

Module 1

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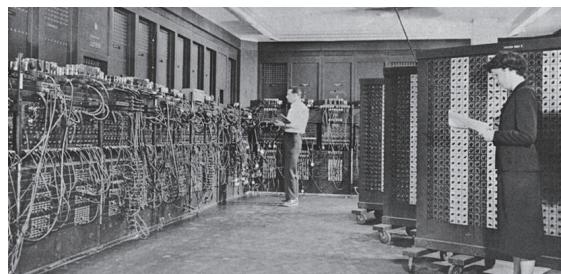
SCRATCH



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.



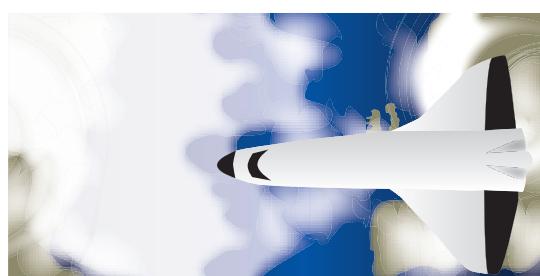
Glen Beck (background) and Betty Snyder (foreground) program the ENIAC in BRL building 328.

In 2010 Facebook had more than 500 million registered users; if it were a country it would be the 3rd biggest in the world.



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.



\$60 billion

Value of merchandise sold on eBay in 2009, this is the equivalent to the GDP of Cuba.



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

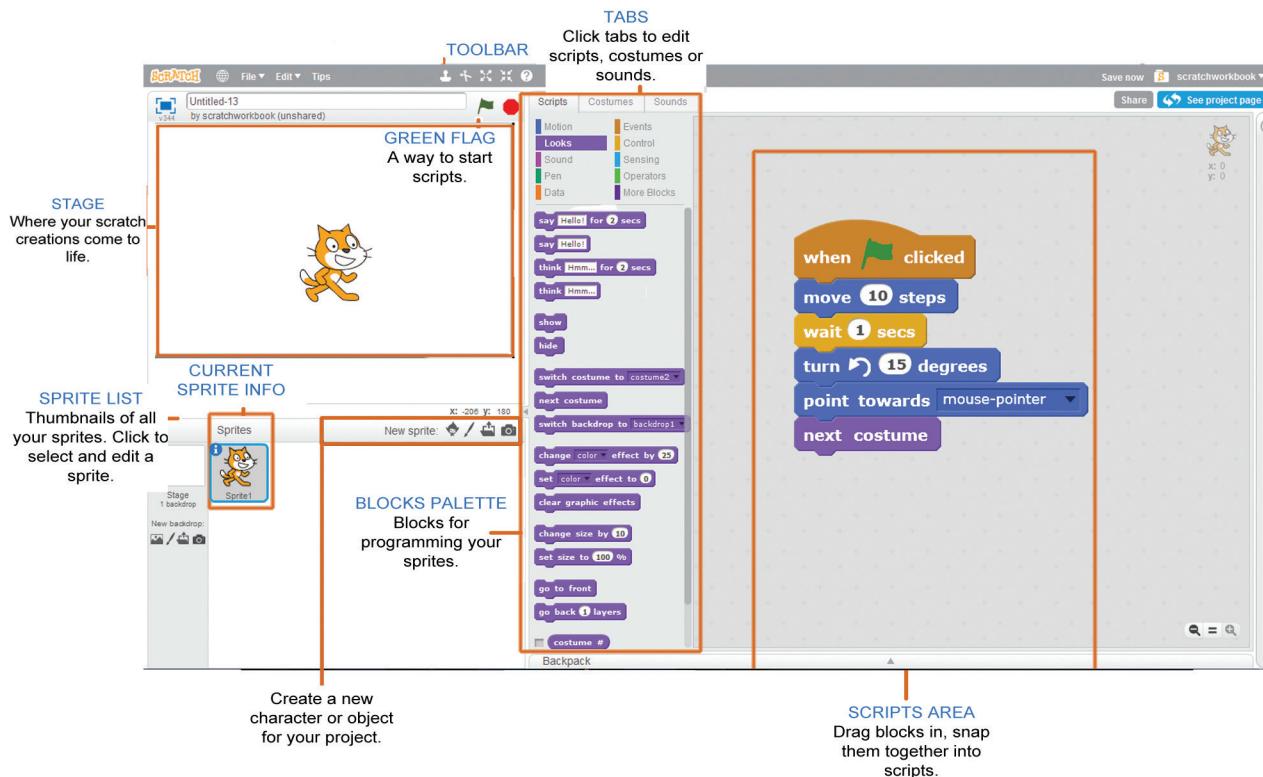
We will learn problem solving and programming skills using Scratch.

