COMPUTING: COMPUTING SYSTEMS AND NETWORKS- Communication

KNOWLEDGE ORGANISER

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).

-We may not get the results that we are looking for if our

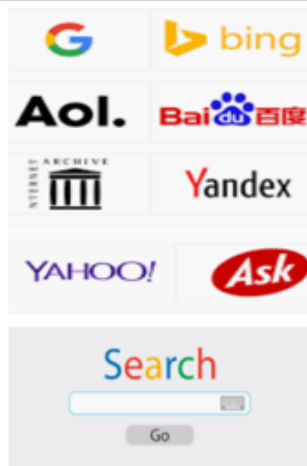## Selecting and Ranking Search Results

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, blogging/vlogging 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.

Important Vocabulary

Search Engine	Refine	Index	Web Crawler	Ranking	Links	Searching	Selection	Communication
	Public		Private		SMS		Blog	World Wide Web

COMPUTING: CREATING MEDIA- 3D Modelling

KNOWLEDGE ORGANISER

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

-Zoom in and zoom out.

-The workspace, where you can work on your model. The square panes help us to distances and dimensions accurately.

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

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

-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.

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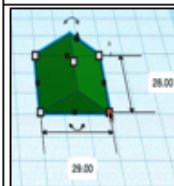
Resizing: Objects can be manually resized by clicking and dragging on the handles around them. The dimensions are labelled.

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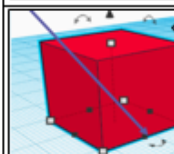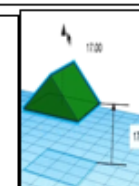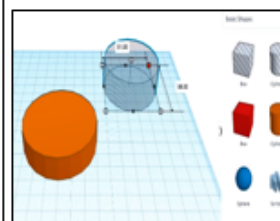
Rotating: Selecting these handles allows us to rotate shapes. Drag the object to rotate it in different ways.

Combining Shapes Many complex shapes are made up of a number of 3D shapes – we can position and merge them together.
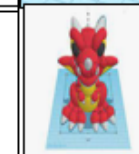
Text: You can add block text by selecting 'text' in the shapes. This can help you to enhance other shapes.

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.

Important Vocabulary

Modelling   Three-Dimensional   Workspace   Faces   Vertices   Edges   Handles   Resize   Position   Hole   Design   Modify

COMPUTING: CREATING MEDIA- Web Page Creation

Overview

Web Page Creation

-A webpage is a hypertext document that is a part of the World Wide Web.

-Websites are a collection of webpages about the same topic. They can be found using browsers.

-Examples of websites are Amazon and YouTube. Webpages are the different pages on the websites.

-Websites are created for a chosen purpose, and with a particular audience in mind.

-They include navigation paths, and must adhere to copyright and fair use of media rules.

Creating a Webpage

Google Sites has been used in these examples, but lots of other web page creation software and apps are available, with similar tools and functions.

Setting Up: Click + to start a new website. Click on the top left to add a website name and the top centre to add a page title.

Header: You can add images used in the header, and the type of header, by clicking on these options.

Text Box: Lets you add different sections of text.

Images: Add in pictures from your computer or from the internet.

The layouts feature lets you set out your page in different ways. There are six for you to choose from.

Most websites contain a home page, which introduces the website. The other pages (sub-pages) on the website go into more detail about individual topics.

Features of Good Websites

Websites can be found using browsers. Browsers allow us to find our way around the worldwide web, and show us what websites look like.

-The website name is usually visible in large font, particularly on the home page.

-There is often a slogan/ logo and short description of what the website is about.

-The search allows you to find different things on the website.

-Webpages are made up of a code called Hypertext Markup Language (HTML). You can find this by right-clicking on a page and selecting 'Inspect.'

-The menus at the top of the page allow you to look at different parts of the website.

-Pictures are used to highlight what the text is about. Colours are used carefully.

-There are links to other areas of the website/ World Wide Web (in blue).

Making Effective Web Pages

Purpose: The purpose is the reason for your web page – what is it for? You should make sure that your web page meets its purpose.

Audience: The audience are the people who your web page is aimed at. You should make decisions with your target audience in mind.

