Greenfield Primary School | Year 5 | Knowledge Organiser

COMPUTING: COMPUTING SYSTEMS AND NETWORKS- Sharing Information

Overview

Systems

-You should also know that Information technology (I.T.) includes computers and things that work with computers.

-You should also know that computers have Input, Process and Output (IPO) components.

-Computer systems are built using a number of parts.

-Computer systems can communicate with other devices.

-There are many, many different kinds of computer systems all around the world, ranging from small-scale to large scale.

Systems

-Systems are a set of things working together as parts of a whole.
-Computer systems are made up of inputs (something that sends a message to the device), processes (the way the device acts on the message) and outputs (something that is sent out by the device). Below are some examples.

Washing Machine:	DVD Player:	Smart Locker:
Input: Dials and buttons.	Input: The disc is inserted and play is pressed on the remote.	Input: The customer scans in a barcode.
Process: The computer inside follows a program.	Process: The system reads the information on the disc	Process: The code is recognised by the system.
Output: The clothes are washed and the display shows the remaining time.	Output: The screen displays the film/ show.	Output: The correct locker is opened.
		

Transferring Information

Protocols and Packets

-Protocols are an agreed way of doing something. When we communicate, we use an agreed set of protocols (greeting, speaking, listening, etc.).

-In computing, agreed protocols are the way that computers communicate with one another.

-The digital information they send is called a 'packet.'

- Media, files and information can be shared on the internet either privately via email/cloud space or publicly on websites.

IP Addresses

-Computers and their users are not always in the same place as one another.

With billions of computers around the world, computers need to send the information to the correct place.

-To do this, computers use special addresses called IP addresses. They may look like this:

Working Together

-Collaborating is another word for working together on something, to reach a shared goal.

-The internet can be used to help people collaborate online, even when they are a long distance apart!

-'Chat' functions can be used keep each other updated with new information.

-Shared 'cloud' spaces and online drives can allow one or more person to have access to/ edit documents.

-When building upon someone else's work, you need to be aware of copyright and intellectual property rules.

Important Vocabulary

System Connection Digital Input Process Output Protocol Address Chat Collaboration IP Address

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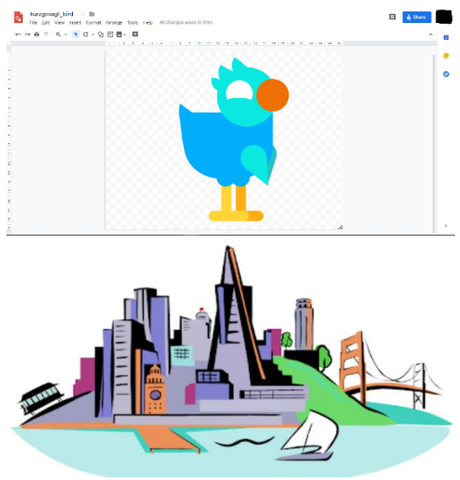
COMPUTING: CREATING MEDIA- Vector Drawing

Overview



Vector Drawing

-Vector drawings are computer graphic images that are made using 2-D shapes.

-The drawings are connected by lines and curves to form polygons and other shapes, forming a complete picture.

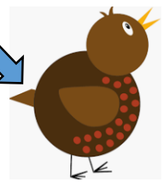
-There are lots of different apps and programs that can help us to complete vector drawings, including Google Drawings and Adobe Illustrator.

Creating Simple Vector Drawings

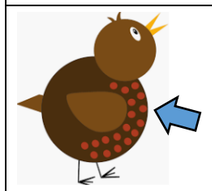
Vector drawings use lines and shapes to create bigger and more detailed images.

Plan your drawing by thinking about what shapes it is made up of. Each shape is called an object.

The tail is furthest away so is drawn first.



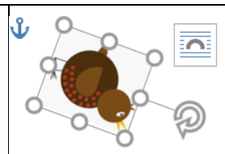
When vector drawing, the shapes overlap, so start with the objects that are the furthest away.



Copy and paste has been used to make the red spots the same size.

You can save a lot of time and effort doing the same thing over and over by duplicating shapes. This is done most easily by copying the object that you want to duplicate (hold ctrl + c) and pasting (hold ctrl + v) a new one.

You can enlarge/reduce an object by clicking on it and dragging the handles to the desired size.