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 2.0 go to <http://scratch.mit.edu>

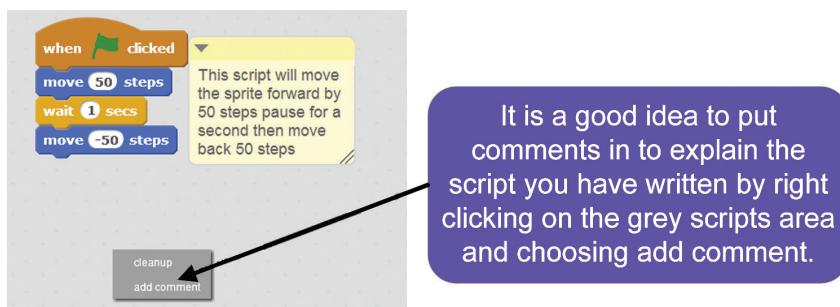
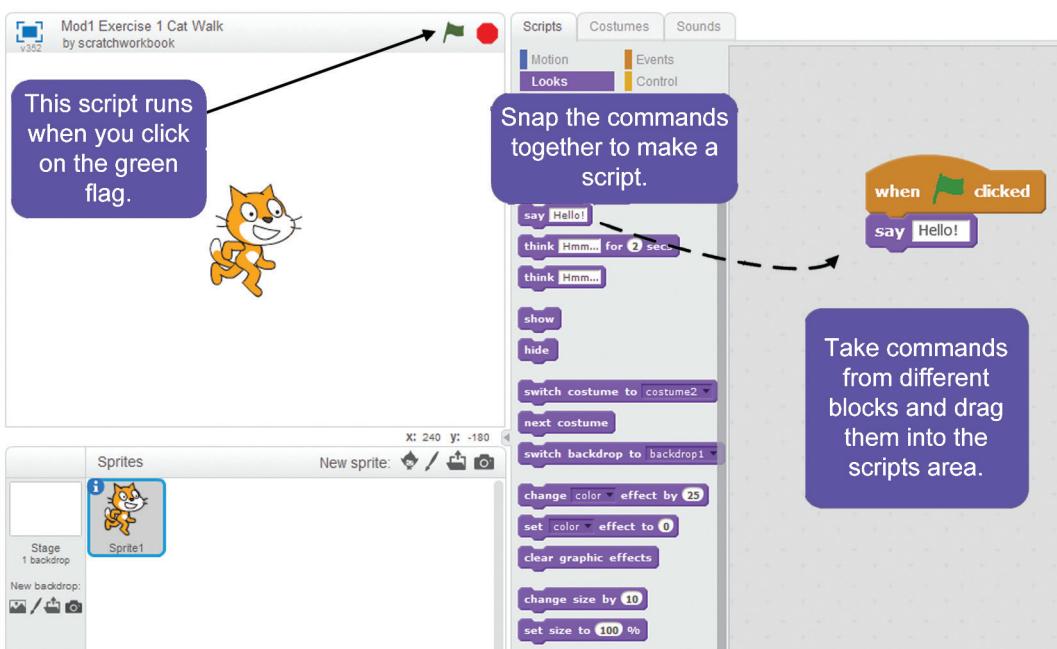
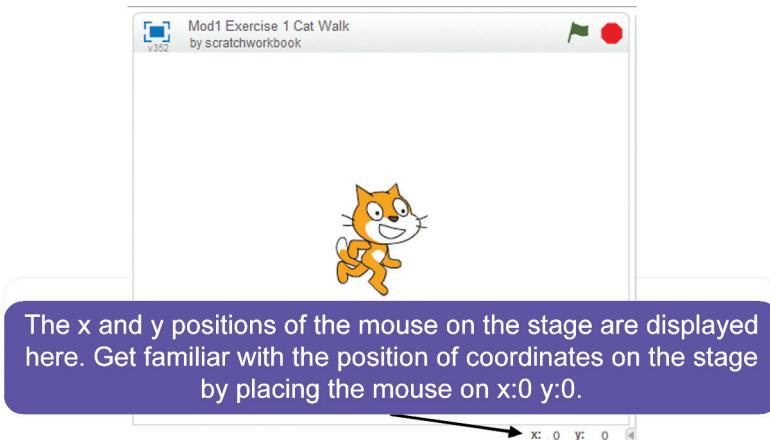


