

Module 1

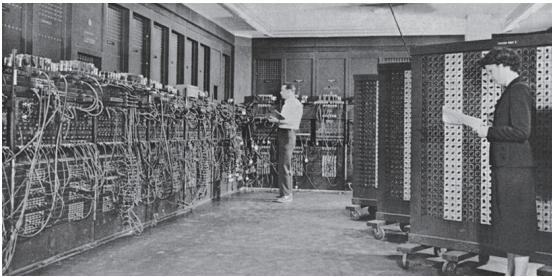
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Computers Rule the World

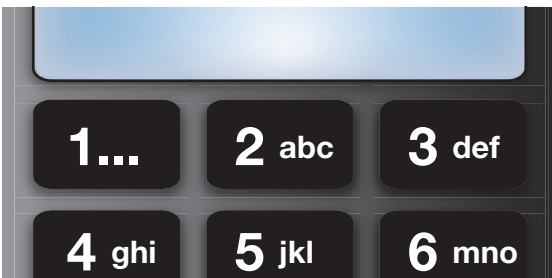
Computers, Internet websites, calculators and mp3 players simply would not function without software. Thousands of lines of code are required for your modern mobile phone or games console to operate. Take a look at some amazing facts that show us how software is present everywhere we look in our everyday lives.

The first computers were huge machines. For example, the ENIAC computer weighed nearly thirty tons and occupied 680 square feet of floor space. ENIAC contained more than nineteen thousand vacuum tubes and performed about five thousand addition or subtraction operations every second. That is super slow for today but it was super fast back in those days. Today computers are tiny compared to what they were in 1949.



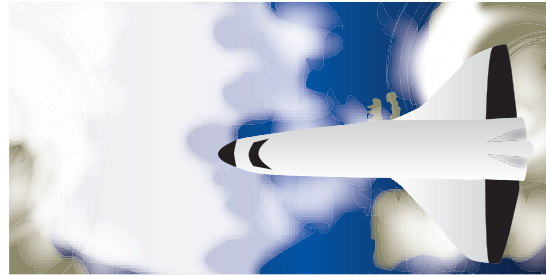
Glen Beck (background) and Betty Snyder (foreground) program the ENIAC in BRL building 328.

In 2019 Facebook had more than 2.38 billion registered users.



According to the Irish telecom regulator ComReg, an average of 25 million text messages are sent in Ireland every day.

The technology contained in a single handheld console exceeds all the computing power that was used to put the first man on the moon.



\$233 billion

Value of merchandise sold on Amazon in 2018, this is the equivalent to the GDP of Portugal.



Dublin native Brian Fallon set up Daft.ie in 1996. It was his transition year mini-company in St. Mary's College, Rathmines. Daft is now Ireland's biggest property website and is estimated to be worth millions.

Say "Hello" to Scratch

We will learn problem solving and programming skills using Scratch.

Scratch is a programming language that makes it easy to create your own interactive stories, animations, games, music, and art and share your creations on the web.

Scratch is completely free. To start creating with Scratch 3.0 go to <http://scratch.mit.edu>



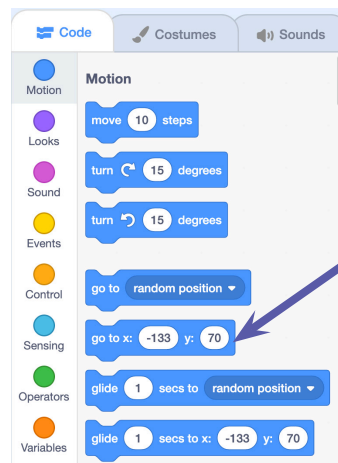
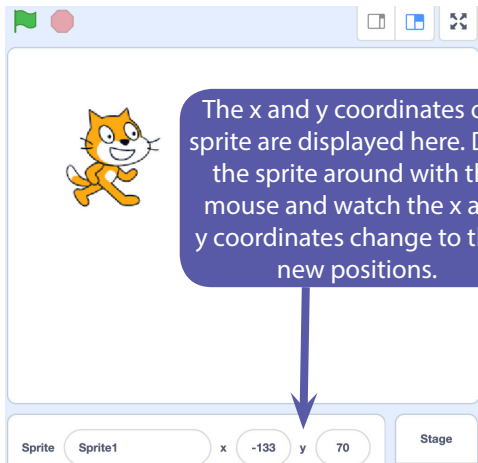
The Scratch Interface

The image shows a screenshot of the Scratch web interface with several components highlighted by blue boxes and arrows. The interface is divided into three main sections: the left sidebar (Blocks Palette), the center (Script Area), and the right (Stage).

