted collecting new data.	It may not be possible to get the specific data required
Data can be shared by teams carrying out the same task.	Data must be kept up to date, with the data owners being informed when updates are made.
A range of different analyses can be carried out on data.	Incorrect data can lead to incorrect results
Data stores can interact to share data.	Sensitive data must be securely stored with good data security measures.

Optical Devices

<u>Area/Application</u>	<u>Uses of data</u>
Education	Attainment and Attendance. College MOOC collects data for a grade.
Health and Fitness	Medical data is gathered and shared for medical research.
Shopping	Analyse Trends and Patterns on a broad scale, and to offer personal promotions/deals to individual customers. Done through loyalty schemes.

Big Data is **collected** each time a **film** or **music** track is **streamed**. **Decisions to make** some films/TV shows are based upon how much **money** they have made or **viewing figures**.

By gathering this information some **companies** are able to **suggest programmes** that we might like based upon **viewing patterns**.

Music streaming services like **Spotify suggest tracks** and artists we might like **based** on **past music download** performances. By looking at viewing **histories, searches, reviews** and **ratings** producers can provide content that is wanted.

Information like user **age, time viewed** and **device used** are also collected. It is possible to provide **advertising** to viewers, **based on this specific data too**.

Law Enforcement

What does ANPR stand for?	Automatic Number Plate Recognition
What does the system look for and what does it check?	This system checks every number plate it sees automatically with the DVLA database to see if drivers have driving licenses and cars are fully taxed, insured and have an MOT .
How are speed cameras similar?	If a vehicle is travelling above the speed limit then an image of the number plate is taken and sent to the DVLA to issue a speeding notice .

Malware

Type of Malware	Why it is used?	How it works?	How to mitigate?
Adware	Adware makes money for the creator	Adware is also known as advertising supporting software. This is any software that automatically shows adverts and pop ups etc. Most adware is harmless but some may include spyware like key loggers etc.	Install, run and keep updated a security software package Do not open files from unknown sources Do not click any links in emails.
Bot	Bots take control of a computer system	A bot allows an attacker to take control of the affected computer without the users knowledge. It can result in a botnet which is a interconnected network of infected machines.	Install, run and keep updated a security software package Do not open files from unknown sources Do not click any links in emails.
Bug	Bugs are connected to software and are a flaw that produces an unwanted outcome.	Bugs are usually the result of human error when coding the software. They can usually be fixed by the creator issuing a fix or a patch. They can allow attackers to bypass security, override privileges or steal data.	Check for and install any patches that are released from software creators.
Ransom-ware	Ransomware holds a computer system captive and	Ransomware can restrict user access to the computer system by encrypting files or locking the system down. A message is usually	Do not open any files from an unknown source. Do not click links in emails.

Type of Malware	Why it is used?	How it works?	How to mitigate?
Rootkit	A rootkit is design to remotely access or control a computer without being detected by the security software.	When installed a rootkit can enable an attacker to remotely access files, steal data, modify configurations or control the computer.	Keeping security software up to date. Not downloading suspicious files.
Spyware	Spyware can collect data from an infected computer including personal information like log in details and financial records.	Spyware is usually hidden from the user and can be difficult to detect. Some spyware like key loggers may be monitoring the users. Spyware can install additional software or redirect the user to different websites.	Do not open any files from an unknown source. Do not click links in emails. Install, run and keep updated a security software package.
Trojan Horse	A trojan-horse is a standalone malicious software that is designed to give full control of a machine to another.	Trojans often appear to be something that is wanted by the machine. They can be hidden in valid programs and make copies of themselves, steal information or harm the host machine.	Do not open any files from an unknown source. Do not click links in emails. Install, run and keep updated a security software package.
Virus	A virus makes an attempt to make a computer system unreliable.	A virus is a computer program that replicated itself and reads from machine to machine. Viruses can infect other machines by infecting files that are accessed by other machines	Do not open any files from an unknown source. Do not click links in emails. Install, run and keep updated a security software package.
	A worm is a standalone	A worm can use a computer network to spread	Do not open any files from an unknown

