Scratch Workbook Solutions

Module 1

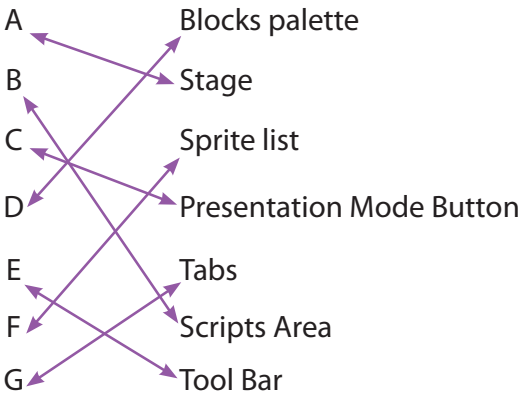
Say "hello" to Scratch

❶ Sample Solution
When the green flag is clicked the sprite will go to the position x:100 y:100 on the stage. The sprite will then pause for 1 second, move downwards by 200 steps, pause for .5 seconds, move left 100 steps and turn forward by 90 degrees. The sprite will glide for 1 second to the stage position x:0 y:0 and point facing in a forward direction.

❷

Select can rotate button

❸ **The Scratch Interface Quiz**



Playing With Pictures

❶

Tell me what to do

❶ Sample Solution

1. Buy a top up voucher in a shop or at a vending machine.
2. Dial 1741 on your phone.
3. Listen to the instructions.
4. Enter the code on the voucher and press the # key on your phone.
5. Listen for your new balance to make sure it's correct.
6. Hang up.

❷ Sample Solution

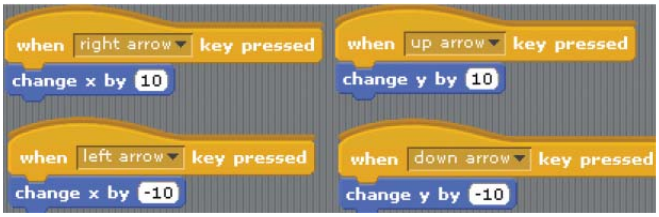
1. Making a cup of tea
2. Brushing your teeth
3. Playing a dvd

❸ Sample Solution

1. Begin on side A
2. Take goat across to side B
3. Return with empty boat to side A
4. Take dog across river to side B
5. Return with goat to side A
6. Take cabbage to side B
7. Return with empty boat to side A
8. Take goat to side B
9. END

Playing With Music

❶



❷

End of Module 1 Quiz

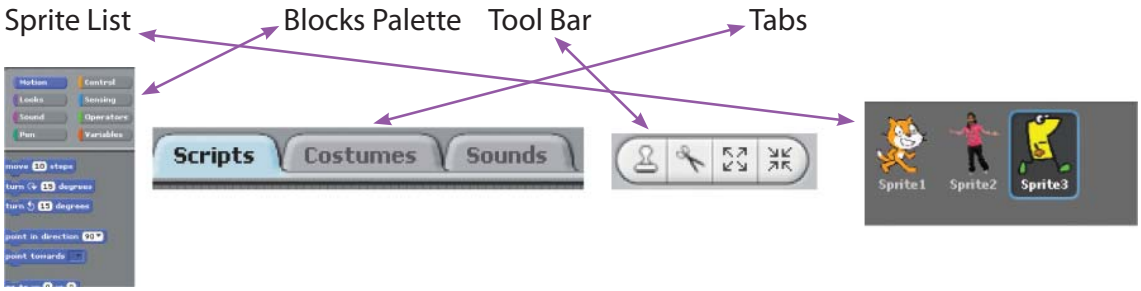
1. C.

2. B.

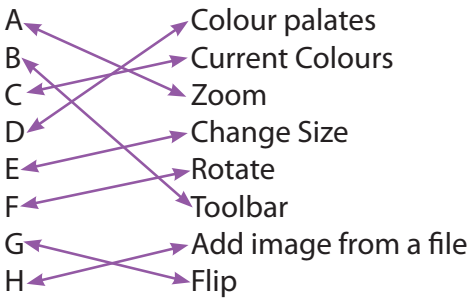
3. A.

4. D.

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



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



7. C.

8. A.

9. B.

10. B.

Module 2

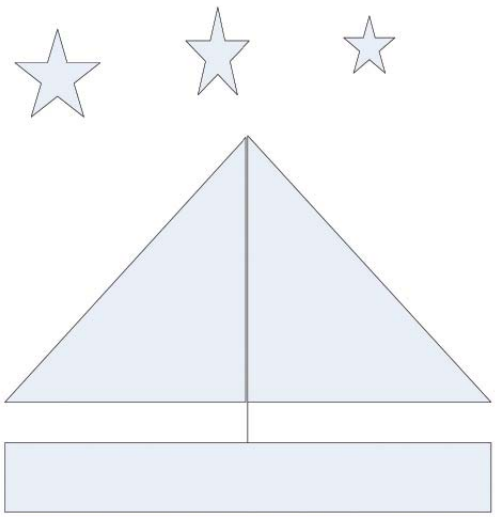
Think Like a Computer

❶ Sample Solution
In the centre of the page draw a rectangle about 3mm high 3 cm wide.
At the midpoint of the top side of rectangle draw a line upwards 5cm in length.
Draw a rectangle 4cm high 2 cm wide with the midpoint of the bottom side touching the top of the upwards line.
Draw 3 circles inside the top rectangle all 1cm in diameter that are centred horizontally across the rectangle and spaced evenly vertically in the rectangle.

❷ Sample Solution

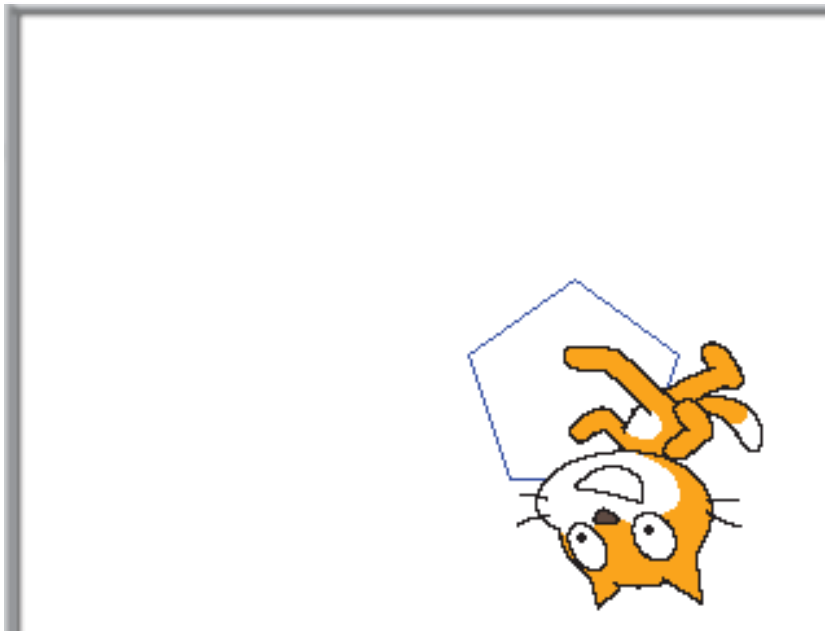
1. Draw 3 circles on top of each other. The top circle is the smallest, the middle circle is middle sized and the bottom circle is the largest
2. On top of the top circle, draw a square with a line underneath it extending out at the sides of the square
3. In the top area of the bottom circle draw a coloured small circle
4. In the centre of the middle circle draw two small coloured circles
5. In the top circle, draw two small solid circles side by side in the upper part of the circle
6. In the top circle, draw three small circles side by side in the bottom part of the circle in a U shape.
7. In the top circle, draw a left facing right angled triangle in the centre of the circle with the base twice the side of the height.
8. On the right hand side of the middle circle, draw a line facing north east direction and at the end of the line draw a small hexagon
9. On the left hand side of the middle circle, draw a line facing north west direction and at the end of the line draw a small hexagon

❸



Could You Repeat That Please?

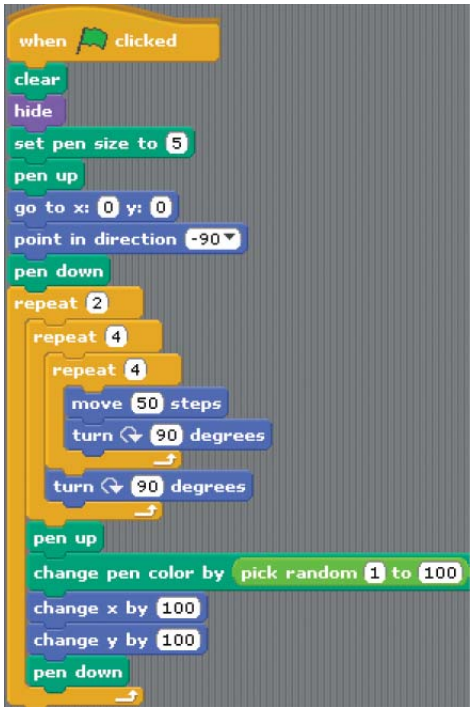
❶



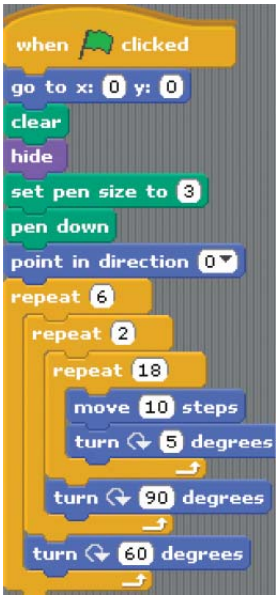
❷

Over and Over Again

❶



❷



End of Module 2 Quiz

❶ C.

❷ B.

❸ D.

❹ C.

❺ A.

Module 3

Where Are You now?

Linear Search – 14 checks. Check names 1 by 1.
Binary Search – 3 checks. > 10 Levey, >15 Moloney, =18 Power
Hash Search – 5 checks. Hash key 5, 4th item under this hash key list

Me First Sorting

First Name (A to Z)
Anna
Brian
Mary
Ruth
Shane

Surname (Z to A)
Scott
Ryan
Ryan
Horgan
Hogan

PPSN (low to high)
7860133C
7860277B
7861212F
8392109D
9058693D

Exercise
3 times through the list
3 swaps required

Anna, Ruth, Brian, Shane, Mary (Original List)
Anna, Brian, Ruth, Shane, Mary (First Pass through list – Swap 1)
Anna, Brian, Ruth, Mary, Shane (First Pass through list – Swap 2)
Anna, Brian, Mary, Ruth, Shane (Second Pass through list – Swap 3)
Anna, Brian, Mary, Ruth, Shane (Third Pass through list no swaps required)

CSI – Finding Information on the Internet

Exercise 1

1. Maroon
2. Laithreoirí
3. Unplug
4. Somali Shilling
5. Elleboog
6. Aerophobia
7. Transport
8. Iguazu

Letters 1 – 8: M L U S E A T I

Magic Word Unscrambled: S I M U L A T E

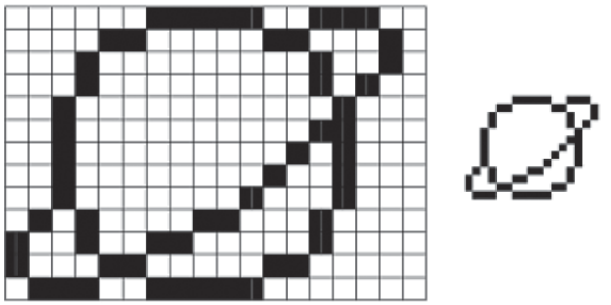
End of Module 3 Quiz

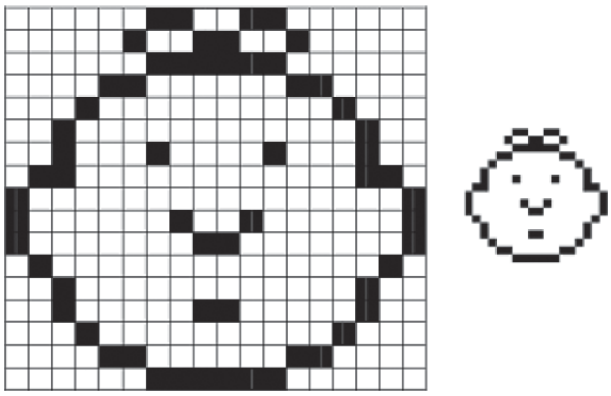
1. C.
2. D.
3. D.
4. D.
5. A.

