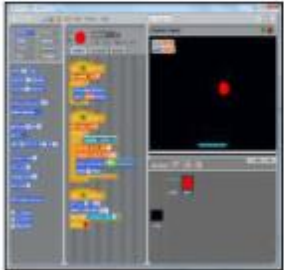


Key Knowledge

Overview

Overview

Variables in Games



- Programming is when we make and input a set of instructions for computers to follow.
- Variables are changeable elements of a program. Scratch is one app in which we can explore variables.
- We use algorithms which we can plan, model, trial and debug, in order to create accurate command sequences, that enable variables to be enacted in games.

Basic Variables

-Variables: A variable is something that is changeable. A variable can be set and changed throughout the running of a program.

In computer programming we use variables to store information that might change and can be used later in our program. E.g. in a game a variable could be the current score of the player; we would add 1 to the variable whenever the player gained a point.



Making Variables in Scratch – The Basics

- Select 'Variables' (dark orange circle) from the menu on the left. Either choose from the available variables or 'Make A Variable.'
- Select 'Events' (light orange circle) from the menu on the left. Choose what needs to happen for the variable to change. E.g. 'When this sprite clicked' or 'when space key pressed.'
- Select 'Variables' again from the menu on the left. Choose what will happen when the event happens, e.g. 'change score by 1' (to add a point) or 'change score by -1' to remove a point.



Key Vocabulary

Programming	When you make and input a set of instructions for computers to follow
Variable	A changeable element of a program
Scratch	A coding program
Algorithms	an ordered set of instructions

More Complex Variables

- Variables should always have a value and an appropriate name.

-Adding Callouts: Select 'Looks' from the menu on the left. Add it to the variable program. Edit the text to change the callout.



-Adding Motion: Many games require sprites to change position. This is achieved using the 'Motion' commands. Select 'Motion' from the menu on the left. Choose from the available motion commands.



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-Adding Comments: Comments are a good way of showing that you understand what your code is doing. Right click on the block that you want to comment on, and add in your comment.



Sequencing and Algorithms

-A **sequence** is a pattern or process in which one thing follows another.

-We design **algorithms** (sets of instructions for performing a task) to help us program sequences involving multiple output devices (e.g. LEDs and motors).



-Programming is the process of keying in the code recognized by the computer into the software (using your algorithm).

Trialling and Debugging

-Programmers do not put their computer programs straight to work. They **trial** them first to find any errors:



-Sequence errors: An instruction in the sequence is wrong or in the wrong place.

-Keying errors: Typing in the wrong code.

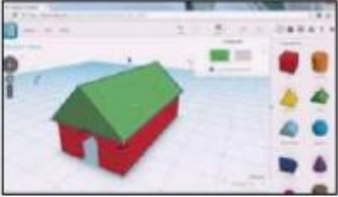
-Logical errors: Mistakes in plan/thinking.

-If your algorithm does not work correctly the first time, remember to **debug** it.

Key Knowledge


Overview


Overview



3D Modelling

- 3D means three-dimensional, or having 3 dimensions. For example, a box is a 3D shape, whereas a square is a 2D shape.
- 3D modelling involves using computer software to create 3D shapes, in order to produce models of real-world objects.
- 3D modelling allows us to view designs from different angles and experiment with various designs.
- 3D modelling is used in many industries, e.g. in interior design, architecture and making video games.

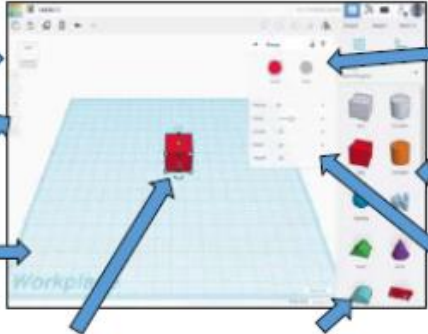




The Basics of 3D Modelling

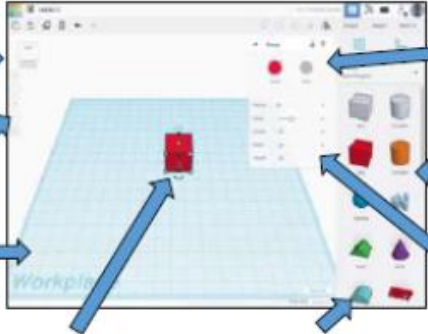
'Tinkercad' is one example of software that we can use to create 3D Models. Other examples include 'CAD for Kids' and 'Sketchup 3D.'