THREATS TO DATA

Type of Social Engineering	Why it is used?	How it works?
Phishing	Phishing tries to get users to input their credit or debit card numbers, or security details or log in details into a fake website.	Phishing uses a fake website that looks identical to the real one. Common targets for phishing are banks and insurance websites. Attackers send out emails or texts from pretending to be banks, with fake links that takes the user to a fake website.
Pretexting	Pretexting is when a cyber criminal lies to get data or information.	This is a scam where the criminal pretends to need the information to confirm the identity of the person that they are talking to.
Baiting	Baiting tries to get victims to give cybercriminals the information they need.	Baiting is similar to phishing. Cybercriminals promise of goods to get the information that they need. E.g. Free downloads in exchange for log in details.
Quid Pro Quo	Quid pro quo tries to disable anti virus software updates so that malware can be installed to gain access to the system.	Similar to baiting except the promise is for a service rather than goods. A method is a phone call pretending to be an IT service provider offering assistance to fix problems.
Tailgating/ Piggybacking	Tailgating or Piggybacking means trying to gain access to a secure building or room.	The most common type of this is an attacker pretending to be a delivery driver and asking an authorised person to hold the door.
Shoulder surfing	Shoulder surfing aims to steal data and information	This is where private and confidential information is seen. E.g. An attacker may stand very close to someone using a cash machine in order to see their pin.

Definition of Hacking	
Hacking means finding weaknesses in an established system and exploiting them to gain unauthorised access.	
Type of hacking	Definition
White Hat	This is where the hacker is given permission to hack into systems to identify any loopholes or vulnerabilities. As this type of hacking is done with permission, it does not break any laws
Grey Hat	This is where the hacker hacks into computer systems for fun or to troll but without malicious intent. If a grey hat hacker finds a weakness they may offer to fix it for a fee.
Black Hat	This is where the hacker hacks into a computer system with malicious intent. This intent can include theft, exploiting the data stolen and selling the data on. Black hat hackers carry out illegal hacking and can be prosecuted under UK law.

Threat	Definition
DDOS	Distributed denial of service is an attempt to make a computer or network system unavailable to its users by flooding it with network traffic. A DDOS is usually focused on preventing an internet site from functioning efficiently, or at all, either temporarily or forever.
Pharming	Pharming is a cyber-security attack that tries to redirect visitors from a genuine website to a fake one. This is done without the knowledge or consent of the users. There are some similarities between phishing and pharming. Fraudulent websites are used by attackers carrying out both phishing and pharming attacks, but phishing attacks use fake or hoax emails

CYBER SECURITY

Environmental

With the increase in the use of mobile computer devices and the cloud, there are vulnerabilities that can affect data. E.g. if an earthquake occurred, it is probable that internet access would be lost. This would make the cloud inaccessible. It is possible that computer devices could be destroyed during tsunamis, earthquakes, floods, etc. if buildings are destroyed, so would the computer systems, infrastructure and internet. If the government stores data about a location, including the number of people in remote villages (Census), rescuers may not know who or how many people they are looking for. Even if you have physical backups, and were available on storage media such as flash drives, there is a chance that these would also be affected by the same natural disaster. If the backup was stored in the cloud, these would be inaccessible if there was no internet access. One of the after-effects of a natural disaster may be power failure. As computer systems need electricity, either to charge or operate, power failures may mean limited access. One way to keep systems operating is by using batteries or a power generator. Another natural disaster is a lightning strike. A lightning strike can cause a surge or spike in the electricity supply. These surges can affect how hard drives and other storage devices operate.