Module 4

Look at Me

❶





End of Module 4 Quiz

❶ A.

❷ C.

❸ B.

❹ C.

❺ B.

❻ B.

❼ C.

Easy Exercises

❶ Move to a Beat

Check that the sprite moves when clicked. Make sure that drum beats are included in the script. Encourage the use of costume changes.

❷ Colour Burst

Check that the green flag starts the program. Both sprites require code to change colour.

Zebra Script

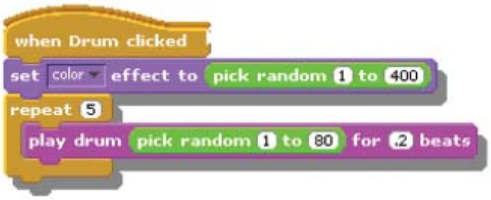
Bug Script

❸ Polly Moves About

A wait command can be used to control the speed of the parrot. Use the "if on edge, bounce" command to make the parrot bounce off the edge of the stage.

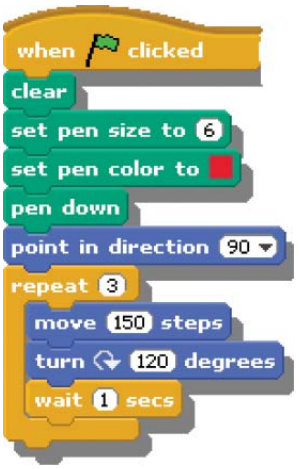
❹ Random Drum

Use the pick random command. The most efficient way of playing 5 random beats is using a repeat loop rather than 5 separate "play drum" commands.



❺ Draw a Triangle

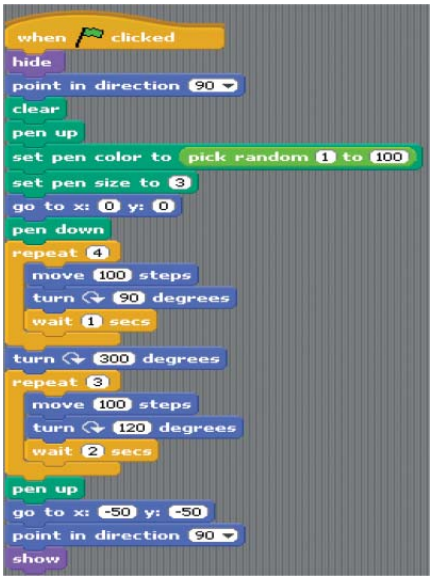
The most effective way of drawing a triangle is by using a repeat loop to draw and rotate 3 times instead of 3 separate draw and 3 rotate commands. Don't forget to put the pen down to start drawing!



Difficult Exercises

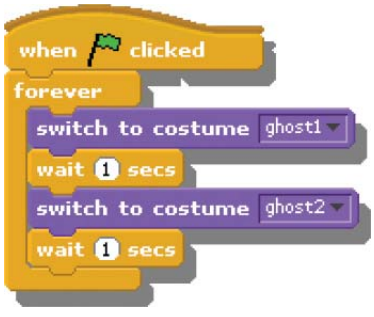
❶ Build a House

You will need to use 2 repeat loops for the triangle and square parts of the house. Make sure your sprite is pointing in the right direction and that you position the sprite correctly inside the house.



❷ Spooky Surprise

Create costume 2 by copying and editing costume 1 in the paint editor. Use a forever loop to repeat the switch between costume 1 and costume 2 continuously. A wait command can be used to decrease the speed of the animation.

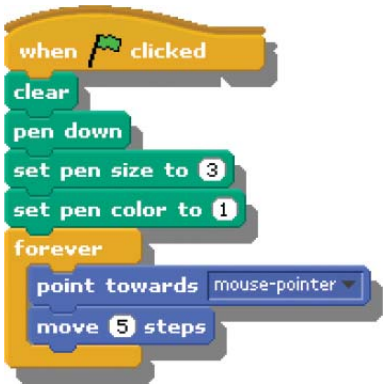


❸ Extraordinary Whirl

The set whirl effect should be placed in a forever loop. The forever loop allows the whirl effect to change continuously as the x position of the mouse changes. The "mouse x" command is found in the sensing block.

❹ Scribbling Dog

Use the pen down command to allow the sprite to scribble on the stage. Set the pen to any size or colour. Use the "point towards mouse-pointer" inside a forever loop to follow the mouse. Move the sprite to leave a trail.



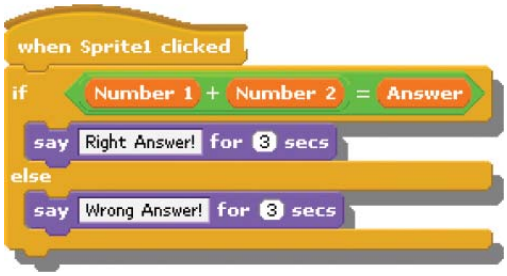
❺ Score goes Up and Down

Create a variable score. Use the wait command to decrease the speed of the animation..

Extreme Exercises

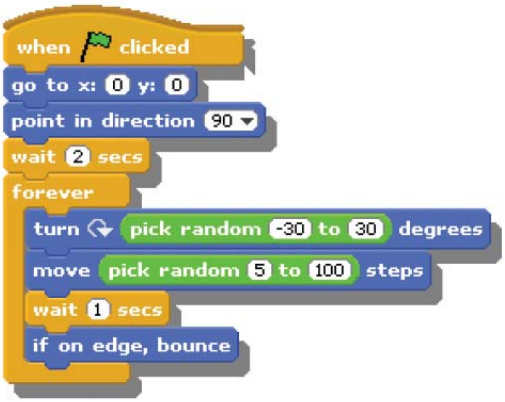
❶ What's the Answer?

Create 3 variables: Number 1, Number 2 and Answer. Use an if else statement. By using the 'when Sprite 1 clicked' command, clicking on the sprite should tell you if the answer is right or wrong. Remember to double click on your variables to make them into sliders as shown on the card.



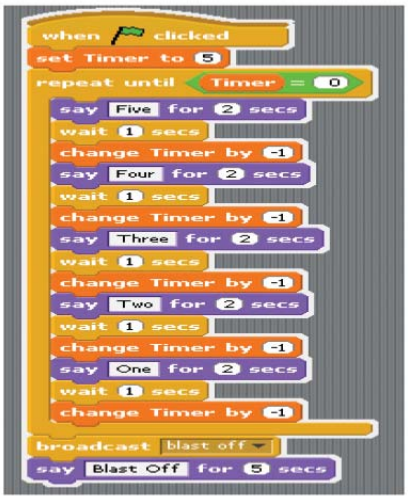
❷ Keeping Track

To make the variables for x position and y position appear on the stage, click the check box next to the block as shown here.



Once the variables appear on stage, you can then use a forever loop and pick random commands to make the sprite move randomly. The variables track the position of the sprite.

❸ 5,4,3,2,1



Draw a rocket or just use a picture of a plane from the Scratch image library. Create a variable called Timer and set it to 5. Use a 'repeat until' loop. When Timer = 0, broadcast 'blast off' to the rocket sprite.

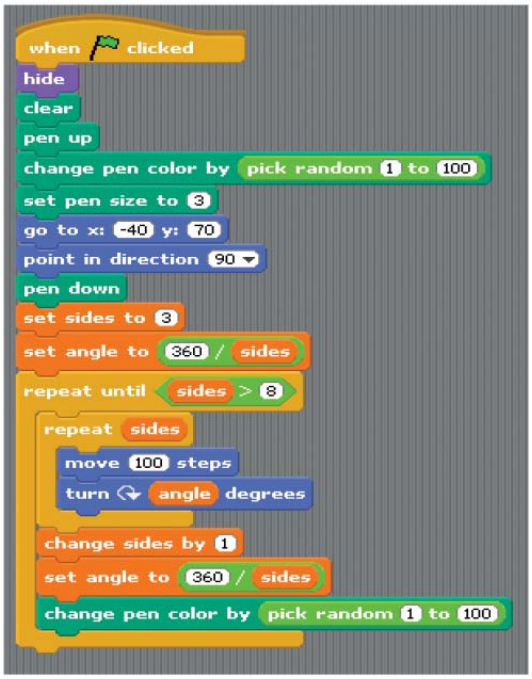
The rocket sprite contains the following code.

❹ Bigger and Bigger

Make the sprite shrink to zero. Create a variable named size. Use a repeat until loop to make the sprite grow to until it reaches full size (100%) again.

❺ Shape Sensation

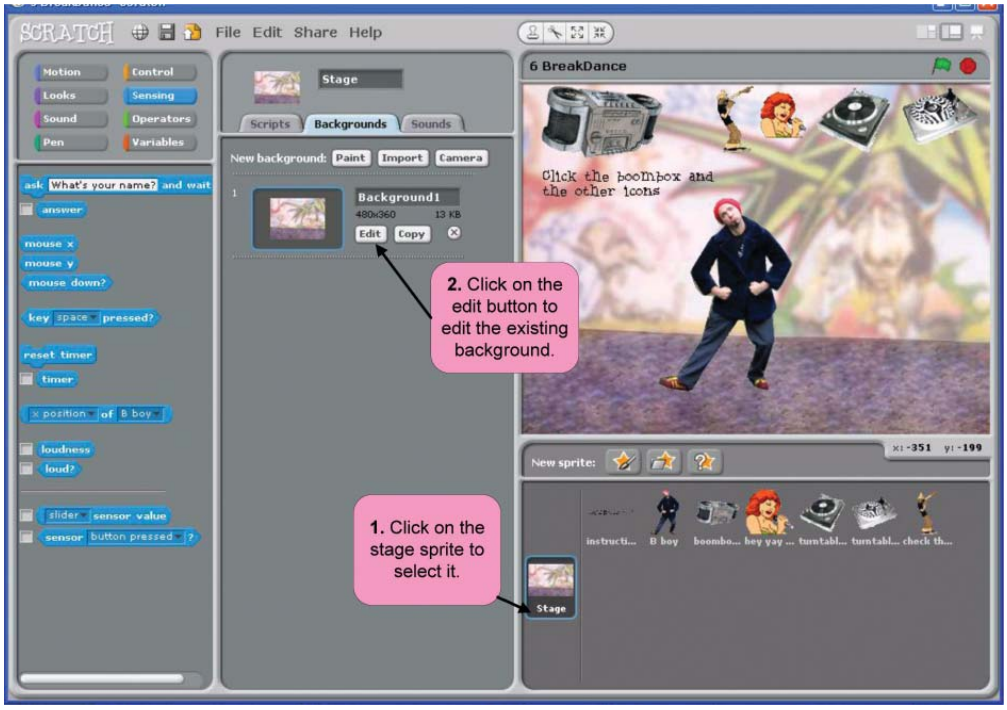
Use variables to store sides and angle. Start with a triangle. Use a 'repeat until' loop to stop when sides = 9. Use 'wait' to slow things down.