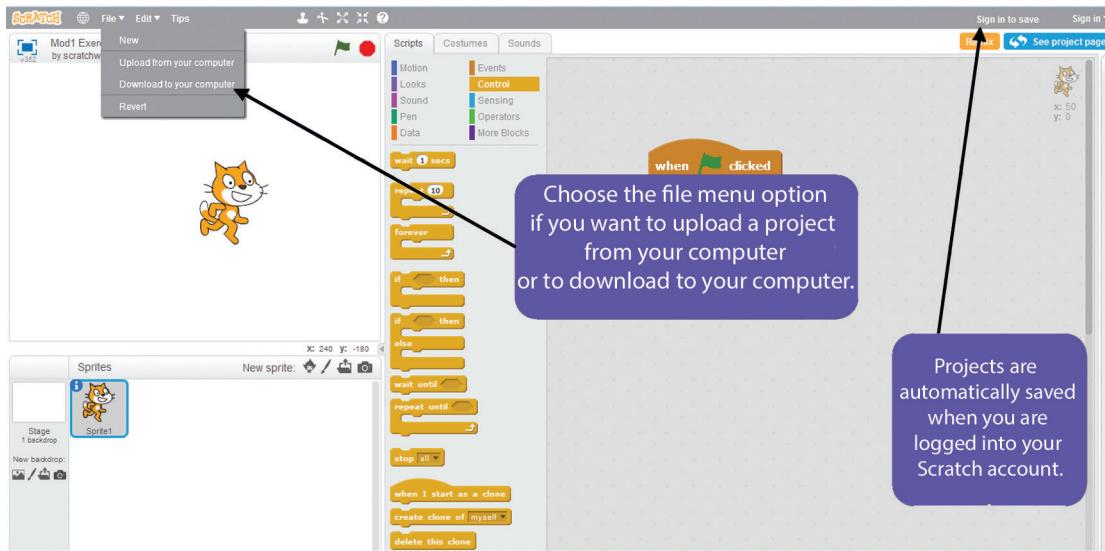
The Scratch Interface



Using Scratch

Check out the Scratch 2.0 Introductory Video at <http://vimeo.com/65583694>





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.

```

when green flag clicked
go to x: 100 y: 100
wait [1 sec]
change y by -200
wait [0.5 sec]
move [-100 steps]
turn [90 degrees]
glide [1 sec] to x: 0 y: 0
point in direction [90°]

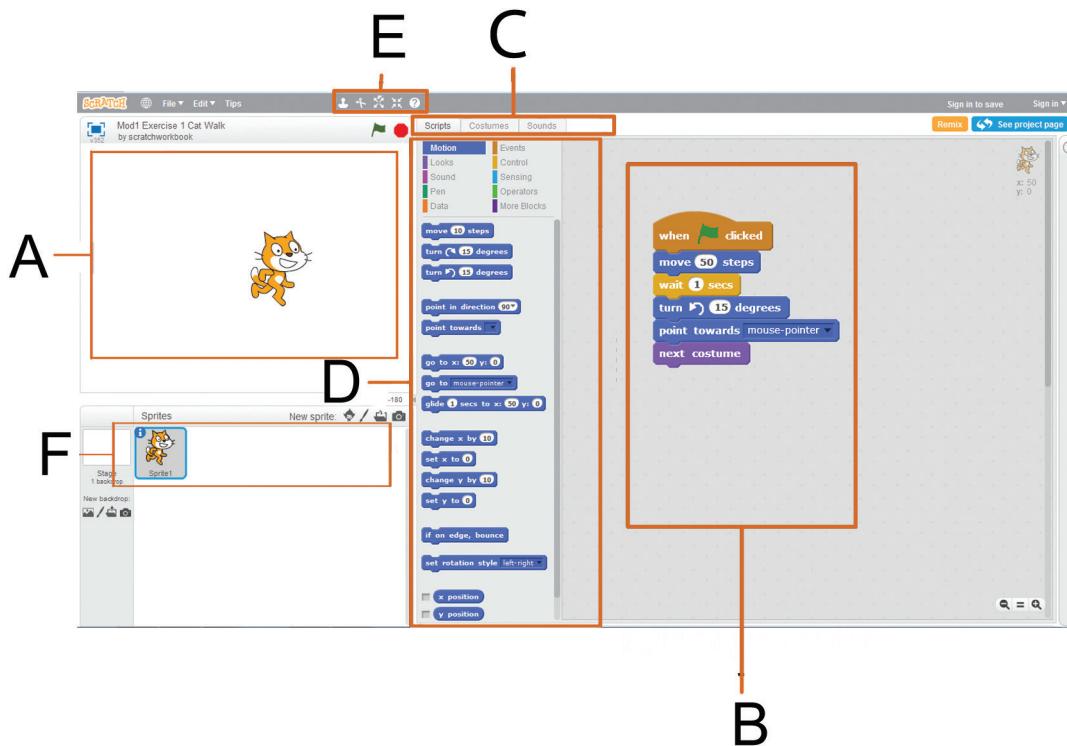
```

