

COMPUTING SYSTEMS AND NETWORKS- The Internet

Overview



The Internet

- You should also know that Information technology (I.T.) includes computers and things that work with computers.
- You should also know that information and data can be shared by devices across networks.
- The internet is a network of networks that is used around the world.
- The World Wide Web is a system on the internet that has websites and webpages.
- Some content is protected on the internet. It is important to know that not all information on the internet is accurate, honest, or legal. Websites and their content are created by people.

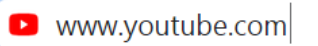
The World Wide Web

The World Wide Web

- The World Wide Web is the part of the internet where we can visit web pages and websites.
- Information can be shared in the form of things we can see or hear (e.g. things we can read, music, sounds, or videos, etc.).
- When we use the world wide web, routers help us to journey to different networks in different parts of the world.
- We can use traceroute tools to track the journey between routers.
- Web browsers, e.g. Google Chrome and Internet Explorer, let us look at different pages on the internet.

Website and Webpages

- Websites are a set of webpages.
- Webpages may contain different features, e.g. a title, links to other pages, images, videos, and text.
- Websites and webpages can be found using web addresses (domains), normally split into three parts:
 1. www (world wide web).
 2. Name of the organisation/ topic.
 3. Type of organisation/ location.
- A web address may also be called a URL (Universe Resource Locator). This is the text you type into your internet browser when you want to visit a website.



Networks and The Internet

- Networks connect different devices to one another, allowing for information sharing.
- Networks can also connect to other networks in different places, using a router.
- The internet is a network of networks that are all connected together.

Router: A router is something that finds a route between networks, connecting them.



The Internet: The internet is a network of networks, that is used around the world to share information and communicate.



Protection: Networks have security features that mean they can block or allow messages and requests. This means that information and data can be kept safe.



Ownership and Reliability

- The content on the internet may belong to different people or companies, for example the person who wrote it or the company who published it.
- The content may be copyrighted, meaning that others cannot copy or use it without permission.
- Not all of the information that we see or hear on the internet is reliable. Some of it may be inaccurate due to people lying or misunderstanding things.
- Inaccurate information can quickly spread. This has become known as 'fake news.' We should check multiple sources that we can trust to verify information.



Important Vocabulary

Network Router Network Security Network switch Server Wireless access point (WAP) Browser World Wide Web Content Links Files Download Sharing Ownership Permission Information

COMPUTING: CREATING MEDIA- Audio Editing

Overview

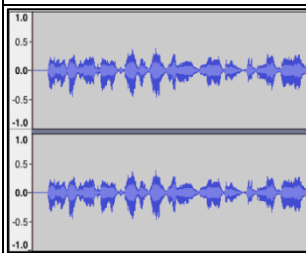
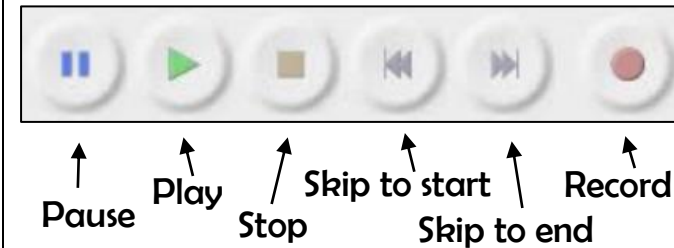


Audio Editing

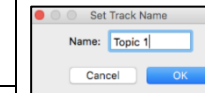
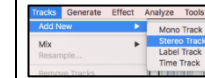
- You should already know that audio means sound, including music, sound effects, and podcasts.
- The process of recording and listening to sound requires input devices (e.g. a microphone) and output devices (e.g. a speaker).
- Podcasts are a type of spoken word audio file, that can be downloaded by listeners.
- People can have ownership over audio files, and can have the audio copyrighted, so that it can't be copied without permission.

Using Software

Audacity is one example of an audio editing tool, but many others are available. For example, you can use the voice memo recorder on a tablet.



The sound is shown as a waveform. We should aim for it to peak at around 0.5/ -0.5








How to Record a New Track

1. Go to the tab 'Tracks' and then 'Add New.'
2. Name the new track
3. Click in the track's window to select it.
4. Press record to begin recording into the new track.