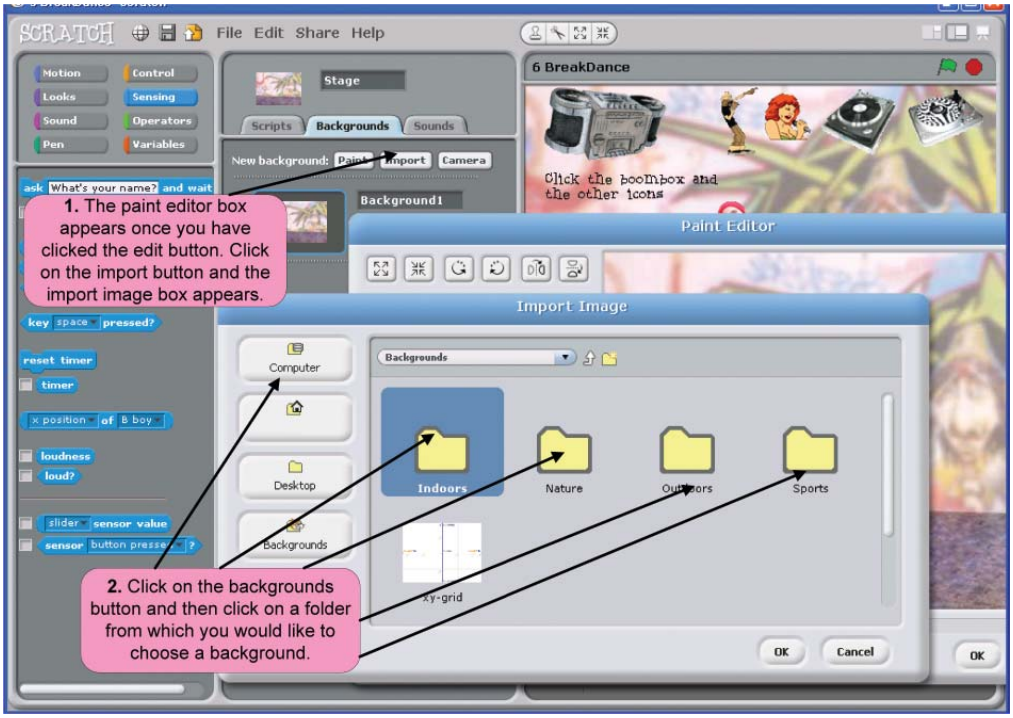


Module 6

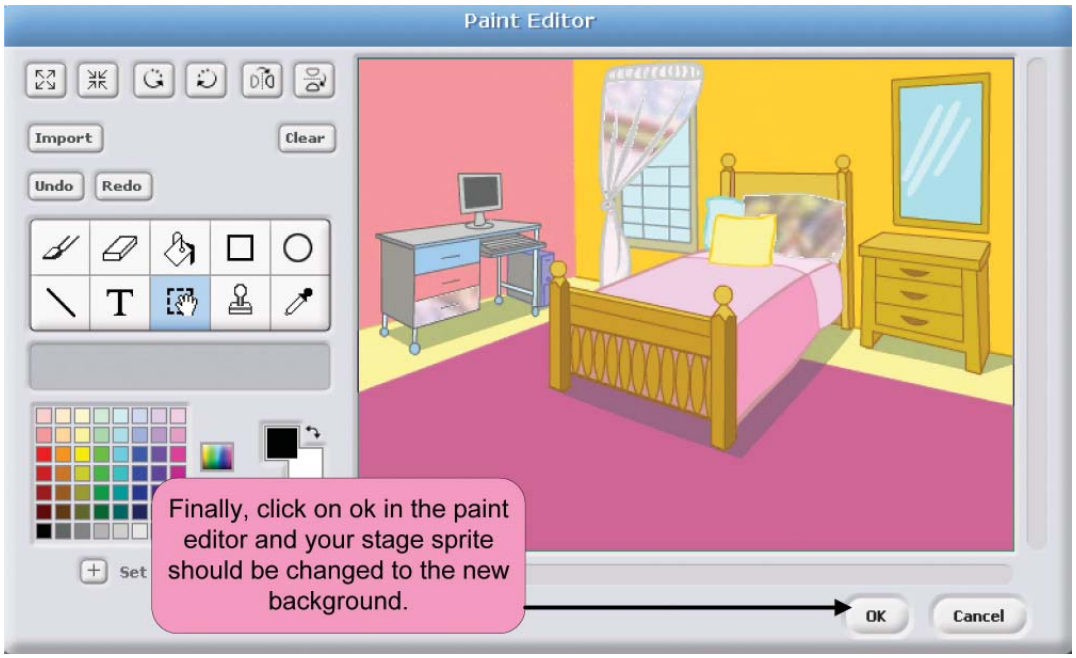
Break Dance Project

1. **Change the background**.
   The following images show the steps needed to change the background for your stage sprite.

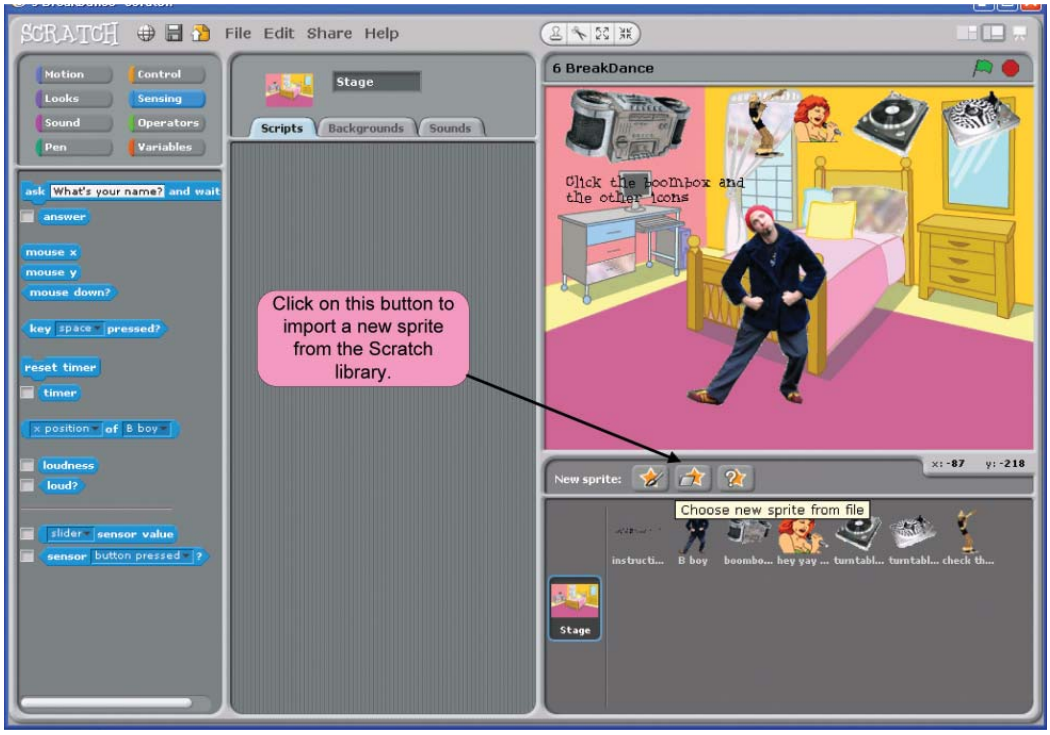




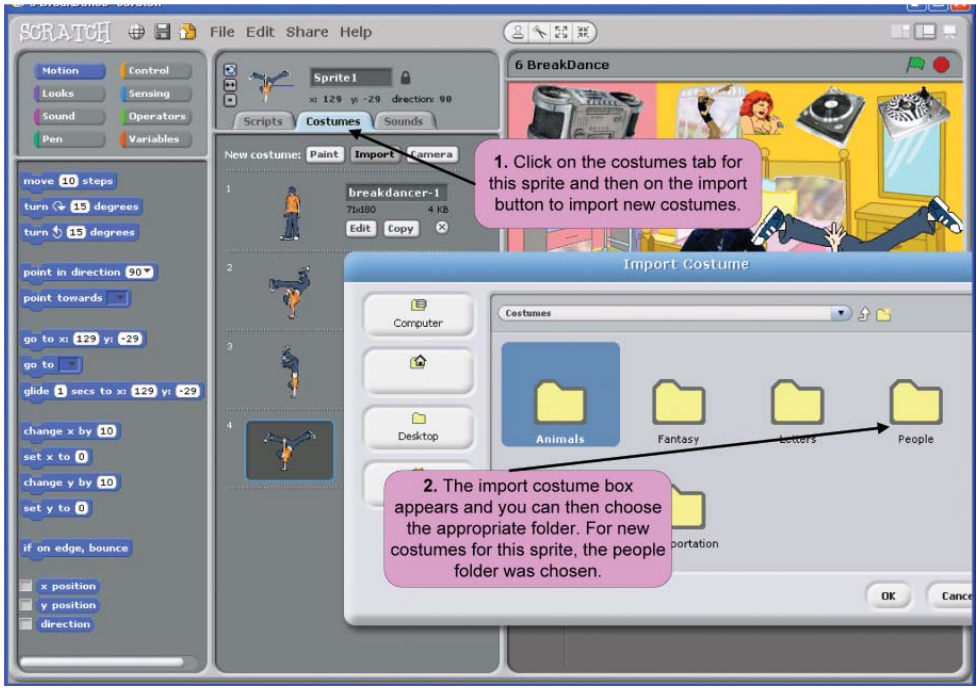

Import Image
Computer
brendan.osullivan
Desktop
Backgrounds
Indoors
bedroom1
bedroom2
chalkboard
clothing-store
room1
Having chosen a folder, such as indoors, click on a background you like and then click on ok.
OK
Cancel


Paint Editor
Import
Clear
Undo
Redo
Set
Finally, click on ok in the paint editor and your stage sprite should be changed to the new background.
OK
Cancel

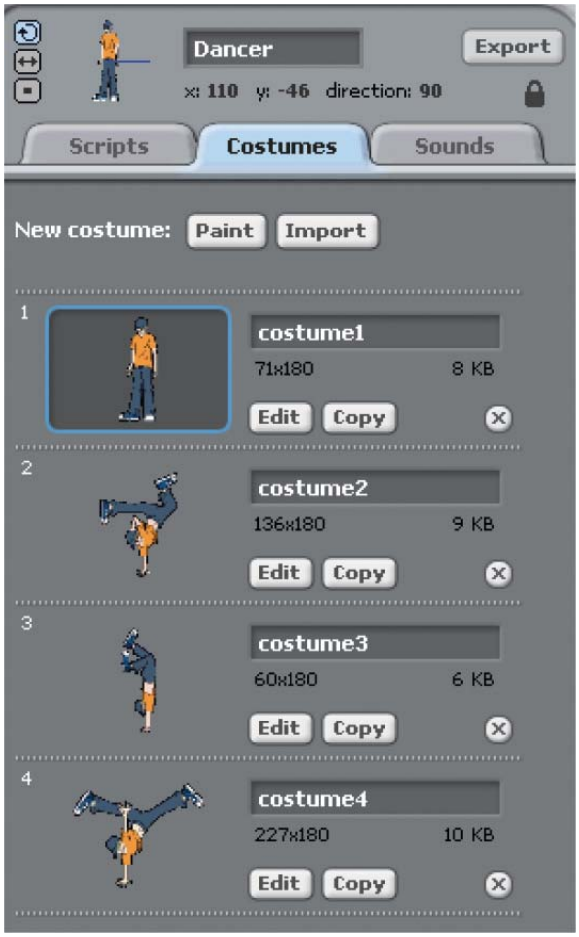
2. **Import another sprite into the project and make it dance in different ways when the green flag is clicked**.
The following image shows how to import a new sprite into the project.



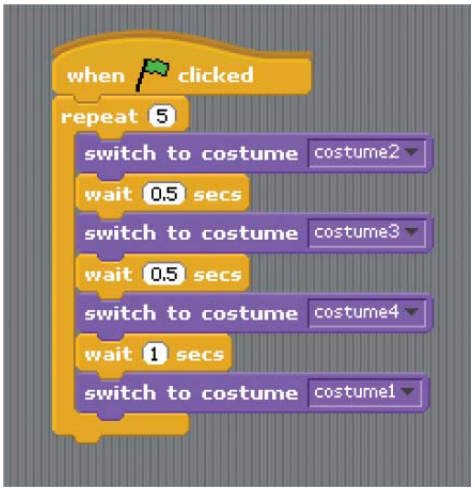
The sprite chosen for the solution is the 'breakdancer1' sprite from the people folder in the Scratch library. 3 new costumes were imported for this sprite, as shown in the following 2 images.



Once you have chosen your new costume, click on OK.
The costumes for the sprite should appear in a list as shown.