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	Tool Bar
E	Tabs
F	Scripts Area

Playing with Pictures

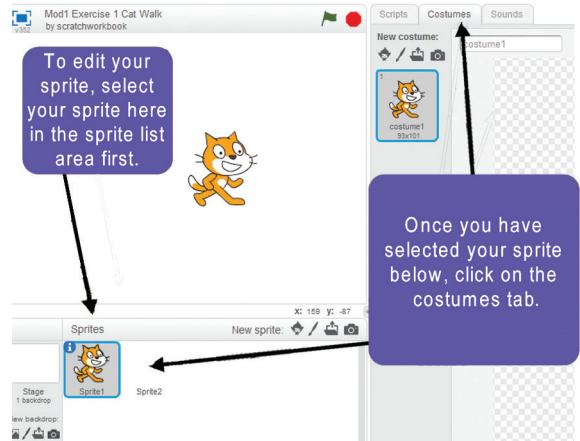
You can add a new sprite to your projects by using this button  located under the stage.

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 also use your computers webcam to take a photo by using this button .

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

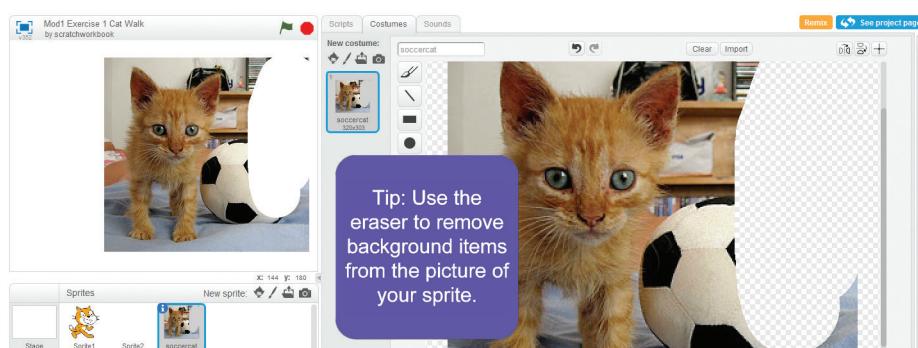


Exercises

- 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.

The image shows the Scratch interface. On the left, the 'Costumes' tab is selected, displaying two costumes for a cat sprite: 'costume1' and 'costume2'. A callout box with a purple background contains the text: 'Open the costumes tab for the cat sprite. A sprite may have many costumes with different names. You can easily edit, add or remove these costumes.' An arrow points from this text to the 'costumes' tab. On the right, the 'Scripts' tab is selected, showing a script starting with 'when green flag clicked' followed by 'switch costume to costume1', 'wait 1 secs', 'switch costume to costume2', and another 'wait 1 secs'. A callout box with a purple background contains the text: 'Return to the scripts tab. Code this script using Scratch allowing the sprite to change costume. The wait command ensures it doesn't happen too quickly.'

- 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.



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

- ① 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.

- ② 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.	<hr/> <hr/>
2.	<hr/> <hr/>
3.	<hr/> <hr/>

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.