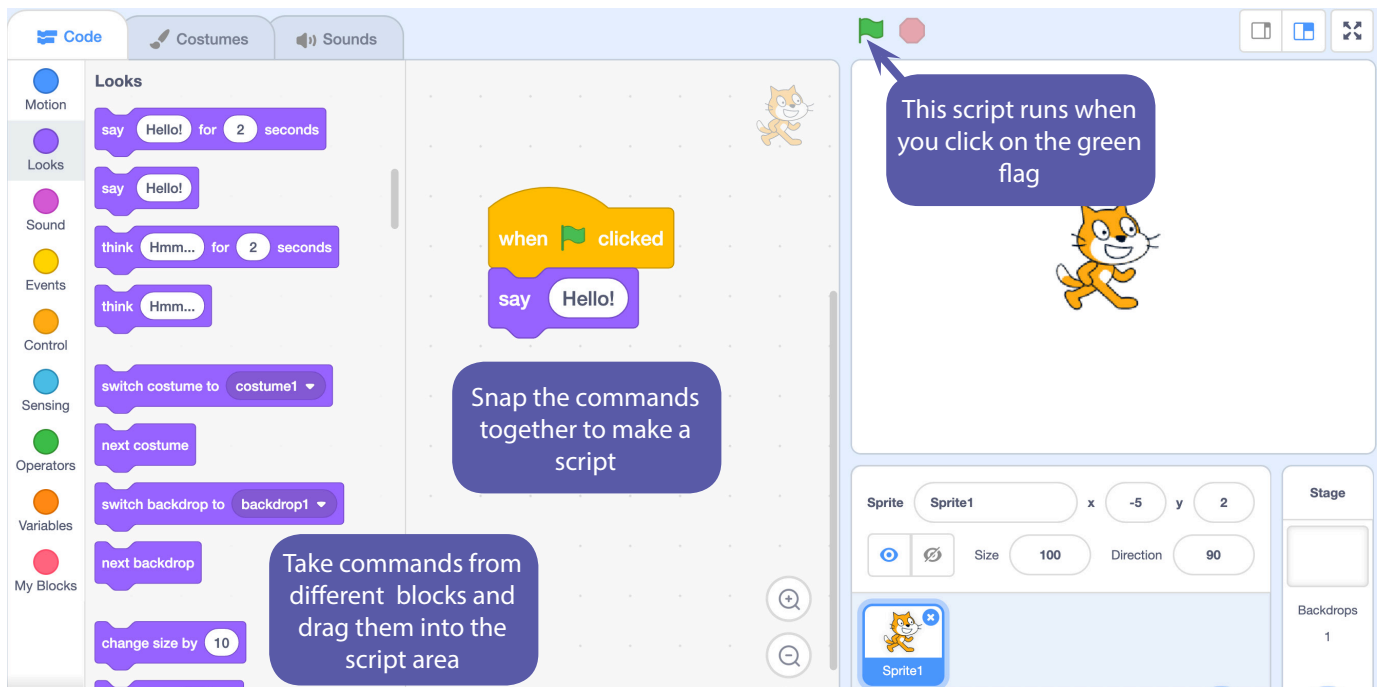
- Tabs:** Located at the top left, it includes 'Code', 'Costumes', and 'Sounds' tabs. A callout box says: "Click tabs to edit scripts, costumes, or sounds".
- Script Area:** The central workspace where code blocks are assembled. A callout box says: "Drag blocks in, snap them together to make Scripts".
- Stage:** The area where the sprite's actions are visible. A callout box says: "Where your creations come to life".
- Green Flag:** A small green flag icon in the top right of the Stage area. A callout box says: "A way to start scripts".
- Blocks Palette:** The left sidebar containing various block categories like Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, and My Blocks. A callout box says: "Blocks for programming your sprites".
- Scratch Extensions:** A button at the bottom left of the Blocks Palette. A callout box says: "Load more block libraries".
- Sprite List:** A list of thumbnails for the current project's sprites. A callout box says: "Thumbnails of your sprites".
- Create New Sprites:** A button at the bottom right of the Sprite List. A callout box says: "From the library or your own pictures or drawings".

Using Scratch

Check out the Scratch 3.0 Introductory Video at <https://youtu.be/98awWpkx9UM>



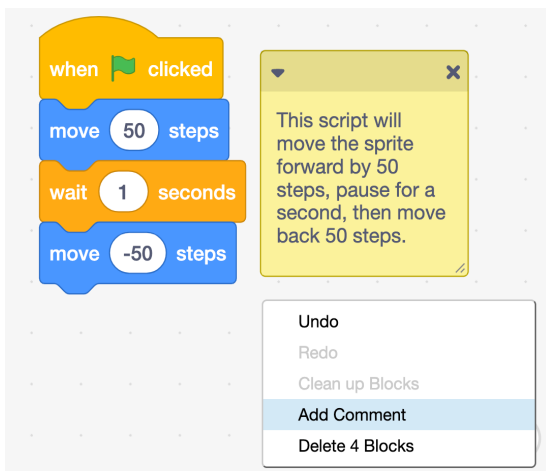
The "go to x y" block will update itself to the x and y coordinates of where the sprite has been placed



