



Year 9

Computing Knowledge Organisers

Computing Knowledge Organiser



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Topic: Cybersecurity



Rationale: The importance and value of data. How human actions can make data more vulnerable to theft or exploitation. Common cyberattacks. Measures put in place on networks to help protect IT systems from attacks.

Data and Information

Data is just facts and figures.

- Man City 1
- Liverpool 2
- Chelsea 3



Information is created when that data is given context.

These are football teams that play in the premier league and their positions in the league table.

UK Law

Data Protection Act (2018)

Organisations must use data:

Fairly, openly and in accordance with the law

For a specific and stated reason

Only in a way that is necessary and sufficient for the purpose for which it was collected

Which is accurate and up to date
Only for as long as it is needed



Social Engineering

Social Engineering Methods

Phishing: message/email contains suspicious links

Blagging: Psychological techniques used to make a user more likely to act- Urgency/Fear - "all your data will be lost if you don't click this link"

Shouldering: An example of shouldering is looking over someone's shoulder at the bank as they enter their PIN number.



Key Words

Data- Individual facts or statistics

Information- Processed data with added context so that it is meaningful

Cyber criminal- A person who uses digital technology to commit crime

Malware- Any software which is designed to do harm to a computer system

Social Engineering- Tricking other people so that they give up confidential information

Hacking- Gaining unauthorised access to or control of a computer system

Brute force attack- Trying to gain access to a computer system by trial and error such as by guessing all possible passwords until the correct one is guessed

Anti-malware- Software which is designed to identify malware and remove it from a computer system

Firewall- A piece of hardware or software which filters traffic going in and out of an organisation's network based on rules set by the network administrator

Biometrics- Physical characteristics that can be used to identify individuals

Distributed Denial of Service (DDoS)

A DDoS attack targets websites and servers by disrupting network services. The perpetrators behind these attacks flood a site with traffic, resulting in poor website functionality or knocking it offline altogether.

Operation of a DDoS attack

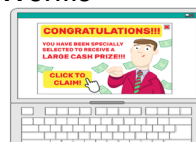


Malware

Malicious software (malware) can be used for a range of reasons: to disable hardware, steal data, send email spam or steal money.

Malware can come in a variety of forms: Viruses, Trojans, Worms

Adware
Spyware
Ransomware



Protection Methods

User permissions are helpful for restricting the parts of a computer system that a group of users can access.



Passwords are one of the most common methods of **user authentication**. Password rules, such as a minimum length, are usually enforced to try to make users choose strong passwords.

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Topic: Using Media

Rationale: Films, television, computer games, advertising, and architecture have been revolutionised by computer-based 3D modelling and animation. In this unit you will discover how professionals create 3D animations using the industry-standard software packages

Move, rotate, scale, colour

Can you explain how to do the following:

- Move an object
- Add an object
- Rotate an object
- Scale an object
- Make colours
- Get colours to show on your snowman

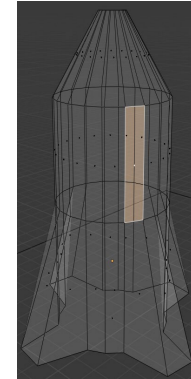


Animation, names, parenting

Stop motion means you have to manually animate every frame of the animation
Keyframe animation only requires you to pick the important locations, the keyframes and the computer works out the rest (called tweening)

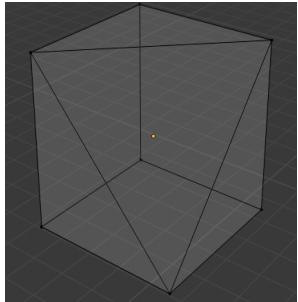
Complex models and colours

- Face:** A surface made up of three or more sides
- Vertex:** A point where one or more edges meet
- Edge:** A line connecting two vertices



Organic modelling

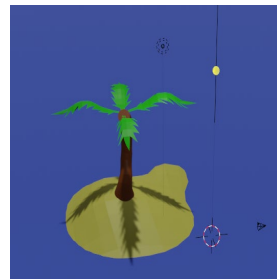
To create natural/organic-looking objects, you need to make them look less symmetrical.