Got to the 'file' tab and 'Save Project' to save your work. You can also delete recordings, but you should only ever delete your own files!

Input and Output Devices

We use input devices to send the audio to the device/ computer.
We use output devices to listen to the audio from the device/ computer.

| Input Devices | Output Devices |
|--|--|
|  <p><u>Microphones</u> are input devices that change sound into electrical signals, which can then be recorded or transmitted.</p> |  <p><u>Digital speakers</u> turn the electrical signal into an audio output that can be heard by the listener.</p> |
|  <p>With the help of special cables, <u>musical instruments</u> can be linked to computers, and become input devices.</p> |  <p><u>Headphones</u> are worn over the ears of the listener, so that only they can hear the sound output.</p> |
|  <p>Some devices are capable of acting as both input and output devices. Examples include headsets, smartphones, and voice assistants (e.g. Google Home and Amazon Echo).</p> | |

Creating Podcasts

Podcasts are a type of spoken word file that can be downloaded by listeners. A user can often choose to download the whole series of podcasts.

Some examples of podcasts are 'Stories Podcast', 'Six Minutes' and 'Brains On! Kids Science Podcast.'

Features of podcasts include:

Sounds: Voices, jingles, background music, sound effects

Information: Presenters' names, name of podcast, introduction, main section, conclusion.



Top Tips for High-Quality Podcasts

- Speak clearly
- Avoid fillers ('um', 'like')
- Avoid coughing/ sneezing
- Take turns to speak
- Avoid background noise
- Don't touch the microphone
- Choose music carefully

Important Vocabulary

Audio Record Playback Input Output Sound Podcast Selection Mixing Time shift Export Sound file

COMPUTING: CREATING MEDIA- Photo Editing

Overview



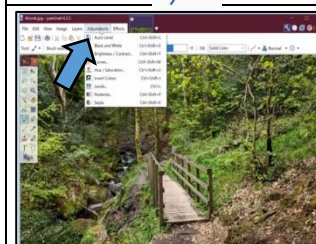
Photo Editing

- You should already know that we can use digital devices to help us to take and edit photographs.
- There are many different apps and programs to edit and improve photos, for example Photoshop, Luminar and paint.net
- There are lots of different ways that we can edit photographs, for example cropping, rotating, flipping, and changing colours and styles.
- We should understand the not all photographs that we see are real – they may have been edited.

Using Software

Paint.net is one example of photo editing tool, but many others are available. Below is how to select, copy and paste in new elements to edit your photograph.

1. Open the photo and use the 'lasso select' tool to select the area that you need.



2. Right click on the image and select 'copy.'



The 'Adjustments' tab allows us to turn the photo black and white, and change contrast & brightness.

3. Open the image that you want your copied photo in. Select 'paste.'



The 'clone stamp' copies pixels from one part to another. 'Recolor' is used to replace colours. 'Magic wand' allows areas with a similar colour to be selected.

4. Use the handles to resize the image, and drag into position.



When we want to save our edit, we should click on this icon or the 'save' button. We can reverse the last thing we have done with the undo tool.



Editing Techniques

Below are a number of different ways that we can edit photographs.



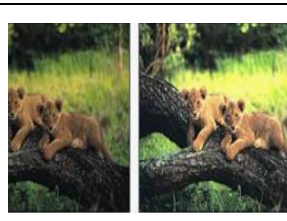
When we only need a part of a photograph, we can crop the image. We can also enlarge and reduce the parts that we need.



We can make more than one of an image by copying it. We can also rotate and flip images to create different effects.



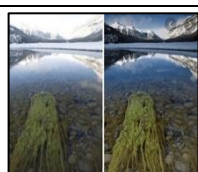
Photograph editing programs often have filters. These can change the colours in a photograph. Different colours can give us different feelings.



When the lighting of the photograph is not quite right, we can change the brightness of the photograph.



We can add and remove parts of a photograph by using cut, copy and paste tools.



We can change the contrast of photographs, making the subjects clearer.

Considerations of Edited Photos

-As photographers and editors become more skillful, and editing programs become more advanced, it can be hard to tell if images are real or edited.

-We therefore need to be alert, and not believe everything we see. We should also edit photos for positive, and not negative reasons (see right).