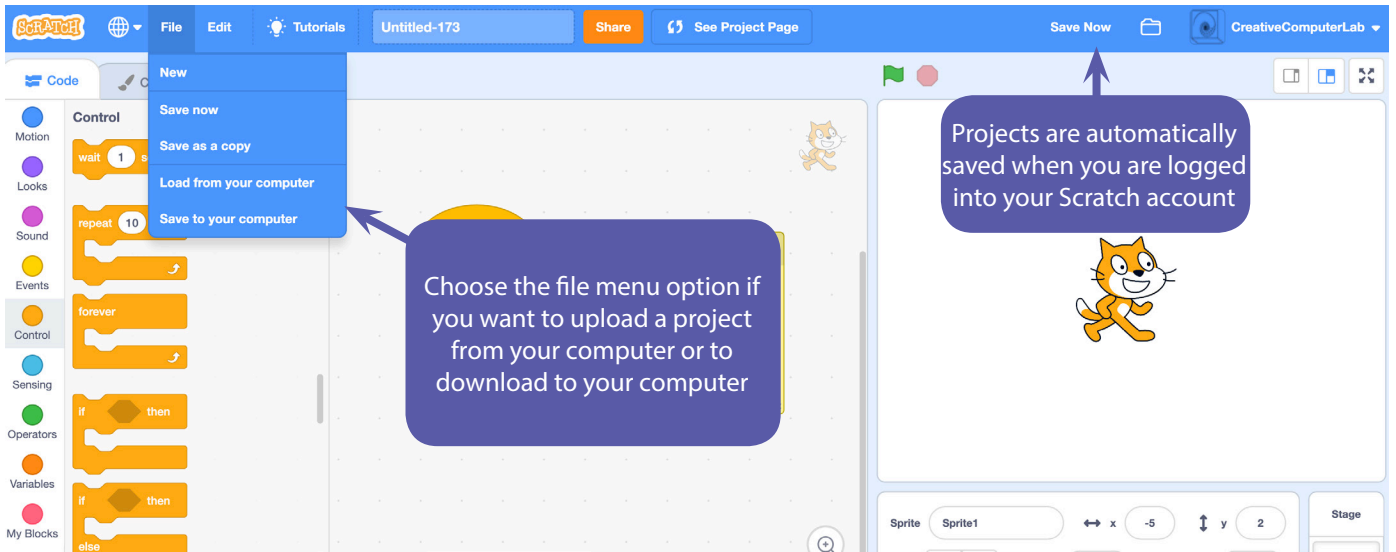
Snap the commands together to make a script

Take commands from different blocks and drag them into the script area

This script runs when you click on the green flag

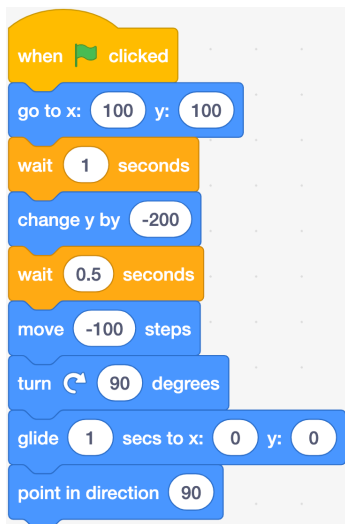


It is a good idea to put comments in to explain the script you have written by right clicking on the script area and choosing add comment



Exercises

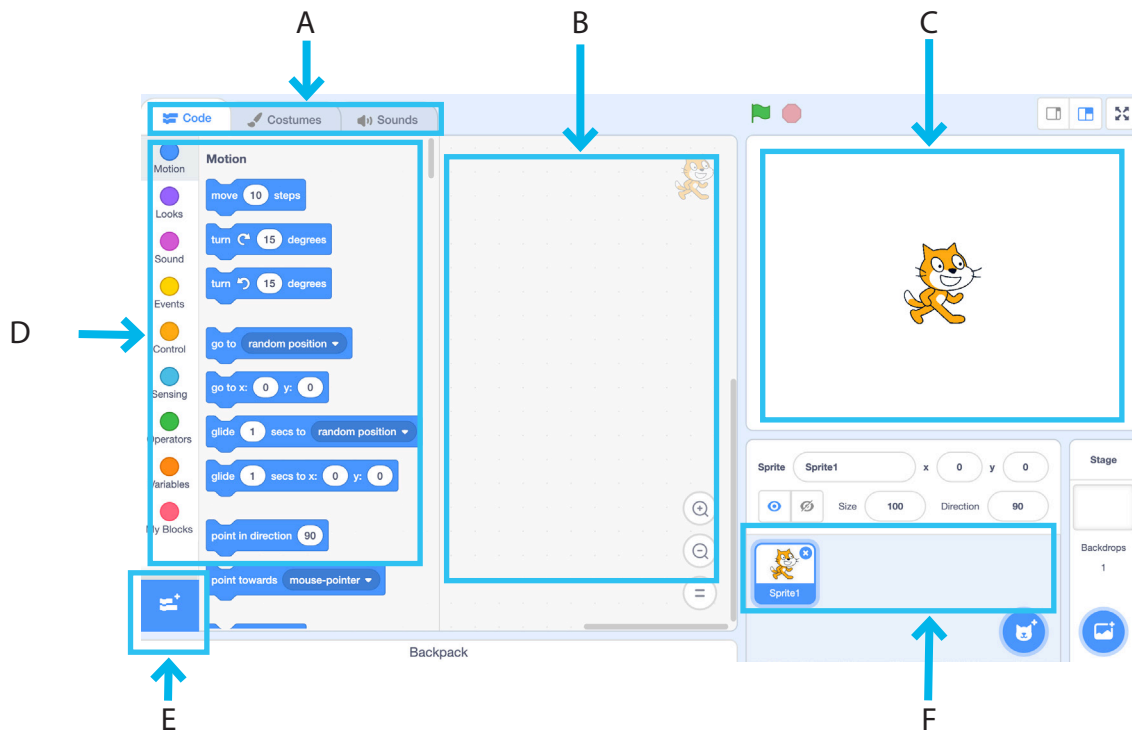
- 1 Assemble the commands from the events, control and motion areas of Scratch. Write a description of what happens in the script when the green flag is clicked.