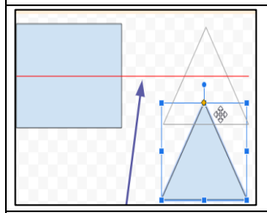
You can rotate an object by dragging the circular handle at the top.

More Complex Vector Drawings

Google Drawings has been used in these examples, but lots of other vector drawing software uses the same tools and functions.

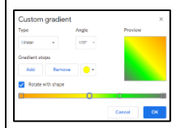
When dealing with small and intricate objects, it is important to use the zoom tool. Zooming in allows you to work with more precision. Zooming out allows a wider view.

The line tools can be used to help you change the colour and weight (thickness) of the line, and to make dotted lines.



The Alignment guides pop up as you move objects around, and help you to align and size objects.

Coloured lines can be drawn, and colours can be used to fill shapes.



Gradient colours can be used to colour the same object in different colours.

Remember too that vector drawing is all about layering. By gradually adding layers of basic shapes, you build up something far more complex.

Advanced Tips

Grouping: 1. Select all images. 2. Right-click 3. Choose 'group.' All of the objects can now be moved and changed at the same time.

Advanced Layering: Right-click on objects and use the 'send to back' and 'bring to front' tools (in 'order') to ensure that your layering is in the correct order.

Backgrounds: You can create backgrounds by uploading images (using this icon). Remember to 'send to back' after it has been inserted.

Selecting Multiple Objects

This allows you to perform tasks with the whole drawing, rather than individual objects:

-Click, drag and drop a box around all of the objects in an image. This allows you to select all of the objects.

-When you perform an action (e.g. copy and paste) it will now apply to all.

Important Vocabulary

Vector Drawing Tools Icons Toolbar Vector Drawing Move Resize Rotate Duplicate/Copy Organise Zoom Select Alignment Grid Handles Consistency Modify Layers Object Paste Group Ungroup Reuse Improvement Alternatives

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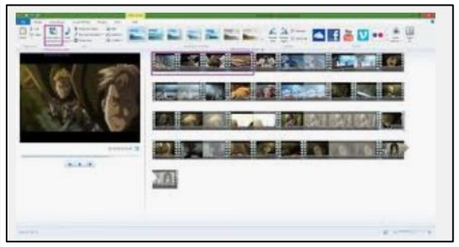
COMPUTING: CREATING MEDIA- Video Editing

Overview



Video Editing

-You should already know that video means the recording, reproducing and broadcasting of visual images (often accompanied by audio).

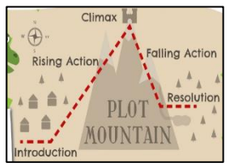
-Video is made up of a sequence of images shown in quick succession, giving the impression of movement.

-Many different devices can be used to record, edit and playback video and sound.

-Theme, setting, characters, colour, sound, and dialogue are all important features of video.

Features of Videos

Videos present moving images, often accompanied by sound. The following features are commonly found in videos.



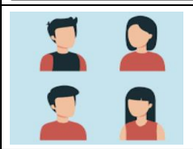
Plot means the main events in the video, shown in a sequence. Plot features are caused by and affect one another.

Themes are the main ideas that run through the video, e.g. love, friendship, magic, violence.

Most videos, even very short videos, try to give the audience a message. This may be obvious or hidden.

Props are the moveable objects that are used by the actors/ actresses in videos texts.

Dialogue is the name given for the conversations between people in video texts.



Characters are the different people and animals in a story, including in a video.

Editing Videos

Windows Movie Maker is one example of a video editing tool, but many others are available. Examples include WeVideo, Nero Video, and Apple iMovie.

In order to edit your video, you first need to import it from your device to the computer. You then need to import it into Movie Maker by clicking 'Add videos and photos.'

By right-clicking on the video thumbnail, you can choose to 'split' the video into pieces. The different pieces can be moved or deleted.

A number of special effects are available, including using animations and transitions between shots. You can also add text in captions.

The trim tool allows you to move excess video from the beginning or the end.

Remember to save your project regularly. You need to save your project as a *.wmv file so that you can continue to edit it.

Recording Videos

Static Camera: The camera is in a fixed position, sometimes using a stand or tripod. Examples of this in use are during news-reading and weather forecasts.

Zooming: Zooming in means to give a closer view of the subject. Zooming out gives us a further, broader view of the subject. Zooming too close can make the subject appear blurry.

Pan: The camera position is fixed, but moves from side to side.