- The ViewCube Allows us to switch the view of the model e.g. from the front angle, top angle, or spin around to show the sides.
- Zoom in and zoom out.
- The workspace, where you can work on your model. The square panes help us to distances and dimensions accurately.



- Change the colour/shading of your model, and make them solid or 'hole.'
- 3D objects that can be dragged into the workspace and remodelled.
- Alter the dimensions of your model, for example the length, height, width and shape.

- Objects can be resized by dragging the handles (white squares).




- When you move multiple objects into the same space, they merge.

Key Vocabulary


Data	
Three-Dimensional	having, or seeming to have, the dimension of depth as well as width and height.
Modelling	the act or an instance of making a model
CAD	Computer Aided Design

More Advanced Techniques

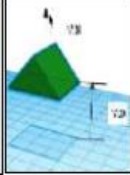
Duplicating: Click and drag around an object to ensure that it is selected. Then, click on the duplicate icon (see left) to create a copy.



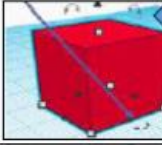
Resizing: Objects can be manually resized by clicking and dragging on the handles around them. The dimensions are labelled.




Lifting: Use the ViewCube to change the viewing angle of the model to the front/ side. Then, use the cone handle in order to lift the object from the workspace.




Rotating: Selecting these handles allows us to rotate shapes. Drag the object to rotate it in different ways.



Combining Shapes Many complex shapes are made up of a number of 3D shapes – we can position and merge them together.



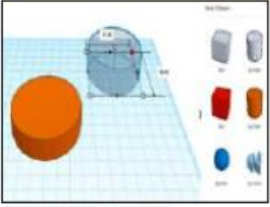
Text: You can add block text by selecting 'text' in the shapes. This can help you to enhance other shapes.




Making Holes

Holes: Sometimes we need to create objects that are not solid – they have space inside/ within them.

- To achieve this, begin by adding a 3D shape onto the workspace. Then drag one of the 'holes' shapes onto the workspace. Adjust dimensions accordingly.
- Drag the 'holes' shape over the 3D shape as desired.
- Click and drag a box around the shapes to select them.
- Click the 'group' button to combine the shapes and create the hole.






Key Knowledge

Overview

Overview



Searching and Communicating

- You should already know that the internet is a network of networks.
- You should also know that the World Wide Web is the part of the internet where we can visit websites and webpages.
- The World Wide Web can be used to find information, using search engines.
- The internet is also a useful communication tool – with a number of different communication mediums for a range of different purposes.

Search Engines - Introduction

- We can find information on the World Wide Web by using search engines.
- A search engine is a program that finds websites & webpages based on key words entered by the user.
- When the World Wide Web was invented by Tim Berners-Lee in 1989, there was only 1 website. By 2018, there were 1,630, 322, 579! The World Wide Web is a big place, and we need search engines to be able to find what we need.
- Some examples of search engines are Bing, Google, Yahoo, DuckDuckGo and Kiddle.
- You can also type searches into the address bar of the browser (e.g. Google Chrome or Microsoft Internet Explorer).















Key Vocabulary

Internet	a vast computer network linking smaller computer networks worldwide.
World Wide Web	a system of extensively interlinked hypertext documents: a branch of the internet. <i>Abbreviation:</i> WWW
Search Engine	a computer program that searches documents, especially on the World Wide Web, for a specified word or words and provides a list of documents in which they are found.
Browser	a software program that allows the user to find and read encoded documents in a form suitable for display, especially such a program for use on the internet:

Selecting and Ranking Search Results

Selecting Search Results

- Search engines use programs known as crawlers to index the World Wide Web.
- They 'crawl' websites for searchable information – they then store where it is found in a huge index.
- Search engines select information from this index when we type in key words.
- Searching for some search terms can bring many millions of results.
- We need to make sure that our search terms are as refined as possible, in order to allow the search engine to select the information that is most relevant.

Ranking Search Results

- Search engines 'rank' the web pages (the highest ranked page is at the top).
- Search engines use algorithms to do this – algorithms look at a number of different factors and give web pages a score for each.
- The web page with the highest score ranks the highest.
- Some factors include if the search term is in the title of the page (high points) or if it appears in the paragraphs of the text on the page (lower points).
- Web designers consider algorithms when making when pages.