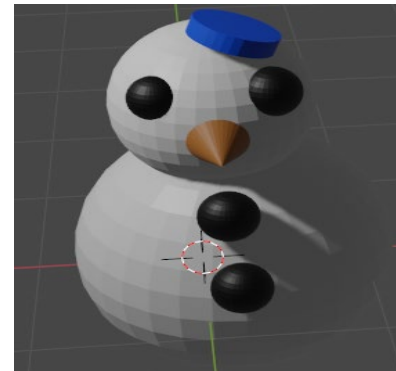
Lights, camera, render

Modern games make guesses about what something will look like.

Popular technologies are **OpenGL** and **DirectX**.



Project



Key Words

Stop motion means you have to manually animate every frame of the animation

Keyframe animation only requires you to pick the important locations, the keyframes and the computer works out the rest (called tweening)

Parenting

Parenting is the process of setting up multiple layers so that the movement of one layer follows the movement of another layer.

Face: A surface made up of three or more sides

Vertex: A point where one or more edges meet

Edge: A line connecting two vertices

Symmetry is considered by some to be a sign of **beauty**.

But often **symmetrical** things can look very **unnatural**.

Symmetrical things in nature often have **differences**, both tiny and large.

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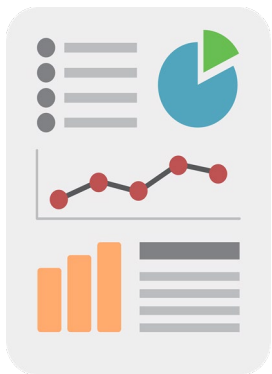
Topic: Data Science



Rationale: Understand how to use data to investigate problems and make changes to the world around them.

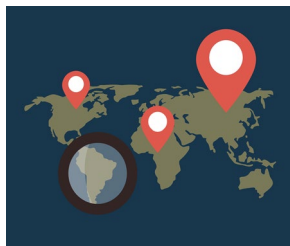
Data Science

Data science is extracting meaning from large data sets in order to gain insights to support decision-making



Global Data

Advances in technology have made it more feasible to collect, store, and analyse data on a much larger scale. We'll consider how companies such as Netflix collect data and how the Information can be useful.



Analysing Graphs

The PPDAC cycle is a framework for us to follow when asking and answering real-world problems using data.



Investigating Data

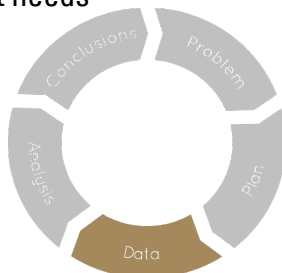
Now that we have decided what data to collect, we need to consider how we will collect and store it.



As we are going to collect this data ourselves, how should we go about it?

"Cleaning up" Data

Once we have the data we need to help us answer our question, we should look through it to see if it needs cleansing. Cleansing involves detecting and correcting, or removing, corrupt or inaccurate data.



Drawing Conclusions

Can we draw any conclusions from data visualisation?
Does it warrant any further investigation?
What other information would be useful?



Key Words

Data science

Data science is extracting meaning from large data sets in order to gain insights to support decision-making.

Visualisation

A way of presenting the data in the form of a chart, graph or diagram

Infographics are visual representations of data, often involving pictures that reflect patterns and help tell a story.

Correlation

A correlation shows that there is a relationship between two or more variables, but that doesn't guarantee that one causes the other.

Outlier

Data that sits outside a trend is known as an outlier.

PPDAC

Is a framework for us to follow when asking and answering real-world problems using data.

Problem>Plan>Data>Analysis>Conclusion

Data cleansing - involves detecting and correcting, or removing, corrupt or inaccurate data.

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Topic: Representations - Going Audiovisual

Rationale: We build images out of individual elements, mix colours to produce new ones, learn how to manipulate digital images and take samples of analogue signals and digitise them.