Tilt: The camera position is fixed, but moves up and down.

Top Tips for Recording High-Quality Videos

-Use considered lighting.

-Think carefully about the sounds that you will use, e.g. music and sound effects.

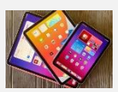
-Think about the use of colour.

-Consider the use of a green screen for settings.

Devices for recording video:

iPads/tablets/smartphones

Camcorders or Cameras



Important Vocabulary

Video Audio Recording Storyboard Script Soundtrack Dialogue Capture Zoom AV (Audio Visual) Videographer Zoom Pan Tilt Angle Lighting Setting Export Split Trim/Clip Titles Timeline Transitions Content Retake Special Effects Title Screen End Credits

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COMPUTING: DATA AND INFORMATION- Flat-File Databases

Overview

Flat-File Databases

-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 databases.

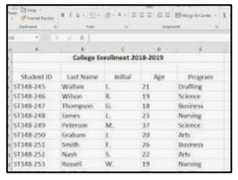
-Databases organise data so that it can be easily added to, amended, stored and accessed. Computer databases can allow large amounts of data to be sorted, filtered and edited more easily.

Types of Databases

Database: A database is a collection of organised data that is easily stored and used. Databases often structure data in logical ways (e.g. in columns, rows and tables) so that it can be accessed by those who need it easily. Databases are made up of individuals records, which contain information in different fields (categories).

-Paper Databases: Paper databases require the creator to manually write in individual records, and to sort the records in an appropriate order. Paper records can still be useful in small databases, particularly where information is not changing and does not need to be amended frequently. However, most large databases are now stored on computers.

-Computer Databases: Many computer programs allow us to create databases, e.g. *j2data* or *Microsoft Excel*. Computer databases have become more popular than paper databases, as data can be easily and quickly added or removed, sorted, filtered, edited, or viewed at any time.



Using a Computer Database

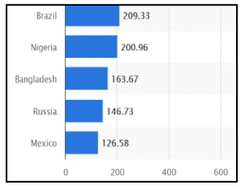
-Computer databases often contain large amounts of data. We can find the data that we need by using the 'search', 'filter' and 'sort' functions. Search functions allow us to type in the exact word/s that we are looking for. This can be useful if we are looking for a particular record.

-If we are looking for records that share certain information we can filter out data by different fields.

-We can also sort records by the data in particular fields.

Presenting Data

-Data can be shown visually, by using graphs and charts. This allows users to quickly and easily find answers to the questions that they need. It helps the user to easily see trends and to sequence information.



-Charts and graphs can be created by selecting the charts icon and selecting which fields to display in the x-axis and y-axis.

Using Databases

-Remember that databases are used in order to quickly and easily find information. Databases are only able to do this if the data is organised logically into clear records and fields.

-Databases are used in most institutions across the world. Think about: medical records, school student information, flight logs and business accounts.

Important Vocabulary

Database Record Field Sort Order Group Value Criteria Graph Chart Axis Compare Filter

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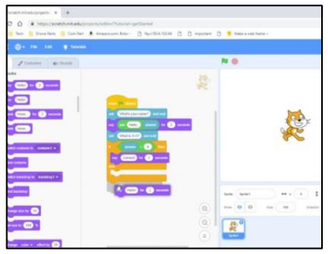
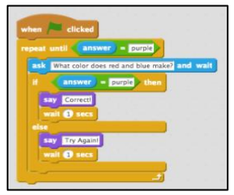
COMPUTING: PROGRAMMING- Selection in Quizzes

Overview





Quizzes in Scratch

- Programming is when we make a set of instructions for computers to follow.

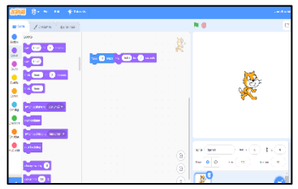
-Scratch is a program that we can use in order to code our own quizzes, stories, animations and games. We can input questions using the 'ask' command blocks. We can use selections and conditions in order to ensure that there are different outcomes depending upon a user's response.

-We use algorithms (a set of instructions to perform a task) to sequence movements, actions and sounds in order to program effective animations.

The Basics of Scratch

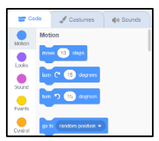
-What is Scratch? Scratch is a website/ app that lets us code our own quizzes, stories, games and animations.

-Scratch helps us to learn how to use programming language, whilst also being creative and using problem-solving skills.