Positive Reasons for Editing Photos

- To make things clearer;
- To highlight the important things;
- To show things in a nice way;
- To avoid embarrassment.

Negative Reasons for Editing Photos

- To try to deceive people;
- To embarrass or put down others;
- To spread fake news or dishonest ideas.

Important Vocabulary

Arrange Digital Crop Undo Copyright Composition Pixels Rotate Flip Effects Hue/Saturation Sepia Illustrator Vignette Retouch Clone Recolour Sharpen

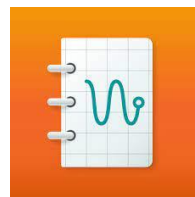
COMPUTING: DATA AND INFORMATION- Data Logging

Overview

Data Logging



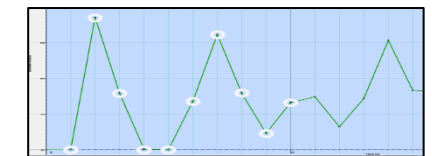
Arduino Science Journal App



- 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 data loggers.
- Data loggers and logging software can be used to automatically capture data. We can then draw conclusions in answer to our research questions.

Data Recording

- One way for us to record data is by writing it down. Some data loggers can also record data themselves, which we can download later. Computers can also help us to record data, e.g. by connecting our data loggers to computers and opening data logging software.
- An advantage of this is that computers can record data automatically, meaning that someone does not need to sit waiting for a long period of time. Data loggers can be set to measure at different intervals (points in time).
- Data logger software can also be used to show different charts and graphs. This can save the user a lot of time!



Data Collection

Asking Questions: Data gathered over time can be used to answer important questions.

For example, the class register can be used to answer questions about children's attendance. Before collecting data, we need to carefully consider which questions we are trying to answer.

| | 23/02/16 | 01/03/16 | 08/03/16 |
|----------|----------|----------|----------|
| Seb | █ | █ | █ |
| Anusha | █ | █ | █ |
| Belle | █ | █ | █ |
| Patrick | █ | █ | █ |
| Reece | █ | █ | █ |
| Ollie H | █ | █ | █ |
| Ollie | █ | █ | █ |
| Oliver D | █ | █ | █ |

-Sensors: Our senses (sight, hearing, smell, taste, touch) detect things in our environment. Computers have input device sensors which help them to sense things.

- Some examples are:
- Microphones (sound)
 - Camera (light)
 - Touchscreen (touch)



- Data Loggers: Data loggers have sensors built into them. They can be used to detect and record data.

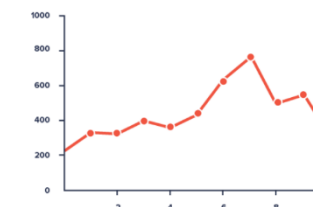
Data loggers often contain:

- A heat sensor (to record the temperature)
- A light sensor (to record brightness)
- A sound sensor (to record the noise).



Analysing Data

- When scientists collect data, they usually store it so that it can be analysed at any time. The data can also be shared so that other scientists can use it.
- Tables and graphs can be used to present the data in a useful way for reading and understanding it. It is important to be able to see trends as clearly as possible.



Answering Questions

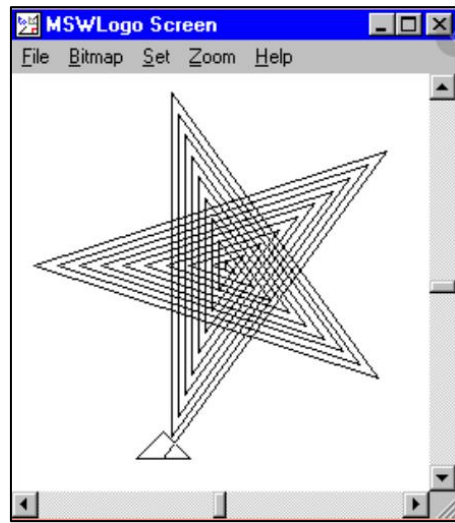
- Remember that data should be collected for a reason: to answer questions.
- It is very important to ensure that the testing that you do is fair and reliable, otherwise the data that you get back may not give you the accurate answers that you need.
- It is important to interpret your data carefully. You can then write a report detailing what your conclusions are.