Problems with Manual Updates

Problem #	Why is it a problem?
Time	It takes a long time to manually update software – this is a problem because it means other day to day tasks cannot be completed as somebody is working on the updates
Delay	Another problem is there may be a delay between the patch being released and the time taken for the vendor to update the software. This is a problem because during the delay, the software is vulnerable to a cyber-security attack.
Computer status	Another problem with manually scheduling updates is that the computer system must be switched on and connected to the internet. This is a problem because the update may be scheduled for when the computer is switched off and therefore will not update, leaving the system vulnerable to a cyber-security attack.

Definition of Physical Security

Some vulnerabilities relate to the physical devices that can be used to store and process data. Physical vulnerabilities can also be lead to the theft of identity.

Question	Answer
What is the most common physical vulnerability?	Theft
Give two other examples of vulnerabilities.	Breaking and entering, and accidentally leaving devices in public areas.
In what year was a flash drive left in a pub car park?	2008
What information was	Login details for benefits website

Type of Vulnerability	What is it?
Environmental	Vulnerabilities can occur when there is a natural disaster or environmental event. Due to the damage caused by a disaster, such as an earthquake, it is easier for a cyber-security attack to take place.
Physical	Vulnerabilities can occur due to physical devices being stolen or misplaced. When they fall into the wrong hands, the data can be used for a cyber-security attack.
System	Bugs are usually the result of human error when coding the software. They can usually be fixed by the creator issuing a fix or a patch. They can allow attackers to bypass security, override privileges or steal data.

System Vulnerabilities

Question	Answers
Definition of System Vulnerabilities	Some vulnerabilities relate to the running of the devices and the computer system.
One example is a weak, what?	Password
Can IDs and Passwords be changed?	Yes, but IDS only for certain circumstances, and passwords are changed to suit the user.
Definition of a weak password?	A weak password is one that is easy to find or guess, the simpler the password, the easier it is to guess.
What is the definition of a Software Patch?	Updates to software.
When does a computer typically update itself?	Shutdown process.
How often does security software update itself?	Automatically all the time.
Why is it updated this often, and why is dangerous to do this manually?	To keep up to date with the latest vulnerabilities and threats, to keep devices safe.

Question	Answers
Why is time an issue with manually updating?	Can take a long time to download an update.
What is another issue with times and delays in updates?	Delay between a vulnerability being found and the software issuing a fix. All the time in-between the device is at risk.
What are two requirements for updating manually?	Switched on and internet connection
What is a drawback to not having the system up to date?	Open to attacks and threats
What is the main example of insecure hardware?	Wireless internet connections
What are the names of three pieces of hardware that can lead to this insecurity?	Modems, hubs, routers
If these devices are left unsecure, what are they leaving the user open to?	Cyber security attack

Impacts to data

Impact to Data

What happens to data?

Data Destruction	Data is destroyed by a cyber-security attacker and no longer exists.
Data Manipulation	When data is edited, usually to meet the needs of cyber-security attackers.
Data Modification	Changes data to meet the needs of the attacker, for example, changing the amount of money in a bank account.
Data Theft	Data theft is when cyber-security attackers steal computer-based data from a person or business, with the intent of compromising privacy or obtaining confidential data.

Identity Theft

Question

Answer

Definition	Identity theft is one result of a cyber-security attack. Identity theft is when personal details are used to commit fraud, for example taking out a loan in someone else's name.
Impact	The impact of identity theft is that a cyber-criminal can steal somebody's personal information and take out loans or credit cards in their name and rack up large bills.

DOS Attack

Question

Answer

Definition	A denial of service attack is when an attacker blocks access to a website for authorised users. Authorised users cannot access the website whilst it is under attack.
Impact	During an attack, authorised users cannot access their data/website – this can have an impact as it slows down business and can affect customers trust

Data Loss

Question

Answers

Definition of Loss of Data	data and information being stolen or corrupted so it can no longer be used
When do most business' back up?	businesses back up only once a day (usually at the close of business for that day)
What are the three main areas of loss?	financial, data and reputation.
What does a business need to do after loss of financial records?	records of who owes the business money needs to be recreated
What might a company have to pay out for loss of data?	the company may have to pay compensation to repay the individuals.
Describe two other negative impacts of losing customer financial data.	Loss of trust from customers, and loss of income
Describe how a time delay can affect loss of data.	With many transactions happening online, e.g. e-commerce, customer orders may be lost. The loss of data can have consequences for customers as their orders or personal information may be lost.