Copyright: You should only use images that are copyright-free. Many images are owned by people/ companies and cannot just be reused.

Navigation Pathways

Navigation Pathways are also known as breadcrumb trails.

-Hyperlinks allow different pages to be linked together.

-These links help the audience to navigate the website easily.

-The user can also keep track of where they have been on the website.

Important Vocabulary

Web Page   Website   Browser   Media   Hypertext Markup Language (HTML)   Logo   Layout   Header   Purpose   Copyright   Home Page   Preview   Navigation   Subpage   External Link   Embed

COMPUTING: DATA AND INFORMATION- Introduction to Spreadsheets

KNOWLEDGE ORGANISER

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.

All formulas must begin with the = sign.

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.'
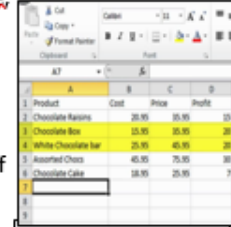
What are Spreadsheets?

-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.

Data is often presented in tables or graphs.

Important Vocabulary

Spreadsheet   Data Heading   Cells   Data   Columns and Rows   Data   Format   Common Attribute   Formula   Calculation   Cell Reference   Operation   Range   Graph   Chart   Evaluate   Results   Comparison

COMPUTING: PROGRAMMING- Sensing in Physical Computing

KNOWLEDGE ORGANISER

Overview

Sensing in Physical Computing

--Lego WeDo 2.0 is an App which enables Lego models to be programmed in order to create movements using robotics. This includes sensors which sense when an action is performed on the Lego model. The action will result in a movement or sound.

-We use algorithms (a set of instructions to perform a task) which we can plan, model and test, in order to create accurate and imaginative robotic actions.

- Input- The data which is entered into a computer or device.

Output Device- The device which receives data from a computer or device.

Programming Blocks

-Flow Blocks:

Start Block

Must be used at the beginning of a program string. Press on it to make the program start.

Wait for

Use this to tell the program to wait for something to happen.

Repeat Block

Use this block to repeat actions. Blocks placed inside will be looped.

-Output: Motor Blocks:

Motor This Way Block

Sets the motor to turn the axle in the direction shown.

Motor That Way Block

Sets the motor to turn the axle in the direction shown.

Motor Power Block

Sets the motor power to the desired speed and starts the motor.

Motor On For Block

Projects Using Sensors

Volcano Alert:

How do scientists use the different stages of volcanic activity to guide their scientific exploration?

You will learn to:

- Explore different ways scientists monitor volcanic activity.
- Create and program an alarm to indicate different stages of volcanic activity.
- Test your program to see how it indicates these at different stages.

Predator and Prey:
Choose from three solutions-

Walk   Crab   Push

How can animals survive in their environment?

You will learn to:

- Explore the different strategies animals use to catch their prey or to escape from their predators.
- Create and program a predator or prey in order to explore the relationship between them.
- Present and document your animal model, explaining the relationship between two species and how that are adapted to survive.

Inputs:

Sensors Change Input Blocks:

Tilt Up
nputs the Tilt Sensor mode to "tilt up" to a block.

hake
nputs the Tilt Sensor mode to "Shake" to a

Numeric and Text Inputs:

Number Input
Inputs a numeric value to a block.

Random Input
Inputs a random number to a block.

Test and Modify:

Try different programs to find out what else you can achieve.

For Volcano Alert, can you program your alarm to emit different signals for each of the three stages of the volcano? As an extra challenge, for each alter, move the drone, the animal, and the rover according to the signal.

Remember to design, test, try and debug your program.

Important Vocabulary

Programming   If...then...else...variable   Random   Direction   Navigation   Motion Sensor   Input   Output   Motor   Alarm

COMPUTING: PROGRAMMING- Variables in Games

KNOWLEDGE ORGANISER

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.

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.
-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
-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.
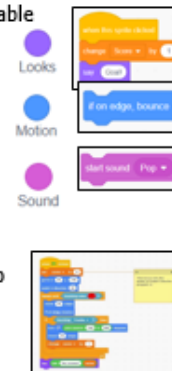
Sequencing and Algorithms

-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.

Important Vocabulary

Variable   Change   Name   Value   Set   Design   Event   Code   Task   Test   Motion   Callout