Script Description

- 2 Using Scratch write a script that will do the following
 1. Move a sprite to the starting position x:50 y:70
 2. Turn the Sprite upside-down
 3. Glide for 2 seconds to x:-50 y:-50
 4. Turn the sprite upwards again

3 The Scratch Interface Quiz



Task:

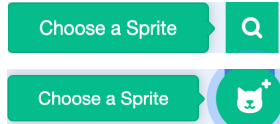
Look at the Scratch Interface above.

In the table below see if you can match the letters to the different features of the Scratch Interface:

A	Blocks palette
B	Stage
C	Sprite list
D	Tabs Bar
E	Scripts Area
F	Scratch Extension Blocks

Playing with Pictures

You can add a new sprite to your projects by using these buttons located under the sprite list:



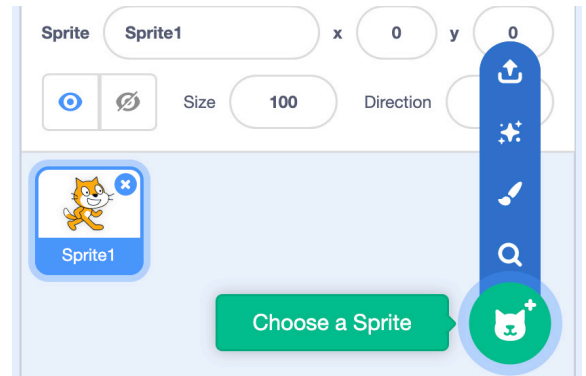
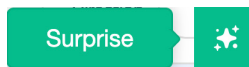
It is also possible to draw your own sprite by clicking on this button:



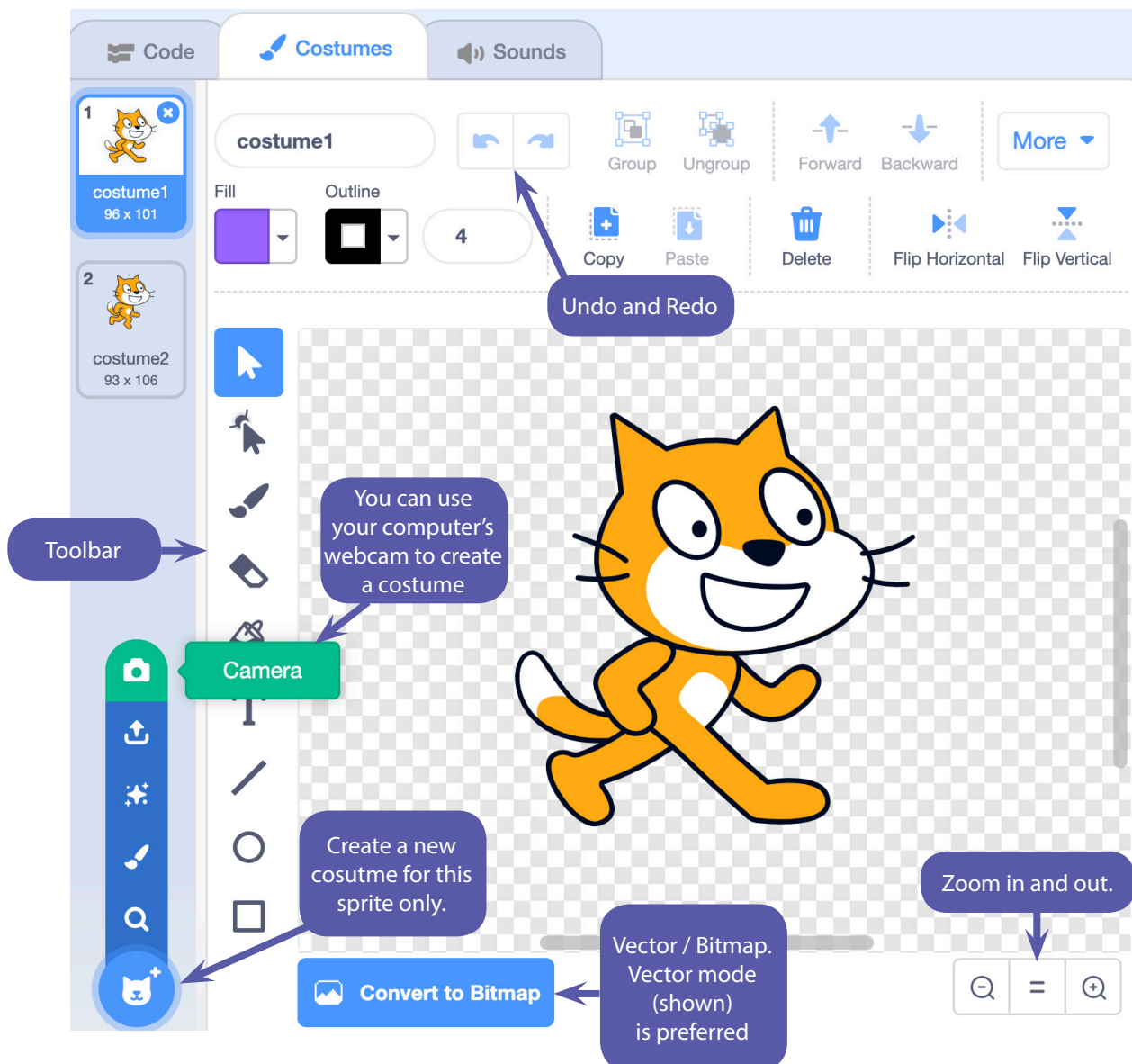
You can also upload a sprite from your computer using this button:



You can get a surprise sprite using this button:

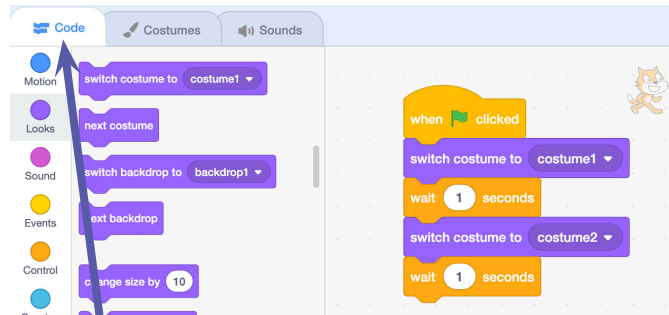
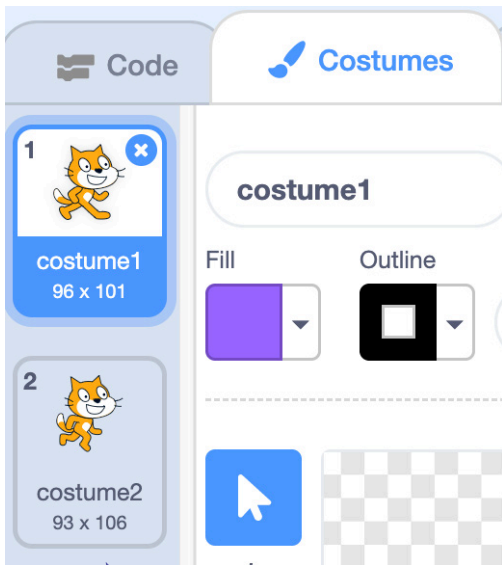


You can change how a sprite looks with any easy to use paint editor.