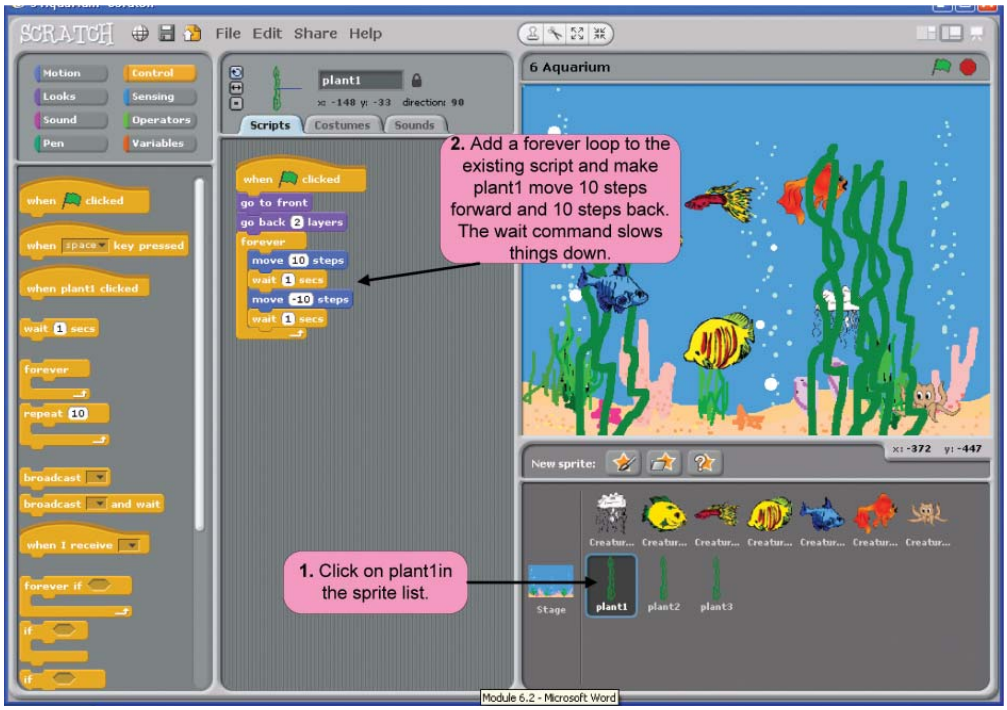


The sample script for making this sprite dance when the green flag is clicked is shown below.



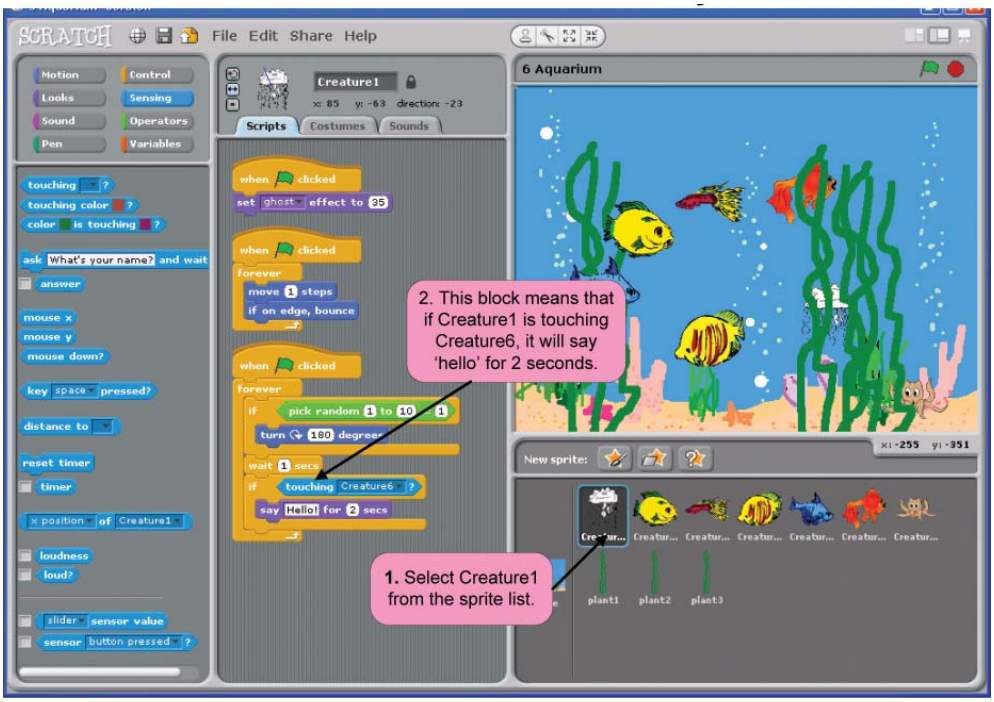
Aquarium Project

1. **Animate the seaweed**.
When you open the Aquarium project, the seaweed sprites are plant1, plant2 and plant3. Click on the plant1 sprite first, to select it, as shown in the following image. You can then add a forever loop, as shown, to move plant1 backwards and forwards.

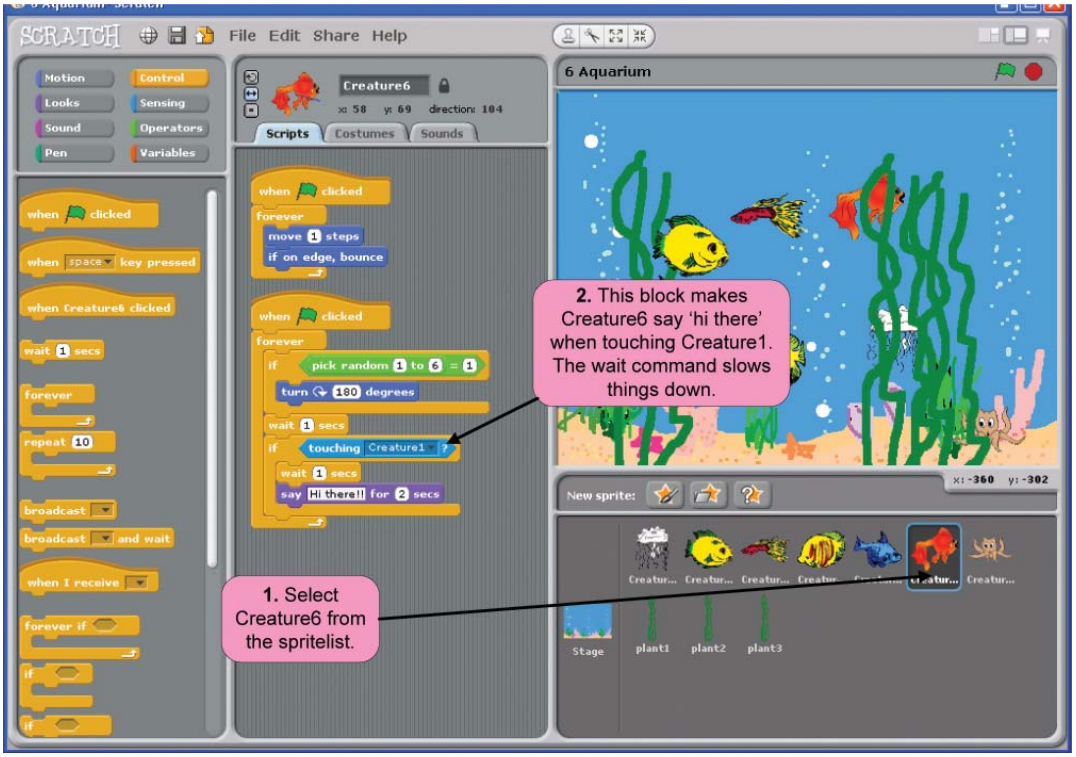


Similar steps may be taken to animate the sprites plant2 and plant3.

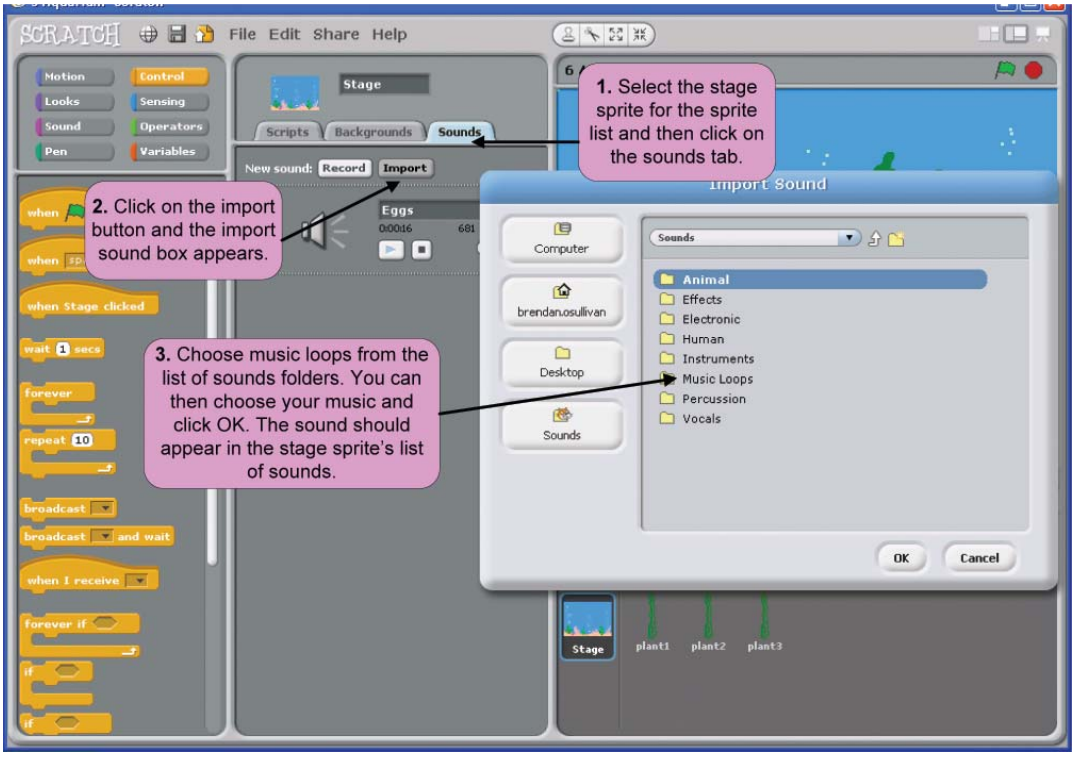
2. **If Creature1 touches Creature6, make Creature1 say 'hello'.**



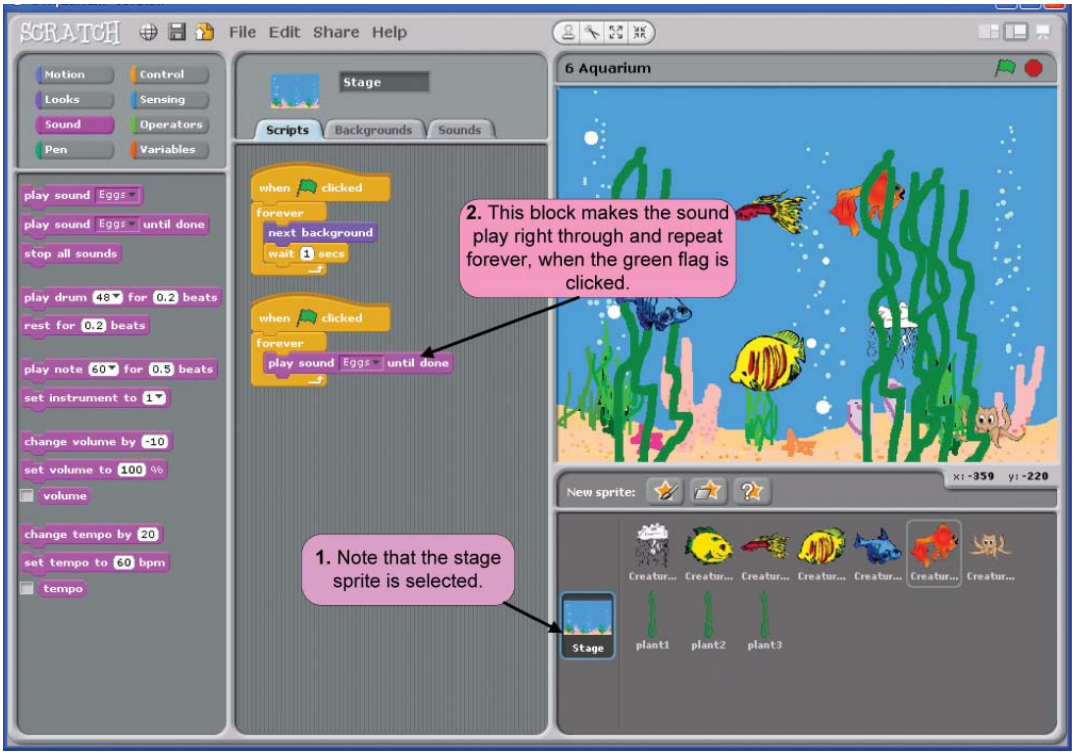
Make Creature6 say 'hi there' in response to Creature1.