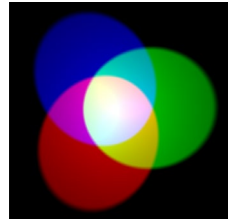
Binary Mosaic and File Size

All data represented by Binary digits 0 and 1. Each pixel is represented by bits of data. We



RGB Colour Palette

Colour can be described as a mixture of red, green, and blue light (RGB colour)



red	green	blue
11111111	10111011	01100100
255	187	100

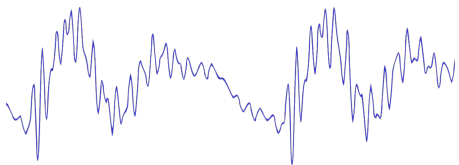
Manipulating Images

Learn to use the crop, rotate, and clone tools to digitally enhance images.



Sound files

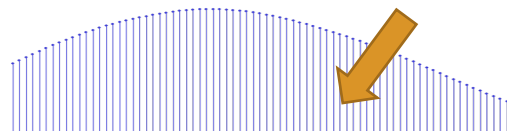
Microphones convert variations in **pressure** to variations in **electric voltage**. Digital devices represent these waveforms as sequences of bits



Sound Sample Editing

To represent sound in digital form, regular measurements are taken, called samples, and a sequence of bits is recorded for each one of them.

111011001110101



Many Representations

As well as Binary for images and sound. Images can be represented as collections of geometrical shapes (each with its own attributes). Such as Vector images. Music can be represented as a sequence of musical notes (with information on how to play them). Such as Midi files.



Key Words

Pixels

The elements of a digital image are called **pixels** (picture elements).

Resolution

The number of pixels in a digital image is the image **resolution**.

Colour Depth

The (fixed) number of binary digits used to represent each pixel's colour is the **colour depth**.

Samples

To represent sound in digital form, regular measurements are taken, called **samples**, and a sequence of bits is recorded for each one of them.

Sampling rate

The number of measurements taken per second is called the **sampling rate**.

Sample size

The number of binary digits recorded for each measurement is called the **sample size**.

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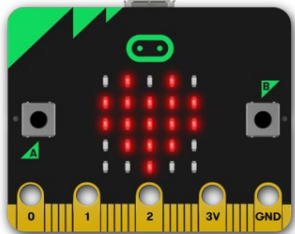
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Topic: Physical Computing

Rationale: We are able to use sensing and controlling with the micro:bit

The Microbit

The micro:bit is a tiny computer. It's a microprocessor that can execute a single program at a time.



Input and output

All devices have input and outputs.

Microbits have:

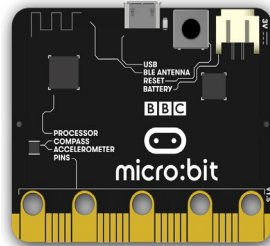
Buttons

Light sensor

Compass

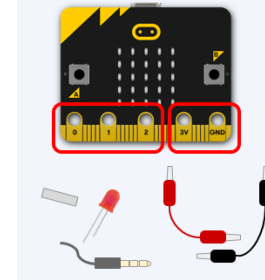
Accelerometer

Temperature sensor



GPIO

The micro:bit can be connected to other components through **GPIO pins**, becoming part of a circuit.



GPIO means
General-Purpose
Input Output

Project proposal

- Proposal
- Feedback
- Planning and development

Prototype development

- Prototype development
- Self-reflection and feedback
- Prototype development

Reflection

- Prototype wrap-up
- The prototype and self-reflection
- Next steps

Key Words

Input

Capture user input to make things happen

LED display: output

Show pictures, words, and numbers

Light sensor: input

Measure how much light is falling on the micro:bit

GPIO (General Purpose INPUT / OUTPUT pins: input and output

Connect headphones, sense touch, and add other electronics

Accelerometer

This is a sensor (input) that senses how the Microbit is being moved, which can also be used to control the lights.

Processor

The brains of the Microbit where it processes the program we have written to control the inputs and outputs