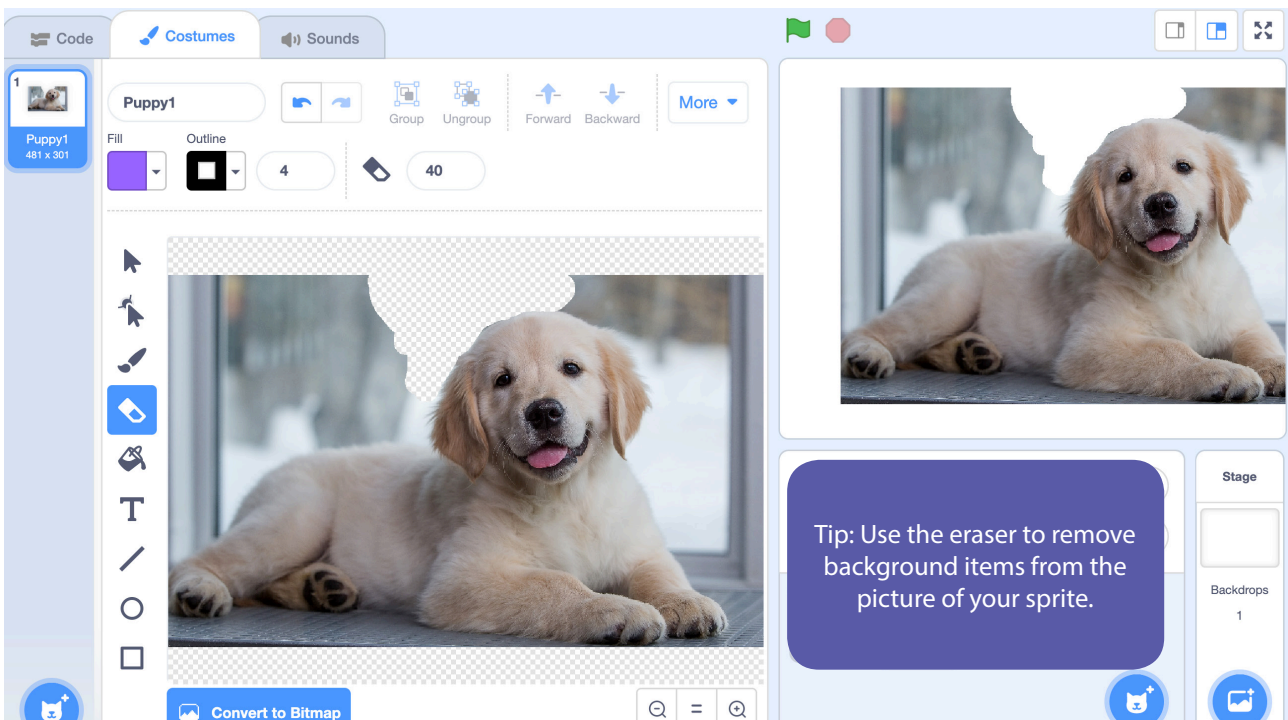


Exercises

- 1 Modify the script below to make the cat move across the stage as the costume changes. Make it appear like it is going for a walk.



- 2 Create a sprite from a photograph that you have taken.



Tell me what to do

Algorithms

Sets of instructions that solve a problem.

Buying items in a shop



1. Choose a packet of crisps and a drink from shelf.
2. Go to checkout.
3. Wait in queue.
4. Hand items to cashier.
5. Wait for cashier to say total price.
6. Take out money.
7. Hand money to cashier.
8. Wait for change.
9. Take items.

Baking a Cake



1. Mix milk and vinegar. Melt the chocolate. Sieve flour, cocoa and soda into a bowl. Add margarine, sugar, eggs and half the milk mixture and beat well.
2. Add the melted chocolate and remaining milk. Beat until smooth. Transfer to 8" round cake tin which has been greased & lined. Bake in a preheated oven at 325°F, 160°C, Gas Mark 3 for 1 ½ hours approx. When cake is cold, split in half & use half the filling to sandwich cake. With remaining filling, completely cover cake & decorate to your choice.
3. Put sugar & evaporated milk into a saucepan. Stir and bring to the boil, then simmer for 5 minutes. Remove from heat. Add the broken chocolate & stir until melted. Repeat with margarine. Pour into a bowl & leave in fridge until it thickens.

A Good Algorithm

1. Leads to completion.
2. Is accurate and unambiguous.
3. Has the appropriate level of detail.
4. Has well ordered instructions.
5. Covers all possible outcomes with practical solutions.

Giving Directions



From the town hall, follow Orchard Road for 2 kilometres until you reach a set of traffic lights. Turn left onto Western Road. Continue driving along Western Road until you reach a T-junction. Turn Right onto O'Connell Avenue and continue forward for 1 kilometre until you pass the Post Office on your left. Just after the Post Office turn left onto Meadow Drive. Mary's house is the second house on the right.

Exercises

- ❶ In the box below write a good computer algorithm to explain how to top up your mobile phone credit. Make sure you use a step by step clear set of instructions.

- ❷ With human algorithms we can rely on
- Intuition
 - Initiative
 - Prior knowledge
 - Independent decision-making
 - Learning from experience

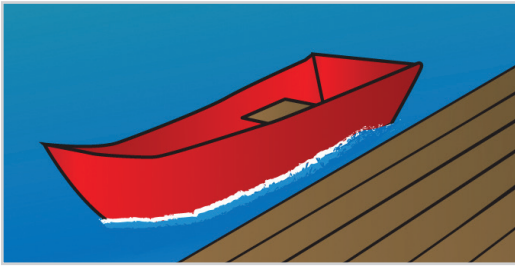
Computers do not have these things. Look back on the 3 algorithms on the previous page. In the box below list 3 algorithms that you execute in your daily life.

1. _____

2. _____

3. _____

3 Solve the Farmers problem



A farmer has to take three items, a dog, a goat and a cabbage, across a river. He has a boat but it can only take two objects at once, in other words, the farmer and one other item.