3. **Add a suitable soundtrack.**

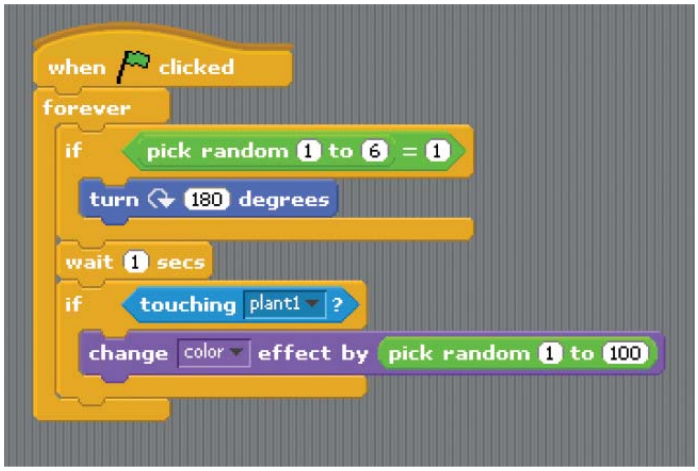


Once you have chosen your sound, click on the scripts tab for the stage sprite and the following image shows the code you will need to play the sound as a soundtrack for the Aquarium project.

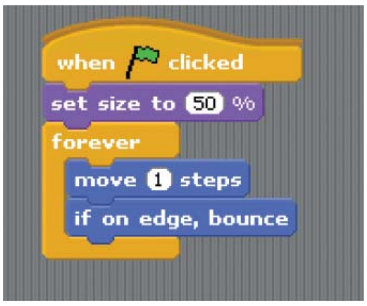


4. **Change the colour of Creature5 if it is touching plant1.**

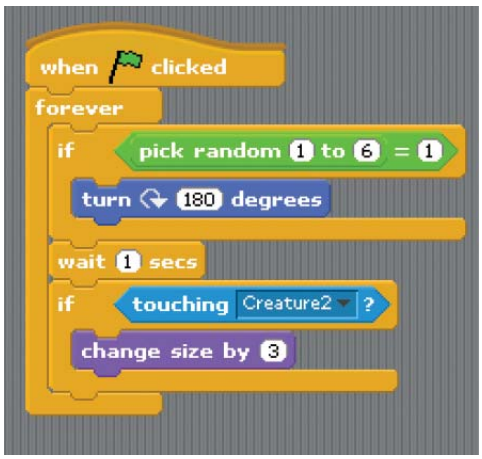
Make sure that Creature5 is selected in the sprite list area. The second 'if' block below can then be added to the existing code. This means that if Creature5 is touching plant1, it will change colour by a random number between 1 and 100.



5. **Increase the size of Creature3 if touching Creature2.**
Make sure Creature3 is selected.
Add the 'set size to 50%' block to the first block of code. This ensures that each time the green flag is clicked, Creature3 returns to 50% of its size.



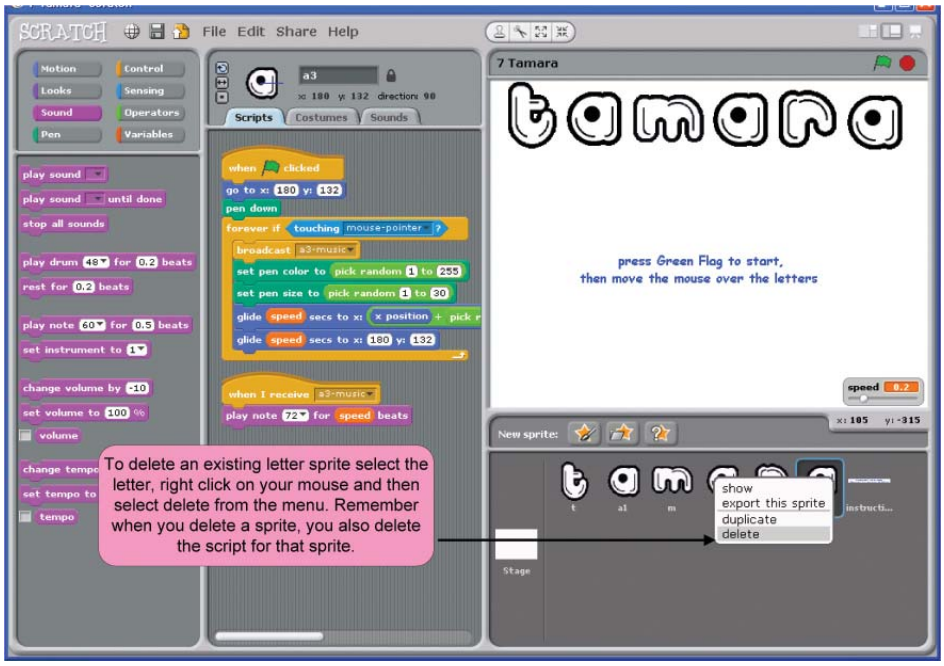
The second 'if' block in the following script ensures that Creature3 increases in size each time it touches Creature2.



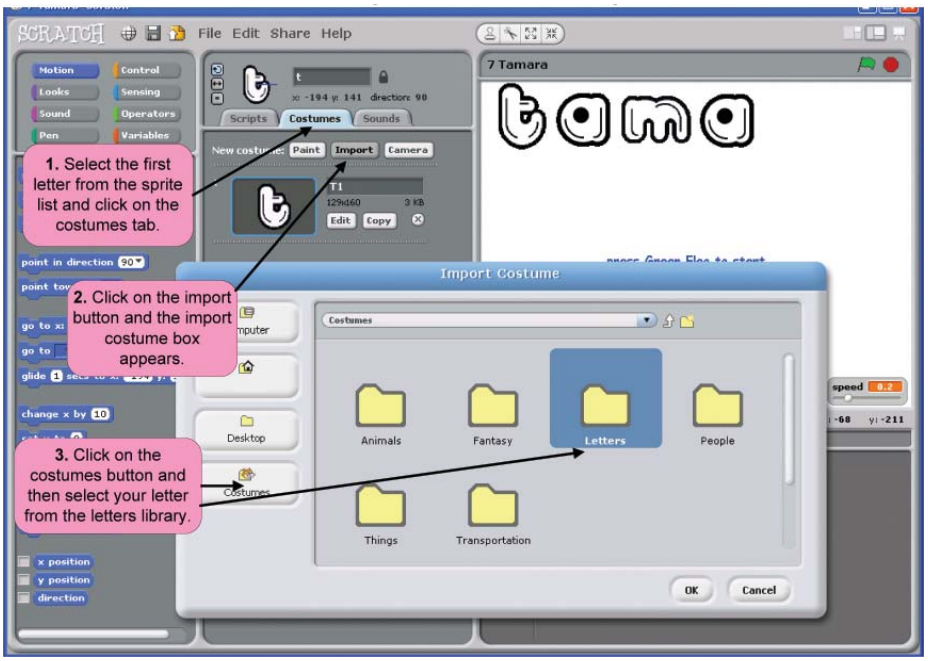
Tamara Project

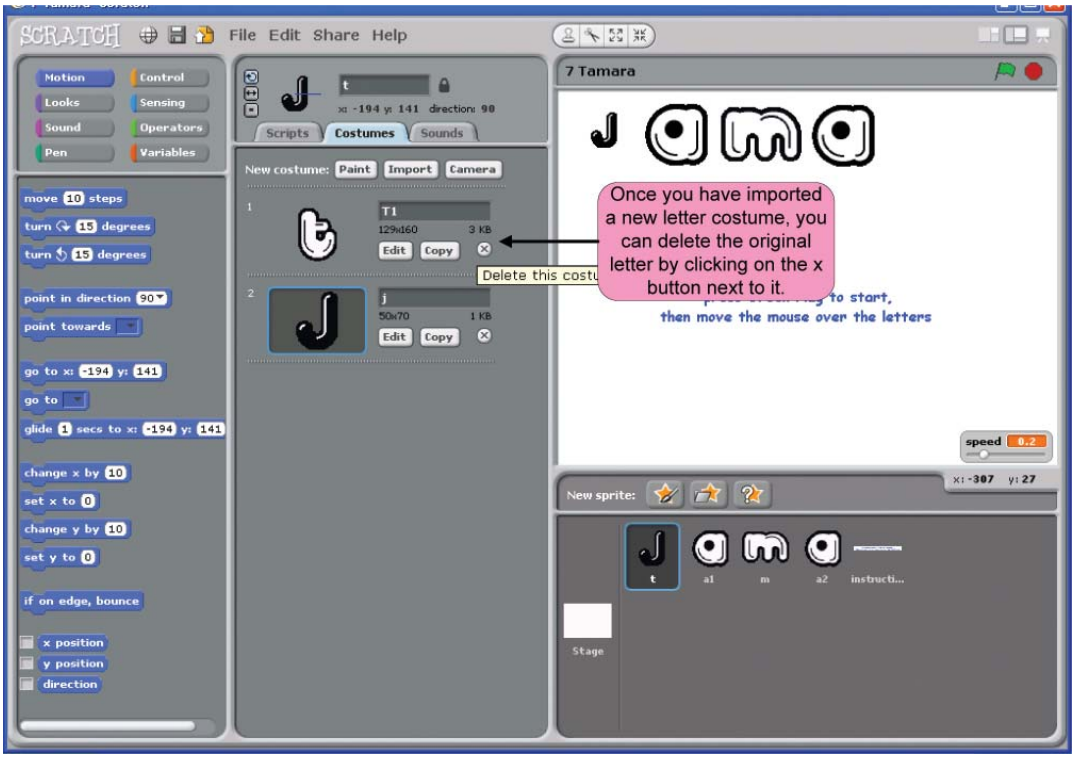
1. **Change the name Tamara to the name JACK**.

First delete the last 2 of the existing letter sprites i.e. r and a, so you are left with 4 letters for the word 'JACK'. **Remember** when you delete a sprite you also delete the script associated with that sprite! It is better therefore for this exercise to keep 4 of the letters to change to the letters for 'JACK' so we will still have the scripts for these.

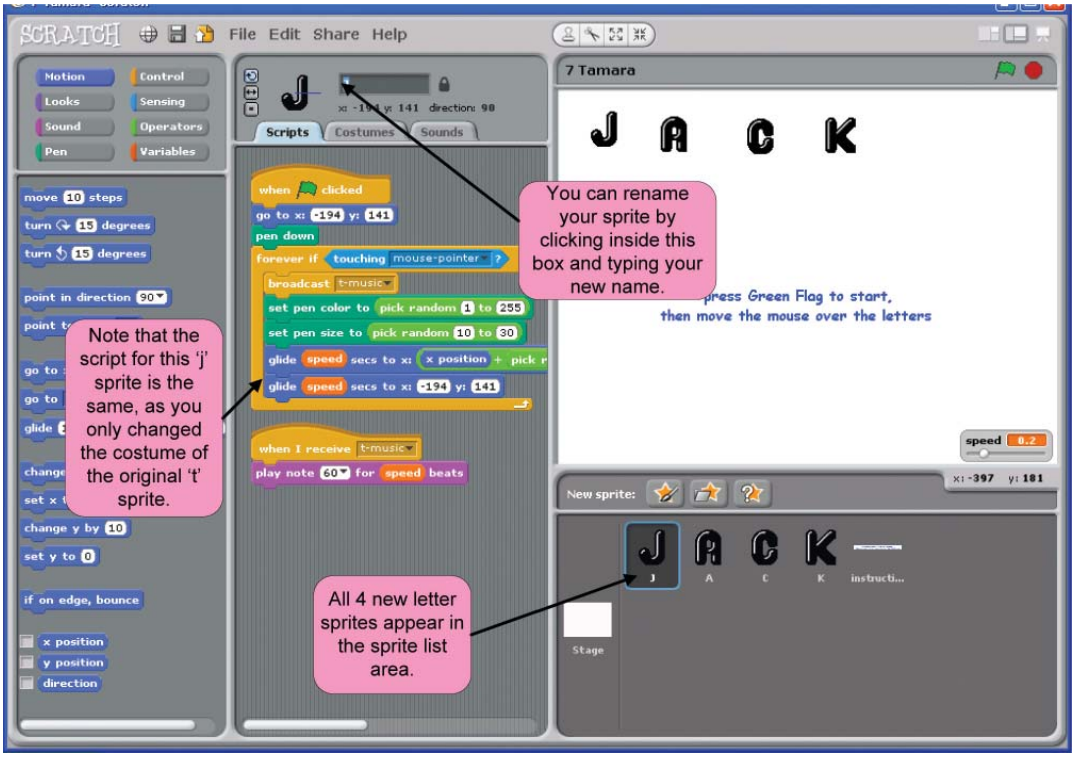


Follow the instructions over to change the 4 remaining letters to J A C K.