Important Vocabulary

Input device Sensor Data logger Logging Data point Interval Analyse Data set Import Export Logged Collection Review Conclusion

COMPUTING: PROGRAMMING- Repetition in Shapes

Overview

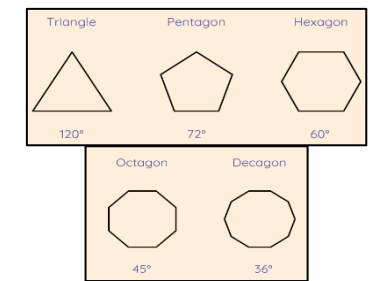
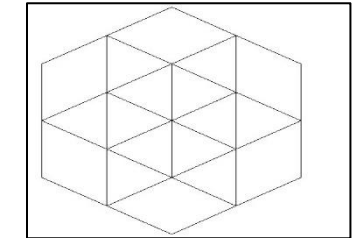
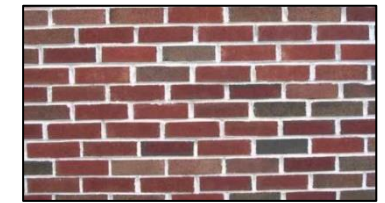


Repetition in Shapes

- Programming is when we make a set of instructions for computers to follow.
- Logo is a text-based program that we can use in order to create shapes and patterns.
- 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 shapes and patterns.

Programming Patterns

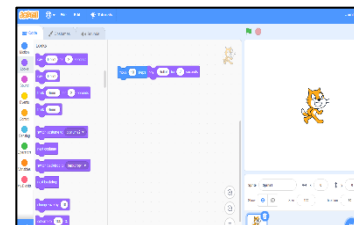
- Patterns: Patterns are things that repeat in a logical way. In everyday life, patterns are everywhere!
- Patterns in Logo: Instead of typing in the code to create each individual shape, we can save time by repeating a sequence of instructions. We use the 'repeat' function.
- Repeat: Type the command 'repeat' — this repeats commands a set number of times. The number following repeat is the number of times to repeat the code, and the code to be repeated is in square brackets, e.g. repeat 4 [FD 100 LT 90]
- The above code will repeat FD 100 LT 90 four times.
- Creating Shapes and Loops: To make shapes, we need to know the angles of corners of different shapes (see right). Using the repeat function with shapes can help us to make spirals.



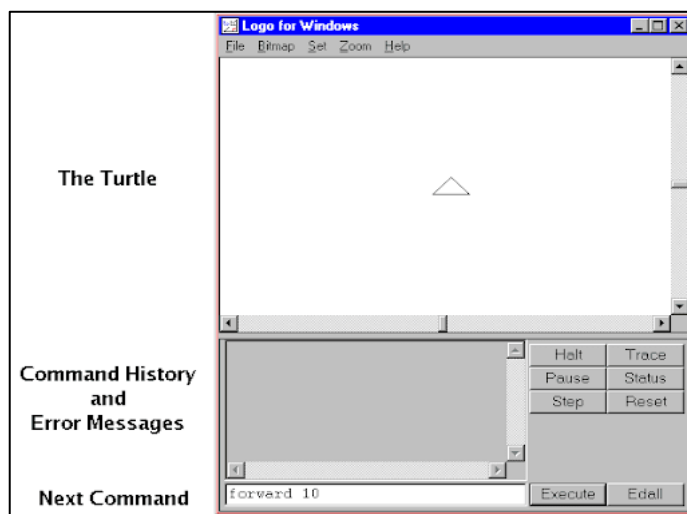
The Basics of FMS Logo

-What is FMS Logo?

- Logo is a text-based programming language, where we can type commands which are then drawn on the screen.
- Logo helps us to learn how to use programming language, whilst also being creative and using problem-solving skills.