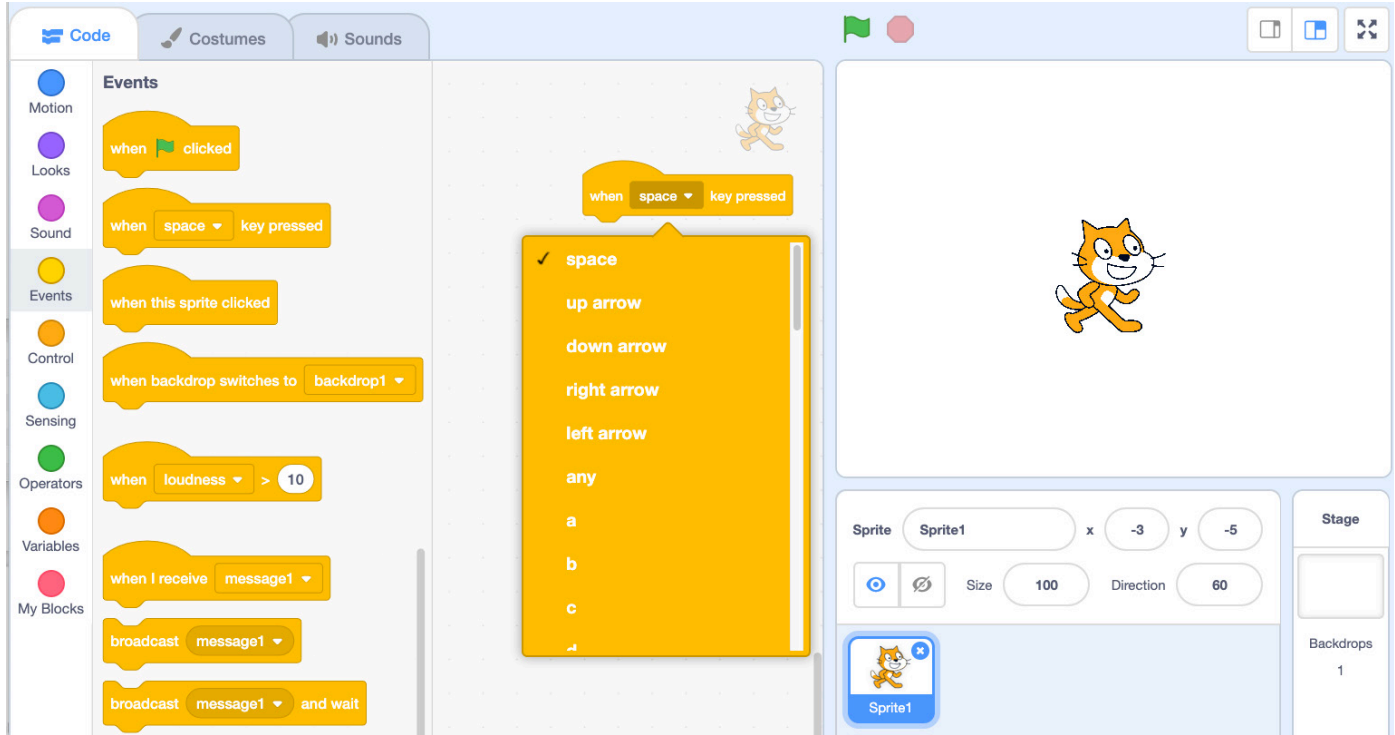
If the dog and the goat are left together the dog will bite the goat.

If the goat and the cabbage are left together the goat will eat the cabbage.

Write an algorithm to tell the farmer how to get the three items across the river.

Playing With Music

Often when using a computer it needs to respond to an event triggered by the user. For example a computer will react when you press buttons on a joy pad when playing a game or simulating piano playing on a keyboard.



Exercises

- 1 Create a script using Scratch that will make your sprite move in different directions using the arrow keys. When you have a working script use it to fill in the blank commands below.



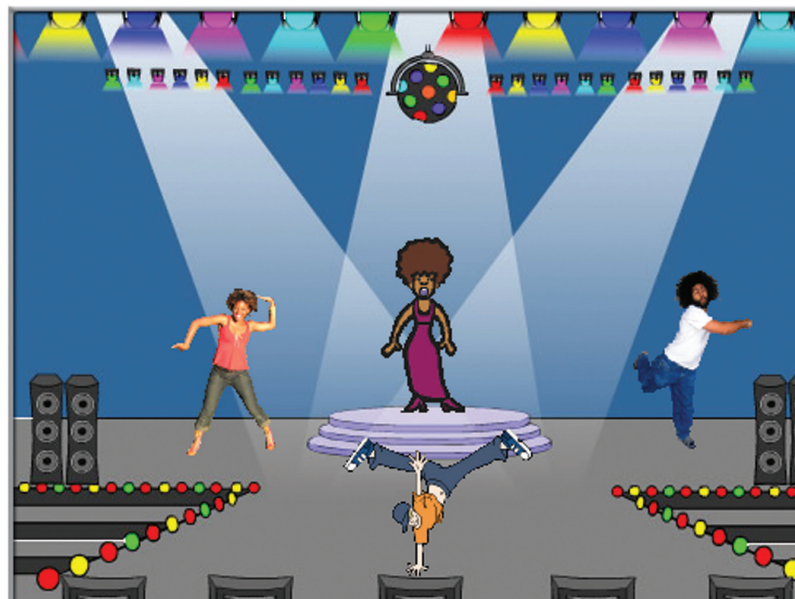
- 2 Load the Scratch Music extension as shown below. Use Scratch commands from the music extension blocks to get your sprite to play a musical scale when the space key is pressed.

The image shows the Scratch interface with three callouts explaining how to add the Music extension:

1. Click on the Scratch extensions button at the bottom of the blocks palette.
2. Choose the Music extension.
3. The Music extension blocks will appear in the blocks palette.

The screenshot displays the Scratch code editor with the Music extension blocks visible in the blocks palette on the right. The Music extension icon, featuring a piano keyboard and a drum set, is highlighted in the center. The Music extension blocks include: play drum (1) Snare Drum for 0.25 beats, rest for 0.25 beats, play note 60 for 0.25 beats, set instrument to (1) Piano, set tempo to 60, and change tempo by 20.

- 3 Create your own band using Scratch. Use sound commands to make music for the band. Animate your sprites by using costumes and motion commands. Figure out how to introduce a background to make the stage fit in with the image of your band.