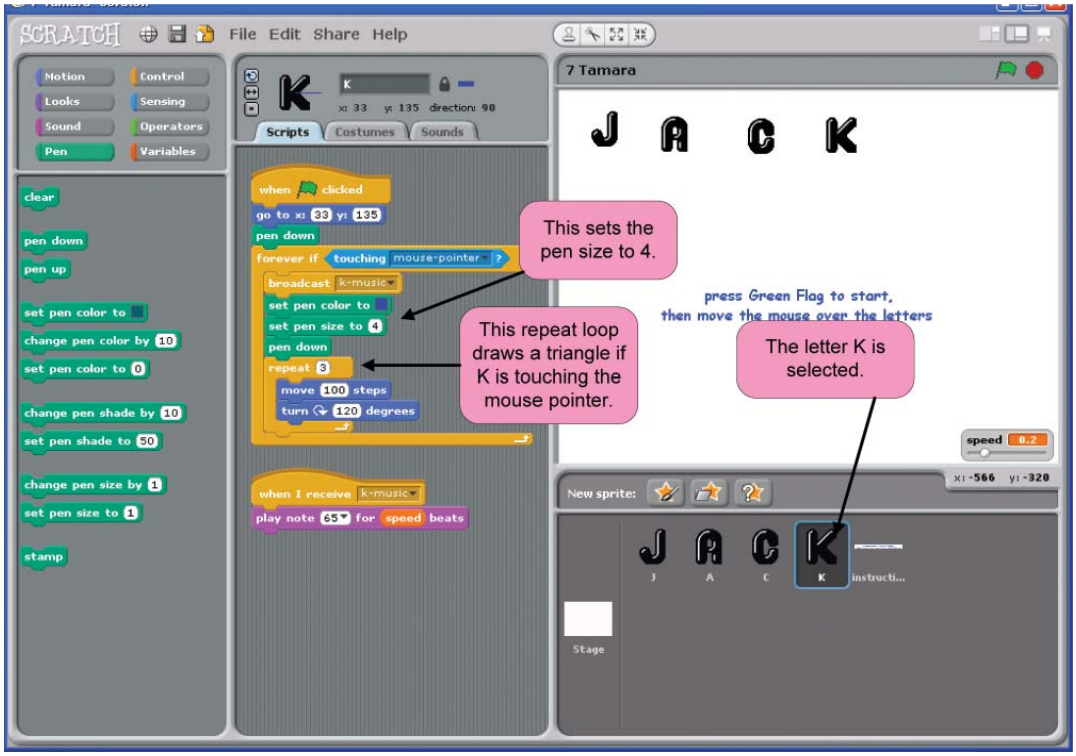




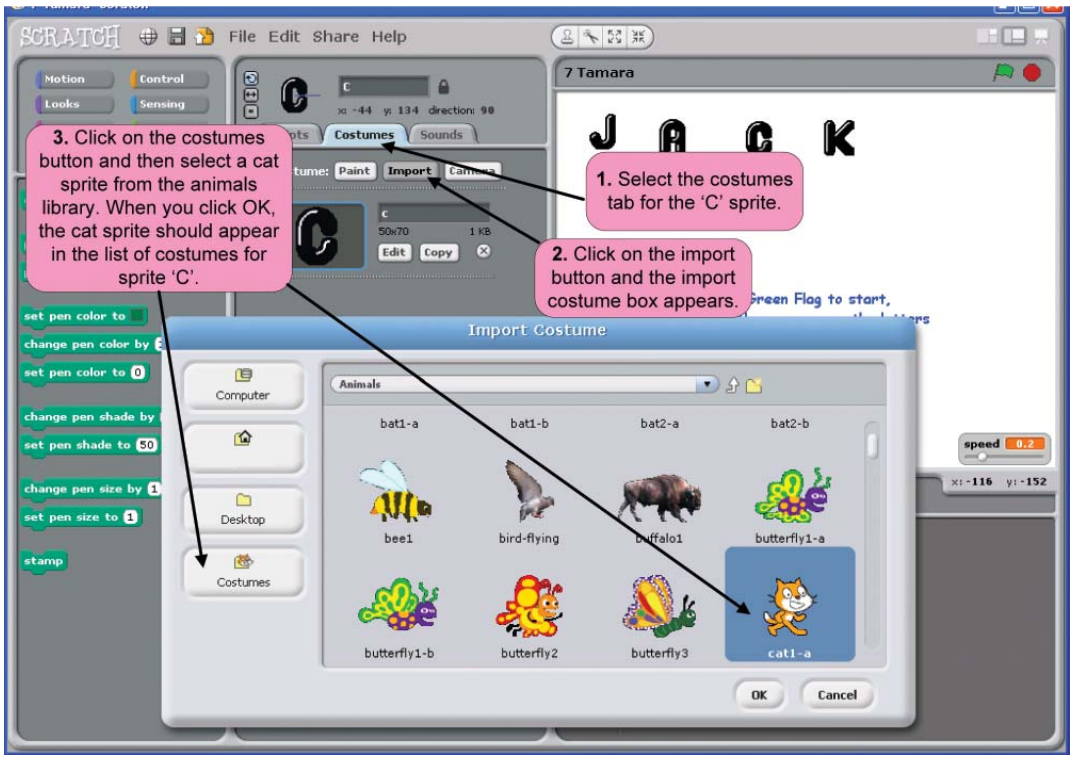
Repeat the previous steps until you have the letters J A C K as your new sprites. You can change the names of the sprites as shown in the following image.



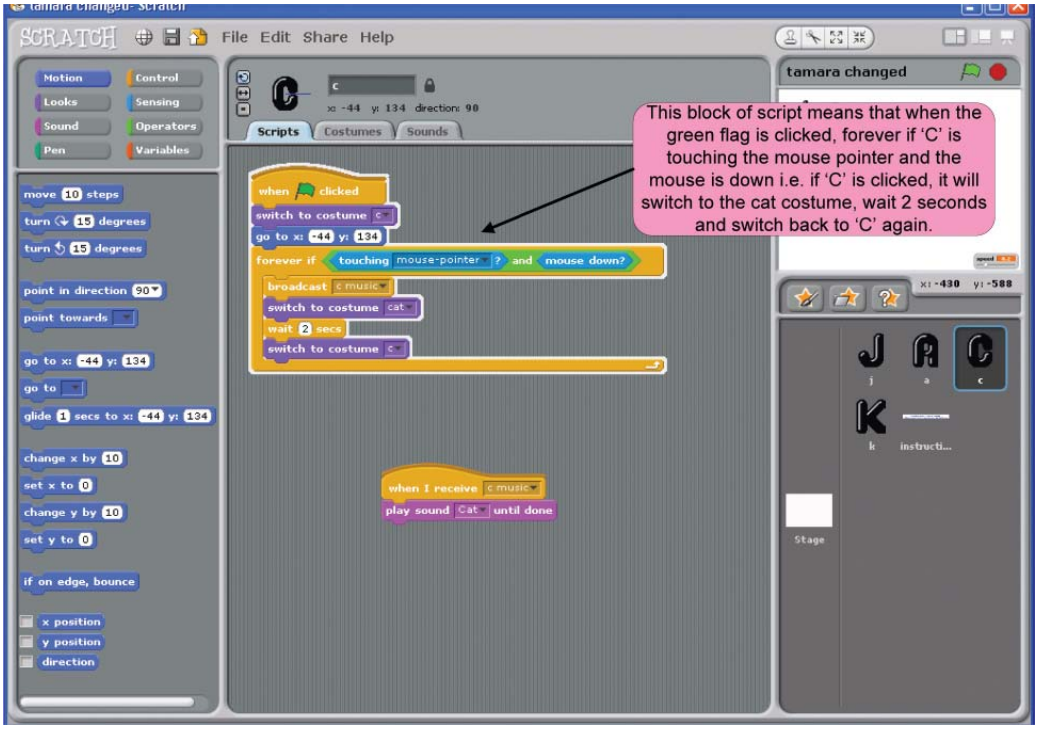
2. When the mouse touches the letter K, draw a triangle. Change the pen size to 4 first and use the wait command to slow things down.



3. Change the letter C to a cat when clicked.
Import a cat costume first.

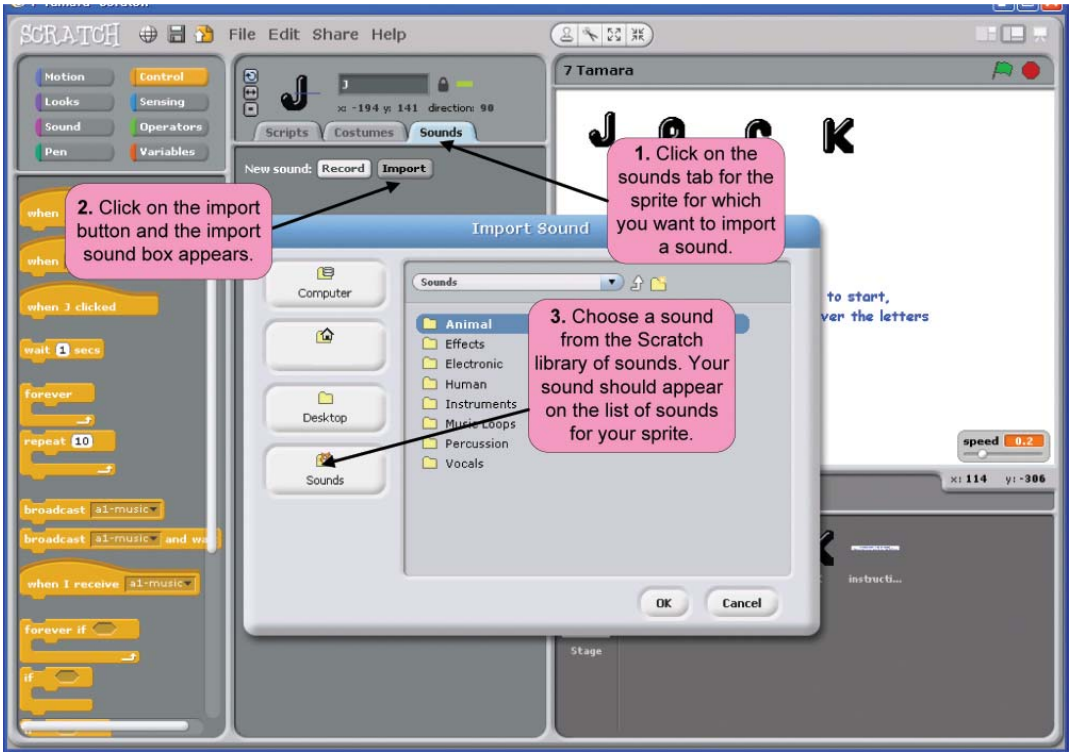


To make the C sprite change to a cat when clicked, use the first block of script in the following image.