Safety

Question	Answers
What are the two types of protection methods?	Logical and Physical
What are the three areas at risk of a cyber security attack?	Individuals, equipment, and finance.
What can the loss of personal data lead to?	Personal details known to attacker. Leads to Identity Theft.
A risk towards Equipment safety, could take the form of what?	DDOS attack
What are the two possible consequences for having a financial attack?	Low credit score, and legal action from debts.

Data Loss and Disruption

Question	Answers
What are two negative impacts on the business for loss of reputation?	Business will be seen as not trust worthy. Loose customers to rivals, losing money/profit
What are the three main types of Disruption?	Operational, Financial, Commercial
It is good for a business to have backups, but what can be an issue when restoring data?	Time it takes to reinstall, will have an impact on operations, this could lead to loss in profit
A business relies on data to carry out day to day functions with who?	Internal staff, suppliers, customers.
Apart from paying customers, what is an internal cost that could occur from loss of data?	Cost of repairing or replacing hardware. Cost of increasing security measures.

PREVENTING DATA MISUSE

Physical Methods

What are the 10 methods of Biometrics?

Fingerprint	Voice	Palm Veins	Palm Prints
Handwriting	Iris Recognition	Retina Recognition	DNA
Signatures		Geometry Of The Hand	

Advantages of biometric systems:

Disadvantages of biometric systems:

Improved security	Environment and usage can affect measurements
Improved customer experience	Systems are not 100% accurate.
Cannot be forgotten or lost	Require integration and/or additional hardware
Reduced operational costs	Cannot be reset once compromised

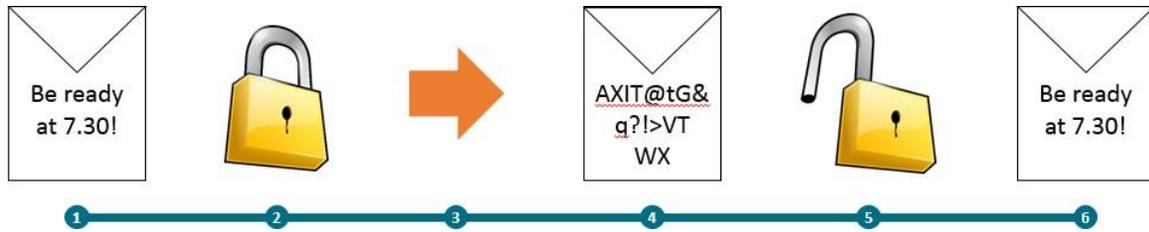
6 Other Physical Methods

Locking doors when rooms containing equipment are not in use	Using swipe or RFID cards or keypadsto activate locks
Using special pens to mark the postcode on computer equipment	Bolting computer equipment to desks
Closing windows and blinds when rooms are not in use	Using CCTV cameras

Logical Methods

<u>Method</u>	<u>Description</u>
Access Rights and Permissions	Files and Folders are set up so only certain users can have access to them. Some can also be set up to only have read permissions, or to have read and edit permissions. User Names and/or Passwords can be used as well.
Authentication	Commonly known as 2 Step Authentication. This is where a code is sent to the users contact information to verify their log in attempt. This can be email, SMS, or to a special app, like the Google Authenticator.
User Names and Passwords	User name is allocated with that user's information and permissions. The password only allows that user to access it.
Anti-Virus Software	Software designed to remove viruses/unauthorised files from the system. Antivirus can be set to automatically detect and remove, but it can also be triggered manually.
Secure Backup	A secure backup of data that is currently in use. These need to be a regular occurrence. Different devices can be used as back ups: flash drives and other physical media can be used, but cloud backups can also be used. Back ups are kept safe and encrypted.