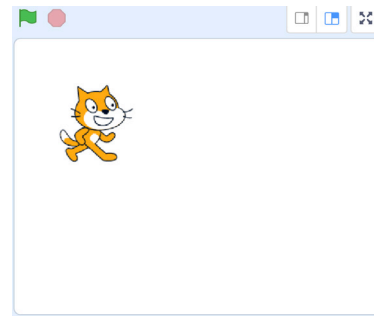


End of Module Quiz

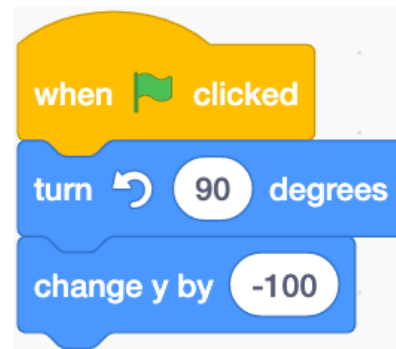
- 1 A software application that allows users to make voice and video calls over the Internet is called
- A. YouTube
 - B. Snapchat
 - C. Skype
 - D. Ebay

- 2 An electronic device for playing digital audio files is often known as
- A. Touchscreen
 - B. MP3 player
 - C. Eniac
 - D. Audio Speakers

- 3 In Scratch your creations come to life in the area shown in the image know as
- A. The Stage
 - B. The Sprite
 - C. The Screen
 - D. The Interface



- 4 What does this script do?
- A. A sprite will rotate forwards by 90 degrees and move 100 steps up when the green flag is pressed.
 - B. A sprite will rotate forwards by 90 degrees and move 100 steps down when the green flag is pressed.
 - C. A sprite will rotate backwards by 90 degrees and move 100 steps up when the green flag is pressed.
 - D. A sprite will rotate backwards by 90 degrees and move 100 steps down when the green flag is pressed.



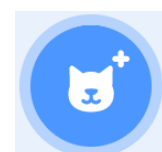
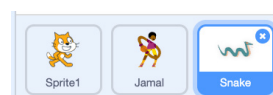
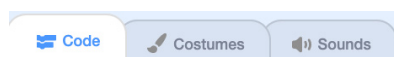
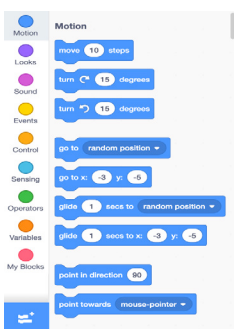
- 5 Match the following parts of the Scratch interface to the images

Sprite List

Blocks Palette

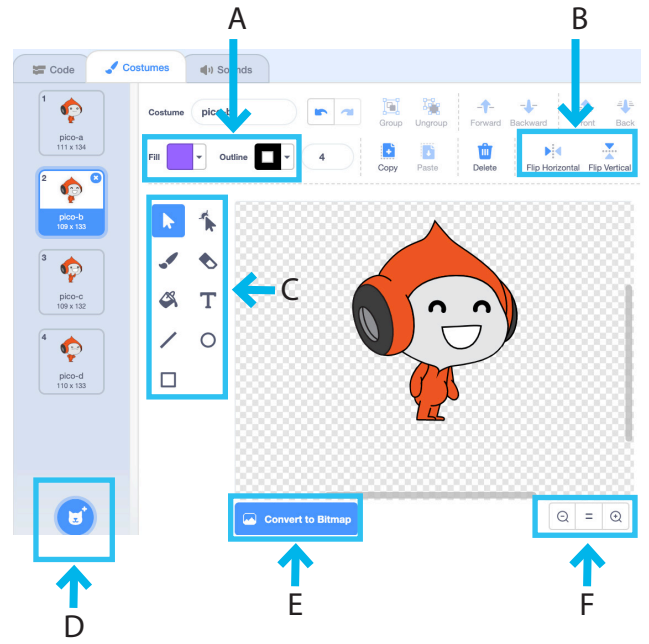
New Sprite Button

Tabs



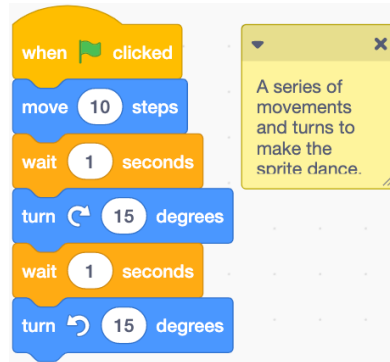
6 Match the letters from the diagram of the Scratch paint Editor to the correct description.

- A. Zoom
- B. Switch between vector / bitmap modes
- C. Colour palettes
- D. Flip
- E. Toolbar
- F. Add image from a file



7 A written explanation that can be attached to code as shown is known as

- A. A Comment
- B. A Cursor
- C. A Sticky Note
- D. A Script



8 Which of the items listed below is not a feature of a good algorithm?

- A. Accurate and unambiguous
- B. Written in random order
- C. Leads to completion
- D. Covers all possible outcomes with practical solutions

9 Identify the script below that matches the game instruction. Hit "a" to move left and hit "b" to move right

- A. A.
- B. B.
- C. C.
- D. D.