The Display:

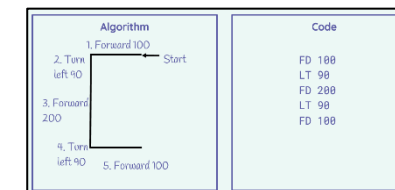


Basic Commands:

- FD: Forwards. Always followed by a space and the number of steps, e.g. FD 50
- BK: Backwards. As above, e.g. BK 50
- LT: Left turn. Always followed by a space and then the degrees to turn, e.g. LT 90
- RT: Right turn. As above, e.g. RT 90
- CS: Clears any pen marks on your screen and gets the turtle back to the centre.
- PU: Stops turtle from leaving a pen trail.
- PD: Makes turtle leave a pen trail again.

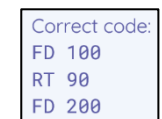
Sequencing and Algorithms

- 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).



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

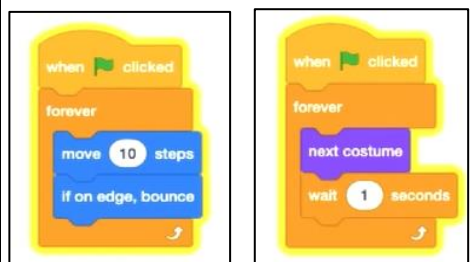
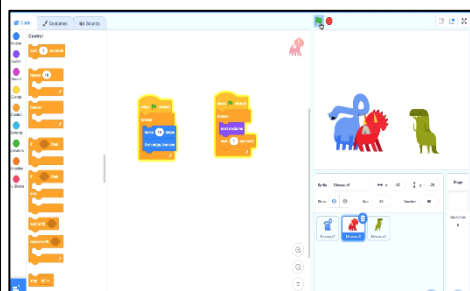
commands code snippet pattern repetition repeat value trace decompose procedure

COMPUTING: PROGRAMMING- Repetition in Games

Overview

Repetition 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 stories, animations and games. We can use repeat and loop operator blocks in order to make our programs more logical and efficient. These help to run code continuously or for a set number of times.
- We use algorithms (a set of instructions to perform a task) to sequence movements, actions and sounds in order to program effective animations.



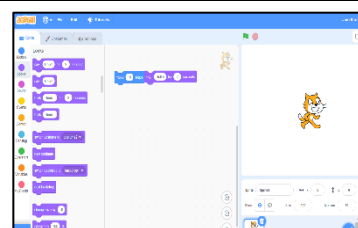
Loops and Repetition

- **Pen Drawing in Scratch:** Select the 'add extension' icon in the bottom left corner. Then select 'pen.' This allows you to draw with your sprites.
- **The Repeat Block:** Select 'code' and then the 'control' blocks (orange). Here you will find the repeat block. It should be placed around the command blocks that you want to repeat. The number of times something is repeated can be typed into the white area.
- **Creating Shapes:** Selecting 'pen down' (in the 'operators' blocks) can be followed by use of the motion blocks to determine the line that will be drawn (e.g. 'move 10 steps'). Turning a number of degrees changes the direction of the pen. Placing the repeat block around this motion code can allow more complex shapes to be drawn.



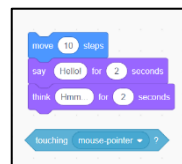
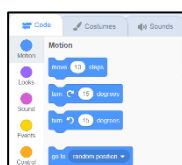
The Basics of Scratch

- What is Scratch? Scratch is a website/ app that lets us code our own stories, games and animations.
- Scratch helps us to learn how to use programming language, whilst also being creative and using problem-solving skills.



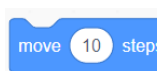
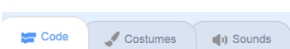
There are three main areas in Scratch:

- 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.



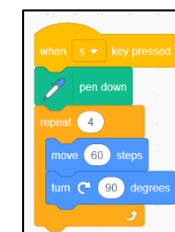
Attributes: There are three attributes of the sprite which we can change to make our animation: Code, Costumes, Sounds.

- 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.



Event Managing and Efficiency

- We should ensure that programs are coded and labelled in easy-to-understand, user-friendly ways.
- Using the 'events' blocks logically can help to make your programming easy to use. E.g. when 's' key pressed a square is drawn, when 'h' key is pressed a hexagon is drawn.
- Efficiency is about getting the right result in the easiest way possible, wasting little time or effort. Our use of the repeat and loop tools should help to create efficient programs.



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

Loop Repeat Value Forever Count-controlled loop Animate Event block Duplicate Modify Refine