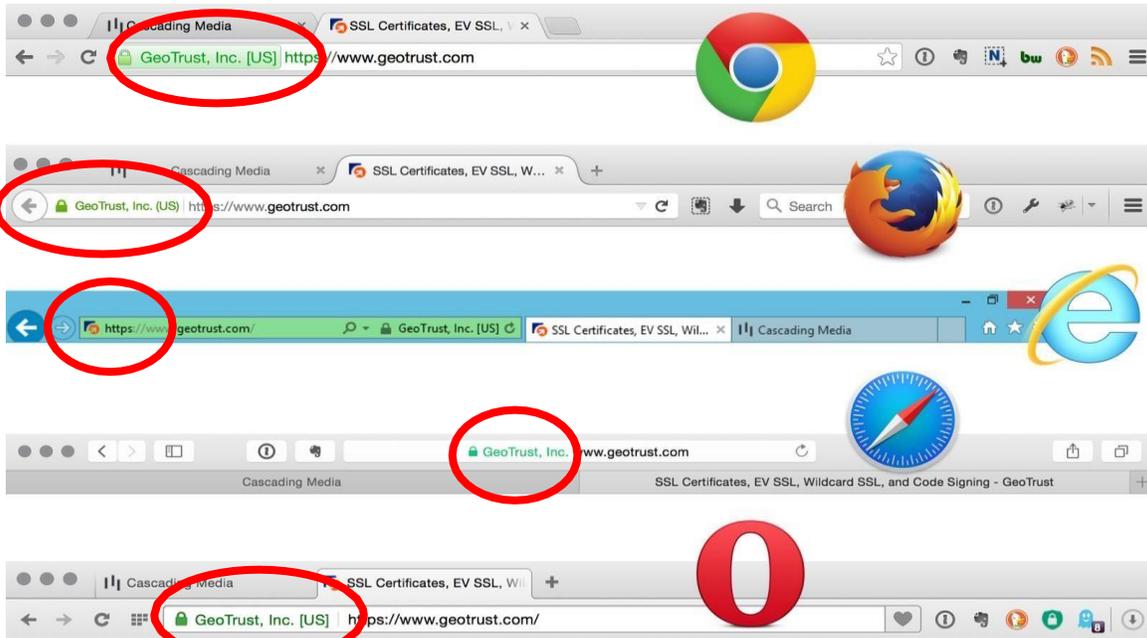
Encryption



Describe each of the 6 stages.

1. Message is created	2. Encryption key is used to scramble message	3. Scrambled Message sent.
4. The encrypted message	5. Same encryption key is used to unscramble the message.	6. Message is received.

Circle on these web browsers where it shows the encryption status.



Secure Destruction of Data

The data to be securely destroyed is written over with random meaningless data.

This meaningless data is usually binary, consisting of 1's and 0's.

Meaningless data is written to all areas of the storage device.

This method is usually used with the physical storage devices.

When the data has been overwritten the storage device can be reused.

This means that the magnetic field part of a storage device is removed.

This makes all the data stored on the storage device unusable.

This is because the wipe also removes all the basic commands stored on the storage device that make the storage device operate.

The most secure way to securely delete data is through the physical destruction of a storage device.

This may mean that it is so thoroughly destroyed that the data cannot be recovered.

Examples of physical destruction is the use of a hard drive shredder, similar to a paper shredder or to use a drill or hammer through the hard drive.

It is also important that paper-based forms that contain personal or confidential data are securely destroyed.

LEGISLATION

Health and Safety Act 1974

Question	Answer
Definition	To make employers look after the Health and Safety of employees and of the public
Explain the 5 parts to the H&S act	
Analyse workstations and assess and reduce risks	employers need to check that the computer equipment and area around it is safe.
Ensure all workstations meet the minimum requirements	employers need to make sure that adjustable chairs and suitable lighting are provided for employees, monitors can tilt and swivel, there is sufficient space for keyboards, monitor and any paperwork.
Plan work so that there are breaks or changes of activity	Regular breaks should be provided or change in the activity that the employees are carrying out.
Arrange and pay for eye tests and glasses (if special ones are needed)	Employees of a business, who are covered by these regulations, can ask that eye tests are arranged and paid for. The business will only have to pay for glasses if special ones are needed.
. Provide health and safety training and information	Employers must provide training to make sure that employees can use their computer equipment correctly. Employers should also provide information to their employees about health and safety when using screen equipment and how to minimise risks.