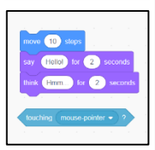


There are three main areas in Scratch:

-The Blocks Palette (on the left) contain all of the different blocks: puzzle piece commands which control the animation.



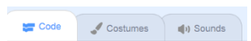
-Code Area (in the middle) is where the blocks are placed to create a program.



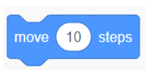
-Stage with Sprite (right) is where the output of the program is presented. The sprite is the character.

Attributes: There are three attributes of the sprite which we can change to make our animation: Code, Costumes, Sounds.

-Event Blocks: Event blocks are coloured yellow and are used to sense different events that happen e.g., the green flag being clicked.

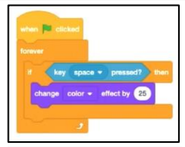


-Action Blocks: Action blocks include 'Motion' blocks, 'Sound' blocks and 'Looks' blocks. They make the sprite move, make sounds and change appearance.



Selections and Conditions

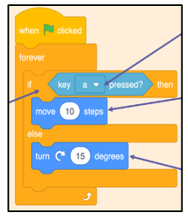
-Creating Conditions: The 'If-then' command block helps us to create conditions. It is one of the darker orange control blocks. Other blocks are placed inside the 'If-then' blocks to create conditions.



The 'senses' blocks (light blue) create the 'trigger' (e.g. when a certain key is pressed). We can change the trigger by pressing the downward arrow and selecting from the range of keys/ actions. The 'actions' blocks (e.g. motions, sounds, etc). are then used to program what will happen when the 'senses' command is triggered.

-Different Outcomes: The 'If-then-else' command block helps us to write programs that have selections with two outcomes.

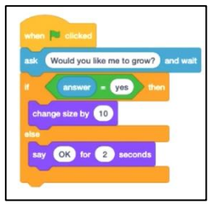
-Actions to be carried out if the condition is 'true' (if the conditions of the 'sense' command are met) are placed below 'then.' Actions to be carried out if the condition is 'false' (e.g. if any other key is pressed) go below 'else.'



-The 'forever' block means that the command will happen continually.

Asking Questions

-Questions can be included by using the 'ask' command blocks.



-If specific answers are needed (e.g. yes or no), these can be typed in when using the 'answer' sensing block within the = 'Operators' block - drag it into the first white space. In the second white space, we can then type in the desired answer.

-The 'say' command block (in looks) is used to inform the user if the response was correct.

Algorithms, Trialling, Debugging

-Designing an algorithm (set of instructions for performing a task) will help you to program the sequence that you require.

-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

Selection | Condition | True | False | Count-Controlled Loop | Outcomes | Conditional Statement

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COMPUTING: PROGRAMMING- Selection in Physical Computing

Overview

Selection in Physical Computing

- Programming is when we make and input a set of instructions for computers to follow. Lego WeDo 2.0 is an App which enables Lego models to be programmed in order to create movements using robotics.

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.

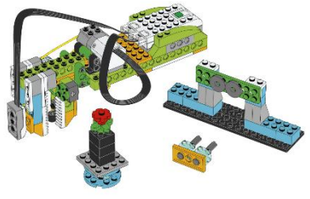
Input- The data which is entered into a computer or device.

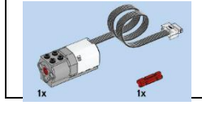
Output Device- The device which receives data from a computer or device.

Connection and Lego Kit

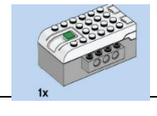
-Bluetooth Connection: Bluetooth enables a secure way to connect and exchange information between devices such as mobile phones, telephones, laptops, personal computers, printers, digital cameras, tablets, voice controlled devices and video game consoles. This connection is needed to exchange information from the App to the Lego model.

Grabbing Objects:





Motor



SmartHub

Space Exploration:

Select your own solution from these three:

Drive

Grab

Sweep

The motor connects to the SmartHub. The SmartHub connects the device to the computer or tablet using a Bluetooth signal.

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

Starts the motor for a chosen amount of time.

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 the sequence that we require to achieve our desired outcomes.

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

Trialing 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 w
-Keying errors: Typing in the
-Logical errors: Mistakes in pl

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

Important Vocabulary

Components	Connect	Infinite Loop	Output Devices	Motor	Condition	Input	Action	Selection