Online Communication


- Communication is when we share information with one another. We can communicate in lots of different ways on the internet, e.g. messaging services, emails, social media, video calling and gaming platforms.
- Public communication is visible to all, whilst private communication is restricted to only some people.
- Some communications are one-way (e.g. Youtube) whilst others are two-way (e.g. Skype).
- Some communications are to one person, whilst others are to many.
- We should consider which type of communication is most appropriate to our needs, safety and privacy.



Key Knowledge

Overview

Overview



Using Micro:bits

- Programming is when we make a set of instructions for computers to follow.
- Micro:bits are small computers that perform different actions based on programs written on computer software. Programs are then downloaded to the micro:bit.
- Micro:bits have a range of input sensors that can be used as input triggers for different codes to run.
- Output devices on Micro:bits (e.g. LED displays) can be programmed to display words, pictures and numbers.

The Basics of Micro:bits

-**What is a Micro:bit?** A micro:bit is a pocket-sized computer. We can write programs on our computers which can then be transferred to micro:bits to run.
 -Micro:bits have an LED light display, buttons, sensors and many input/output features that we can program.



The Parts of a Micro:bit - Front

1. A and B buttons: make things happen.
2. LED Display: shows words, pictures, numbers.
3. Light Sensor: Measures the light that falls onto the micro:bit.
4. Input and Output Pins: Connects the micro:bit to other devices.



The Parts of a Micro:bit - Rear

5. Temperature Sensor
6. Compass
7. Accelerometer – Detects movement
8. Radio Communication – to communicate with other micro:bits and devices.
9. USB Port – Connects device to computer.
10. Reset Button
11. Battery Socket – to power away from the computer.
12. Processor – The 'brain' of the device.

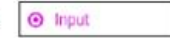


Key Vocabulary

Micro:bit	A small computer
Algorithm	Instructions for a computer to follow.
Emulator	A simulated (pretend) on-screen version of a device (e.g., a Micro:bit)
Input	A device through which info. is put into a computer (e.g., button, mouse).
Output	A device through which info. is shared by a device (e.g. screen, LED, buzzer).
Sensor	A device which detects or measures something (e.g., temp., sound, light).
Variable	A named value that can be set and changed within a program
Debug	To correct errors (bugs) in a program.

Using Micro:bit Software

- Software Interface:** Just like other programming software, the micro:bit interface has programming blocks and a programming area. The emulator gives a simulation for testing code.
- Basic Blocks:** Can be used to do things like display images, text and pictures on the LED display. They should be placed into the 'on start' or 'forever' blocks.
- Input Blocks:** Enables the user to create 'triggers' using different parts of the micro:bit device, e.g. 'on button ... pressed.'
- Logic Blocks:** Allow conditions to be set. E.g. 'If, then, else' blocks allow us to set actions for when certain conditions are met (true), and alternative actions for when they are not met (false).
- Math Blocks:** Includes numbers and sums in programs. The 'pick random' block can allow different codes to run dependent on the random number generated.



Transferring to Micro:bit

Micro:bit can be connected to the computer using a USB cable.



1. Select 'download'
2. Locate the file in the downloads folder.
3. Copy the file from the MICROBIT drive.
4. Run the program on the micro:bit.

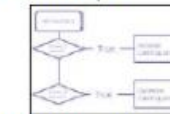


-Micro:bit will only run code that has been downloaded. If code is changed in the editor, it will need to be downloaded again in order to run on the micro:bit.

Sensing Inputs

-There are a number of input sensors on micro:bits, including the buttons, light sensor, accelerometer, compass, temperature sensor and GPIO pins.

-We can create algorithms that enable different codes to run depending upon what is detected by different sensors.
 -Remember to trial your programs and to debug them if there are sequence, keying, or logical errors.



Key Knowledge

Overview

Webpages

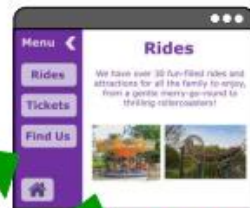
- Webpages are documents commonly written in HTML that is accessible through the internet or other networks using an internet browse.
- Webpages are accessed by entering a URL address

Creating a Website

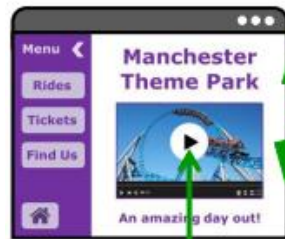
A website is made up of several **pages** about a topic, **navigated** in a **non-linear order** in a web browser.