Computer Misuse Act- 1990

Question	Answer
What does this act aim to protect?	This act aims to protect data and information that is held on computer systems. The CMA relates to illegal access to files and data stored on computer systems.
<u>Describe the three parts to the CMA</u>	
Unauthorised access to computer material	"hacking".
Unauthorised access with intent to commit or facilitate the commission of further offences	accessing computer material with the intent of using the material to commit further offences is against the law.
Unauthorised acts with intent to impair operation of a computer	this means that any unauthorised alterations made to computer materials is against the law. Examples of how this law is broken is by sending viruses that impair operation.

Copyright designs and Patents Act 1988

Question	Answer
Definition	This act makes it illegal to copy a work without the permission of the owner or copyright holder. It is also illegal to make unauthorised copies of software.
Name 3 ways this law is commonly broken	<ol style="list-style-type: none"> 1. Using software without correct software licence - e.g. a licence is valid for 3 work PCs and the business installs it on more 2. Downloading files from the internet – permission to use text, images and other files must be obtained. The name of the copyright holder should be acknowledged too. 3. Copying music, DVDs, CDs and software – any copying or sharing of digital files that you have not created yourself is a breach of copyright, e.g. you can not share mp3 files from a CD you have burned.

Data Protection Act 1998

<u>Question</u>	<u>Answer</u>
Who does the DPA aim to protect, and what does it not protect?	Protects the rights of the owner of the data Does not protect the data itself
<u>Describe the 8 Principles of the DPA</u>	
Personal data must be fairly and lawfully processed.	This means that personal data must not be collected by misleading the person into providing it and the data collected can only be used lawfully.
Personal data must be processed for limited purposes.	This means that personal data must only be used for the purpose for which it was obtained.
Personal data must be adequate, relevant and not excessive.	This means that personal data that is stored should be just enough for the task to be carried out, only relevant for the task, and not include other data.
Personal data must be up to date	This means that the person storing the data has a duty to ensure that any data they hold is accurate and free from errors.
Personal data must not be kept for longer than necessary	This means that data should be destroyed or deleted when it is no longer needed. This should be carried out to ensure that others cannot read or access it.
Personal data must be processed in line with the individuals rights	This principle ensures that the persons data is processed so that their rights are respected.
Personal data must be kept secure	Any stored data must be secure. The DPA ensures that businesses that hold data must take precautions against its loss, unauthorised access and damage.
Personal data must not be transferred to other countries outside the European Economic Area that do not	Other countries around the world may not have the same level of data protection as the UK, so the act states that personal data must not be sent to countries with lower levels of data protection than those in the UK.

Freedom Of Information Act 2000

<u>Question</u>	<u>Answer</u>
Two ways this act works:	Public authorities are obliged to publish certain information about their activities. Members of the public are entitled to request information from public authorities.
Name 6 sources of information that this act covers.	printed documents, computer-based files, letters, emails, photographs and sound/video recordings.

The act does not give people access to their own personal data, such as credit reference files or health records. If someone wants to see their own data then they should make a subject access request under the DPA. Anyone can make an FoI request to a public authority. It is the responsibility of the public authority to respond.

GDPR 2018

<u>Question</u>	<u>Answer</u>
What does GDPR stand for?	General Data Protection Regulations
Enforcement date	25 th May 2018
What will non complying companies face?	Heavy Fines
Which companies does this apply to?	All companies holding EU citizen data
Does this only affect companies inside the EU?	No, affects companies outside the EU too.