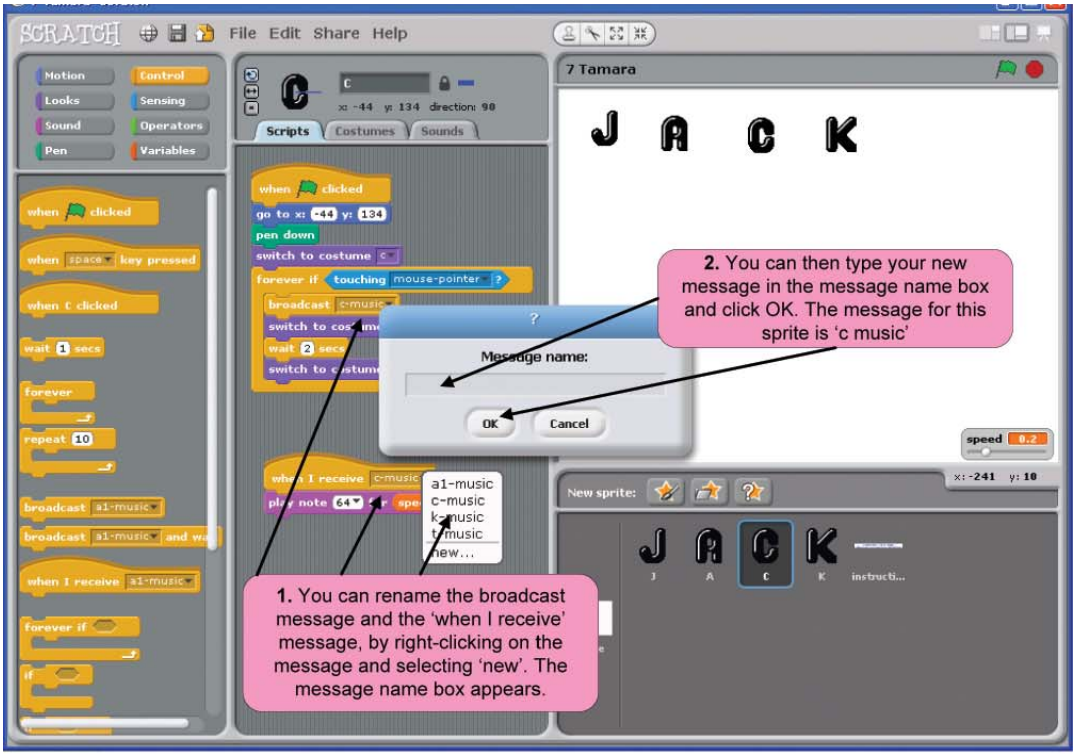


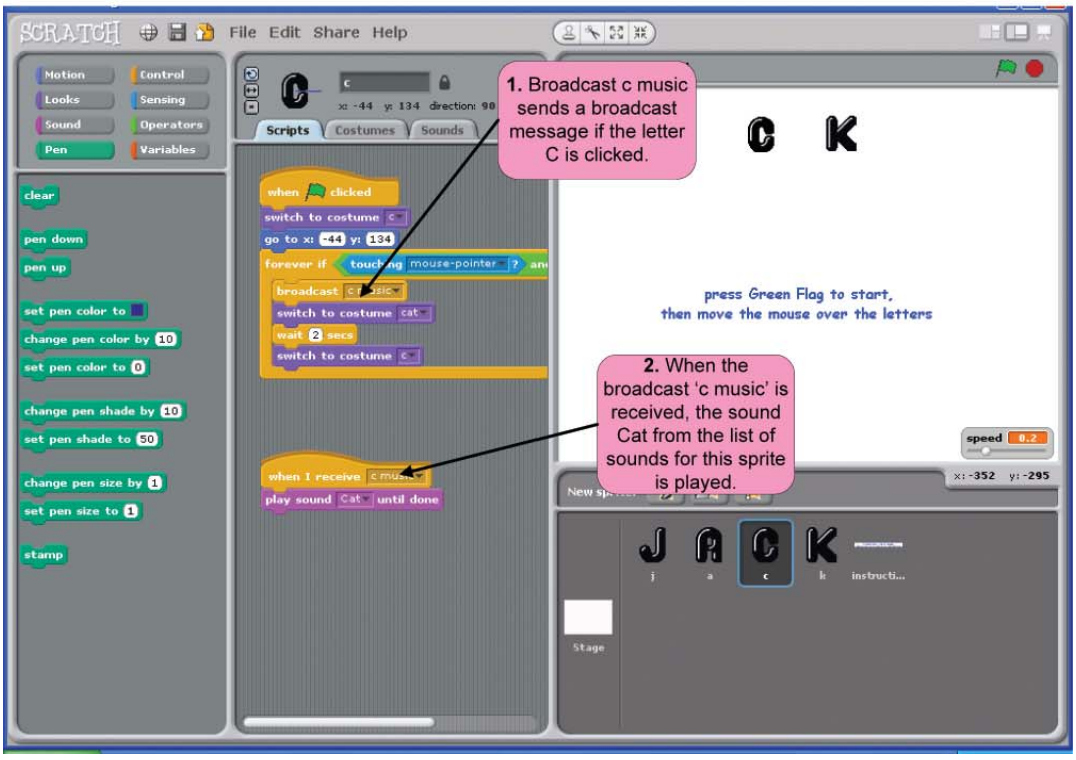
4. When the mouse is touching the letters J, A and K play a different sound. Play 'meow' when the letter C is clicked.

Import your sound from the Scratch sounds library first.



Once you have imported your sound, the following image shows you how to apply your sound to your sprite e.g. the cat's 'meow' sound.

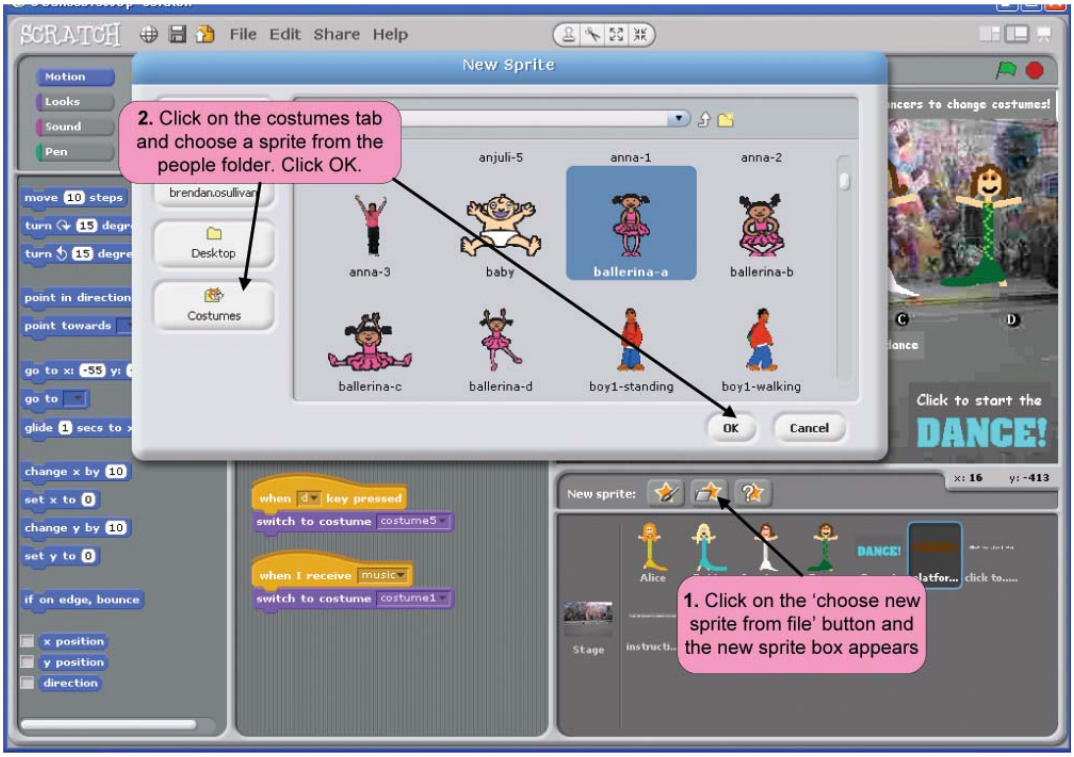




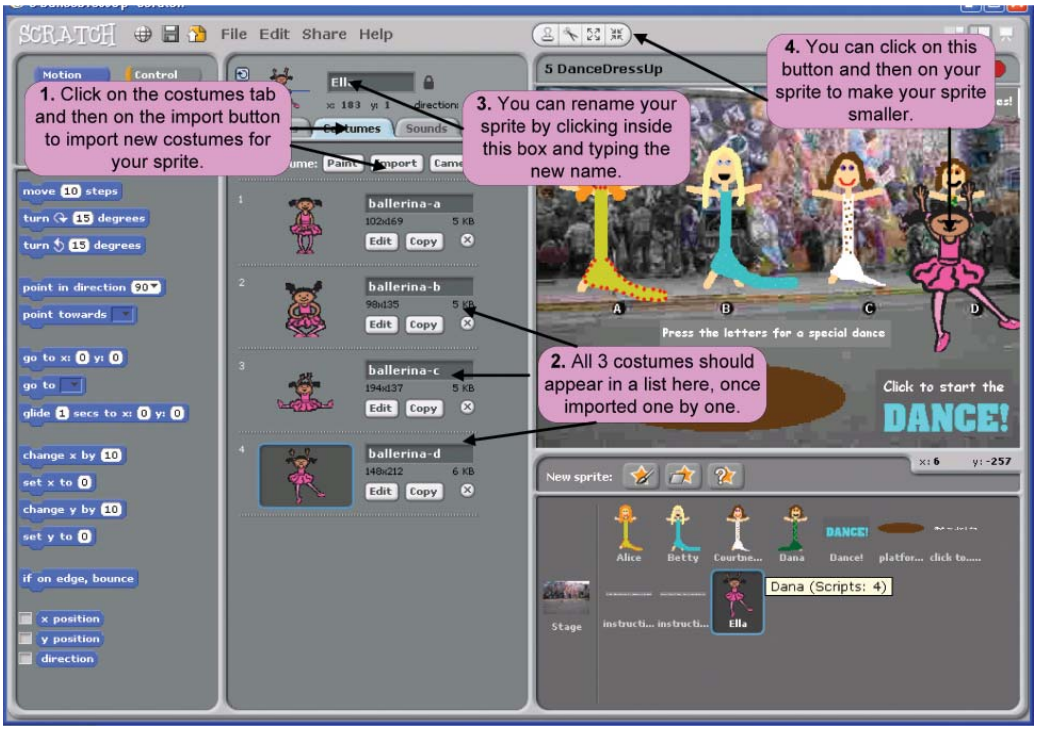
Repeat the steps above to add sounds of your choice to the other letters.

Dance Dress Up Project

1. **Introduce a new sprite called Ella.**

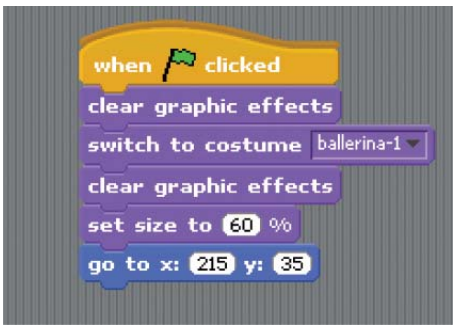


2. **Give her 3 different costumes like the other sprites.**



3. **When the green flag is clicked, Ella should be the smallest sprite and make sure to position her at the end of the line of other sprites on stage**.

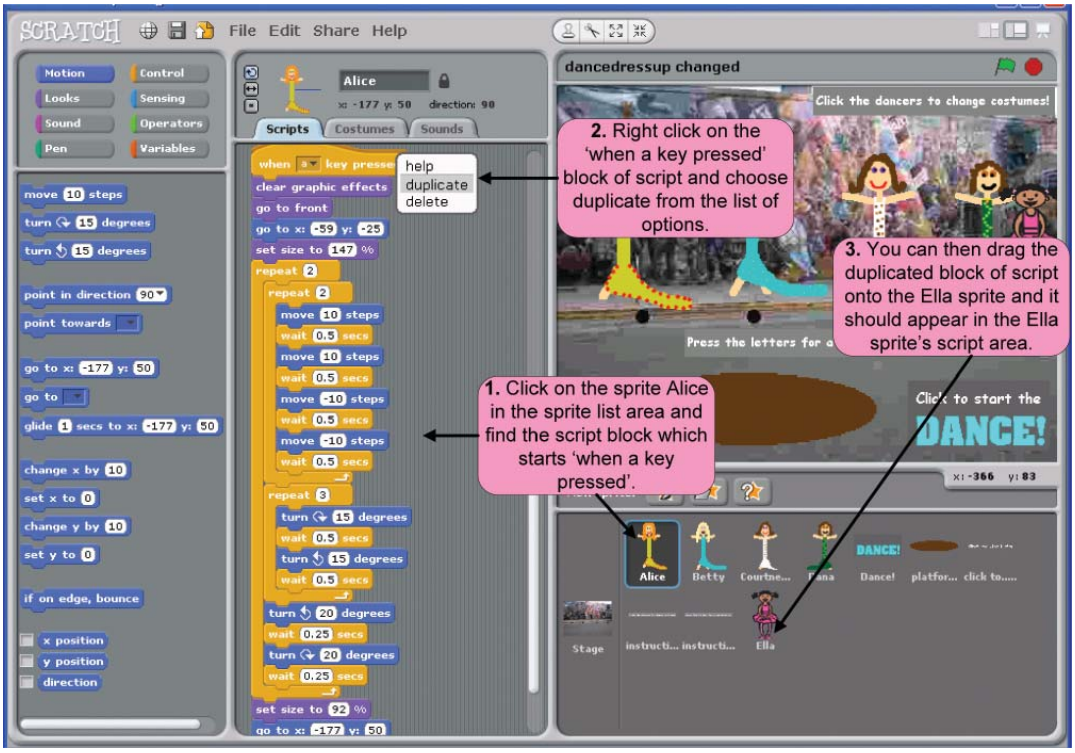
   The next biggest sprite, Dana, is set at 72% in size when the green flag is clicked, so set new sprite Ella's size to approximately 60%, when the green flag is clicked.
   Figure out the (x,y) position Ella needs to be in when the green flag is clicked. She should also switch to her first costume, each time the flag is clicked. The script solution for question 3 is below.