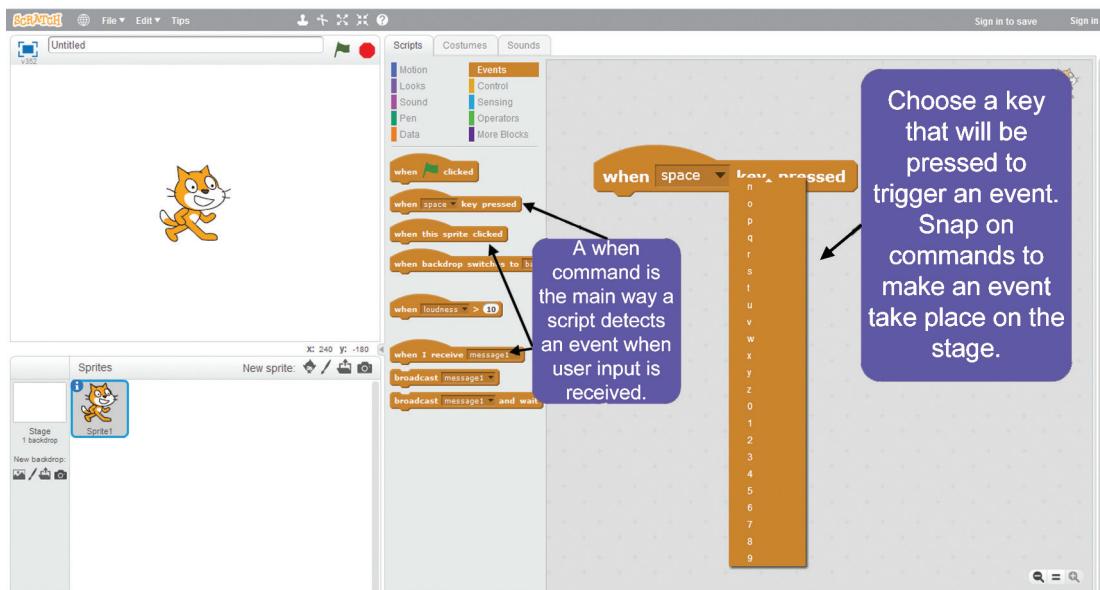
If the dog and the goat are left together the dog will bite the goat.

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.

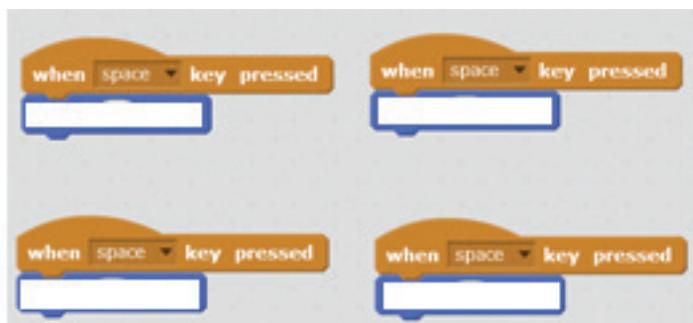
Playing With Music

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.