Coded in **HTML** or made in a **web design package**.



sub-pages



home page

embedded content



hyperlink button

- ✓ A **consistent design** and an appropriate **colour scheme** used across the site.

Purposes
persuade inform entertain

Key Vocabulary

Browser	An application used to view web pages, e.g. Internet Explorer or Google Chrome.
Hyper Text Markup Language (HTML)	Hyper Text Markup Language. The language used to write and display web page documents
Hyperlink	A link in a document or webpage that connects to another location.
Internet	A global network connecting millions of computers
Web browser	An application that displays web pages
Web Page	A page designed for, and viewed in, a web browser.
Website	A web page or group of web pages hosted on one web server and viewed in a web browser, usually maintained by a person, group or organisation.
URL	Uniform Resource Locator, termed a web address, refers to a web source that specifies its location on a computer network.

Google's Advanced Searches

- Advanced search is a built-in feature of Google which allows a user to specify additional requirements for a search.
- When used for searching the Web, an advanced search gives additional information to Google, which helps re- fine the search.



Key Knowledge

Overview

Overview

Spreadsheets



-Data is raw numbers and figures. Information is what we can understand from analysing data.

-There are lots of different ways that we can collect, log and interpret data, including by using spreadsheets.



-Spreadsheets organise and store data in meaningful ways so that it can be easily accessed and analysed. Computer spreadsheets are particularly useful for powerful calculations, graphs and charts.

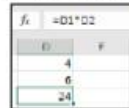
Formulas, Calculating and Duplicating

Formulas: A formula can tell a computer which mathematical operation to use for a calculation: add, multiply, divide, or subtract. It also tells the computer which data to use.

+ = add - = subtract * = multiply / = divide

Select your cell. Use cell references to create your formula.

E.g. In D3, you enter the formula =D1*D2. The answer will appear in D3.



-Calculations: Sometimes there are large amounts of data that require multiple or complex sums. The 'fx' or 'sigma' icons (see below, depending on the program you are using) can help you to find averages (AVERAGE) add many cells together (SUM) and many other calculations.



-Duplicating: Duplicating allows you to create copies of the same data, without having to type it out multiple times. The copy and paste function (Ctrl+C and then Ctrl+V) can duplicate individual cells. You can duplicate whole worksheets by clicking on the worksheet name and selecting 'move or copy' then tick 'create a copy.'

Key Vocabulary

Information	knowledge communicated or received concerning a particular fact or circumstance.
Spreadsheet	a type of software that offers the user a visual display of a simulated multicolumn worksheet and the means of using it especially for financial plans and budgets.
Data	information in digital format
Formula	a rule or principle, expressed in symbols.

What are Spreadsheets?

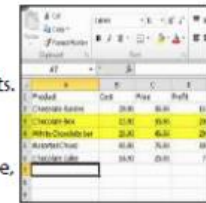
-A spreadsheet is a computer application that allows users to organise, analyse and store data in a table. Programs such as Microsoft Excel and Google Docs help users to make spreadsheets.

-A spreadsheet can be made up of multiple worksheets. They can be reordered and renamed. Each cell has a unique reference, made up of a number (the row) and letter (the column).

-Data headings allow data to be stored in a meaningful way.

-To select a cell, we click on it. To enter data, we double click on it. Data can be typed directly into a cell or into the formula bar.

-By clicking on a column or row, we can sort information in different ways (e.g. alphabetically, 0-9, etc).



Other Functions

-Formatting makes a spreadsheet easier to read. Hovering the mouse between two columns/ rows allows the user to drag them to the desired size. Right-clicking on a cell and selecting 'format cells' presents a number of options, including fonts, borders, fill etc.

-Charts and graphs can be created using the data in the spreadsheet. Select the charts icon (see below) and which fields to display in the x-axis and y-axis.



Using Spreadsheets

-Spreadsheets are commonly used by individuals and businesses across the world. They are most commonly used for organising and presenting finances, for example budgets and finance reports.

-Spreadsheets may be used by businesses to look back on past income and expenditure and to forecast future performance. They are also used for calculating taxes and deductions.