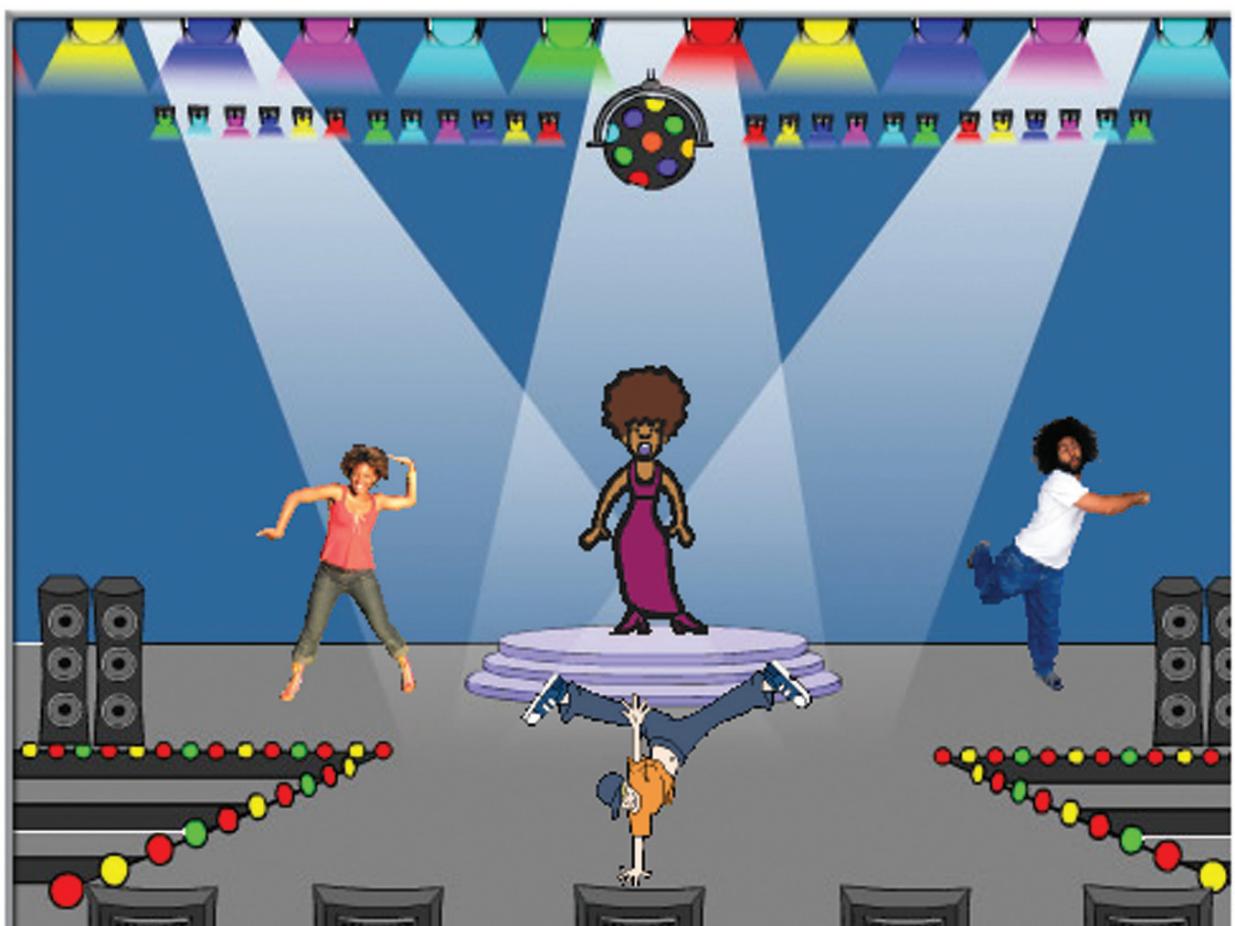


Exercises

- 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** Using Scratch commands from the sounds block palette get your sprite to play a musical scale when the space key is pressed.
- 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.

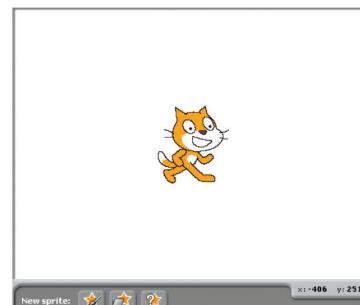


End of Module Quiz

- ① A software application that allows users to make voice and video calls over the Internet is called
- A. YouTube
 - B. Facebook
 - 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.

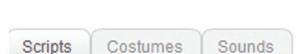


- ⑤ Match the following parts of the Scratch interface to the images

Sprite List



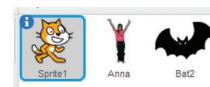
Blocks Palette



Tool Bar

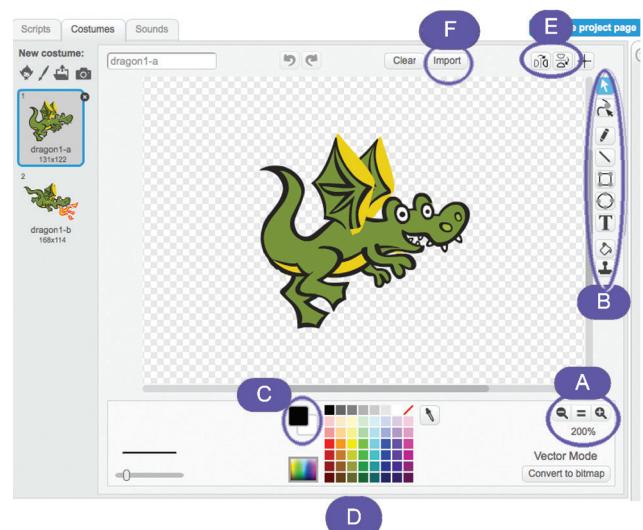


Tabs



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

- A. Colour palates
- B. Current Colours
- C. Zoom
- 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 Scratch script with two parallel 'when key pressed' loops. The first loop is for key 'a' and moves the sprite 10 steps to the left. The second loop is for key 'b' and moves the sprite 10 steps to the left.
- B. A Scratch script with two parallel 'when key pressed' loops. The first loop is for key 'a' and moves the sprite 10 steps to the left. The second loop is for key 'b' and moves the sprite 10 steps to the right.
- C. A Scratch script with two parallel 'when key pressed' loops. The first loop is for key 'c' and moves the sprite 10 steps to the left. The second loop is for key 'd' and moves the sprite 10 steps to the right.
- D. A Scratch script with two parallel 'when key pressed' loops. The first loop is for key 'a' and moves the sprite 10 steps to the right. The second loop is for key 'b' and moves the sprite 10 steps to the left.