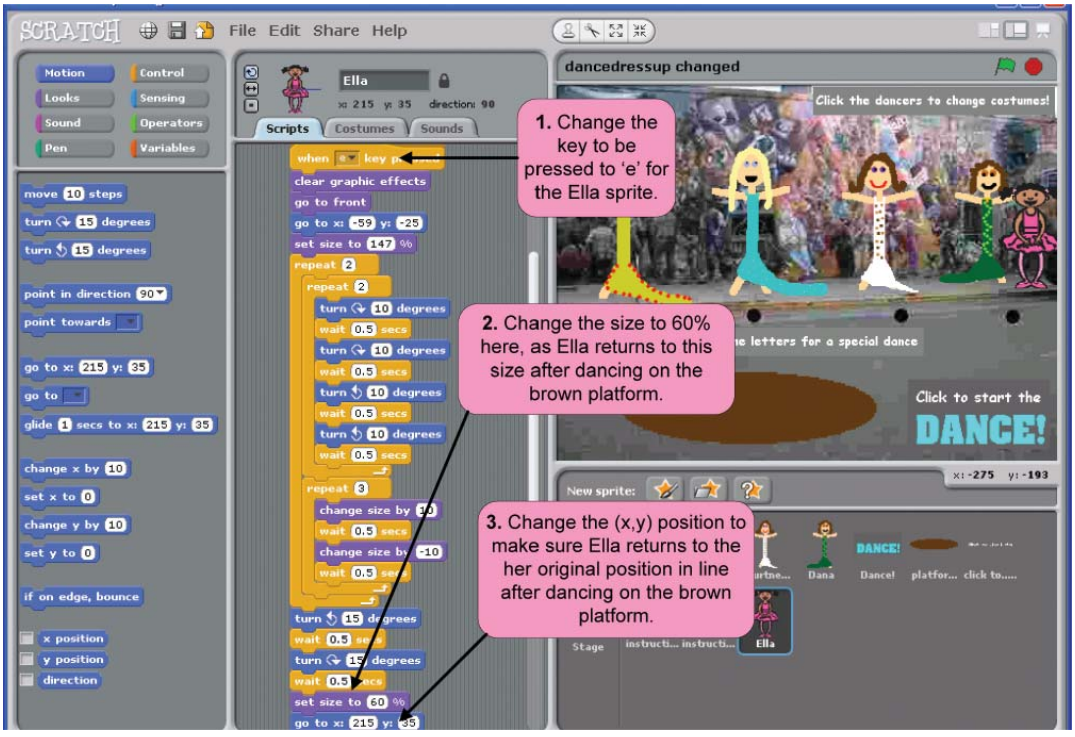
4. **When sprite Ella is clicked, she should change costume**.
   See script below.

5. **When the e key is pressed, make Ella dance on the brown platform, in whatever way you like, before returning her to her original position**. (Tip: you may duplicate some code from the other sprites by right-clicking on the block of code and dragging it to the Ella sprite).

   The other sprites already have scripts associated with them when a key is pressed. First copy the code from one of these sprites and drag and drop it onto the Ella sprite as shown. This will eliminate the need to build this part of the script from scratch.

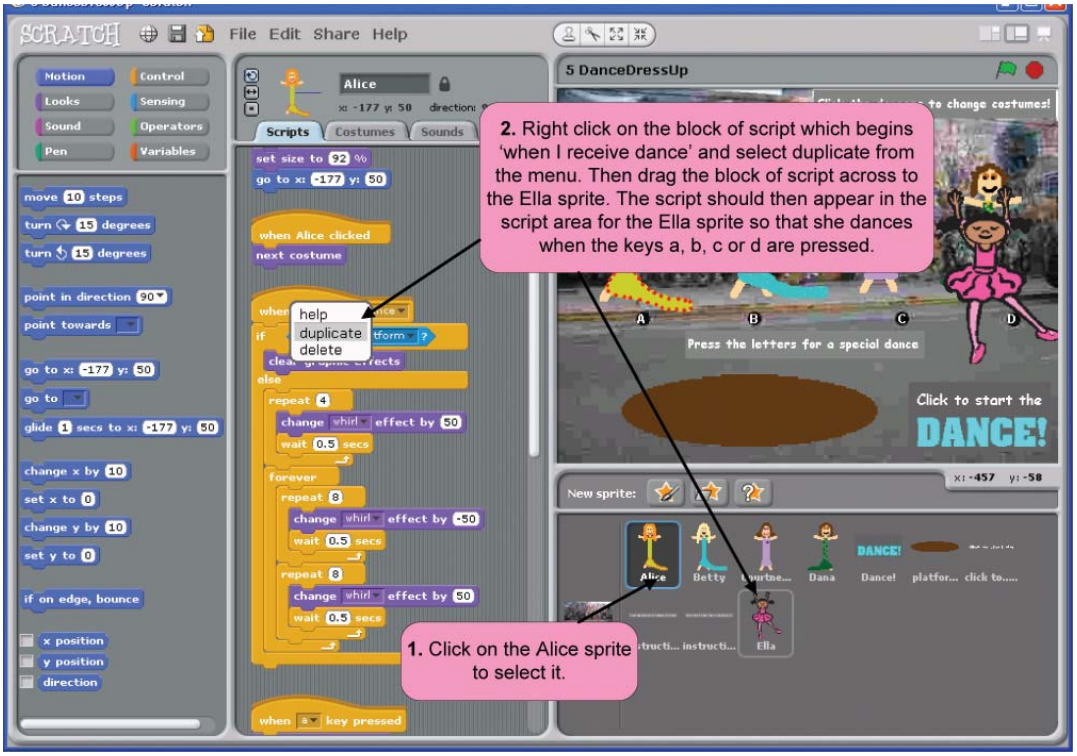


Edit the script for the Ella sprite when the 'e' key is pressed, as shown.



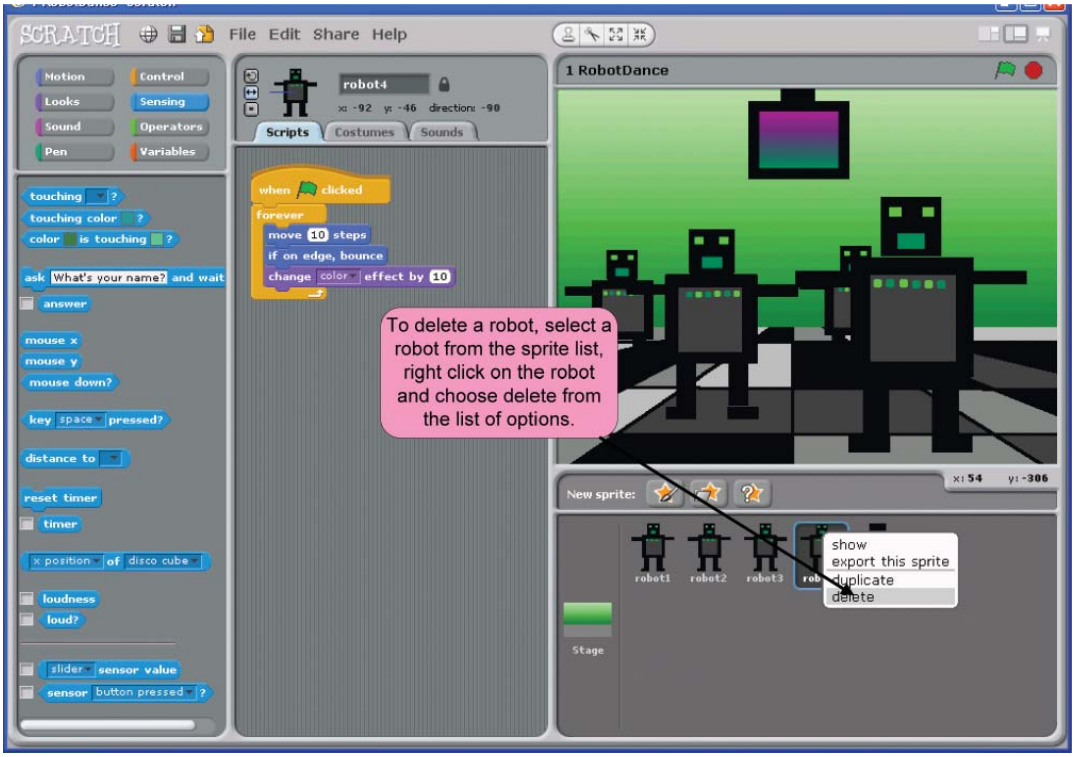
6. **When the letter keys for the other sprites are pressed (i.e. a, b, c, d), make Ella dance in line like the other sprites. (Tip: you may duplicate some code from another of the sprites by right-clicking on the block of code and dragging it to the Ella sprite).**

To make Ella dance in line like the other sprites, right click on the block of code which begins with 'when I receive dance' and drag it across to the Ella sprite as shown. This will make Ella dance in a whirl like the other sprites, when the keys a, b, c or d are pressed.

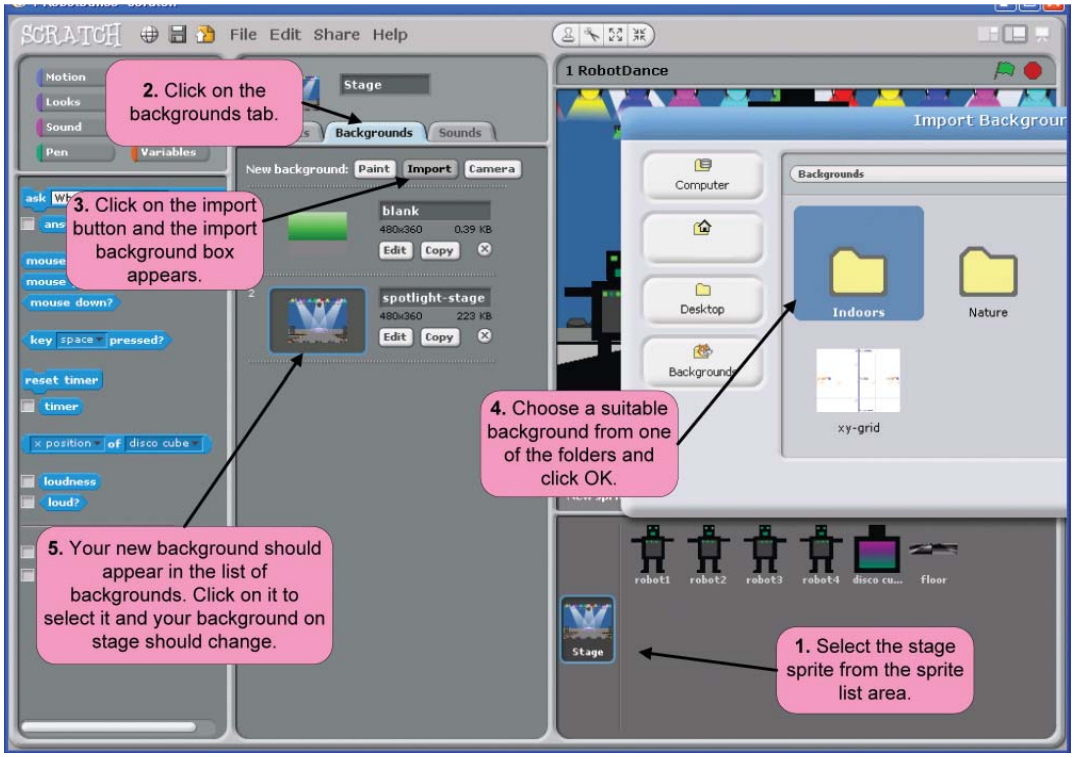


Robot Dance Project

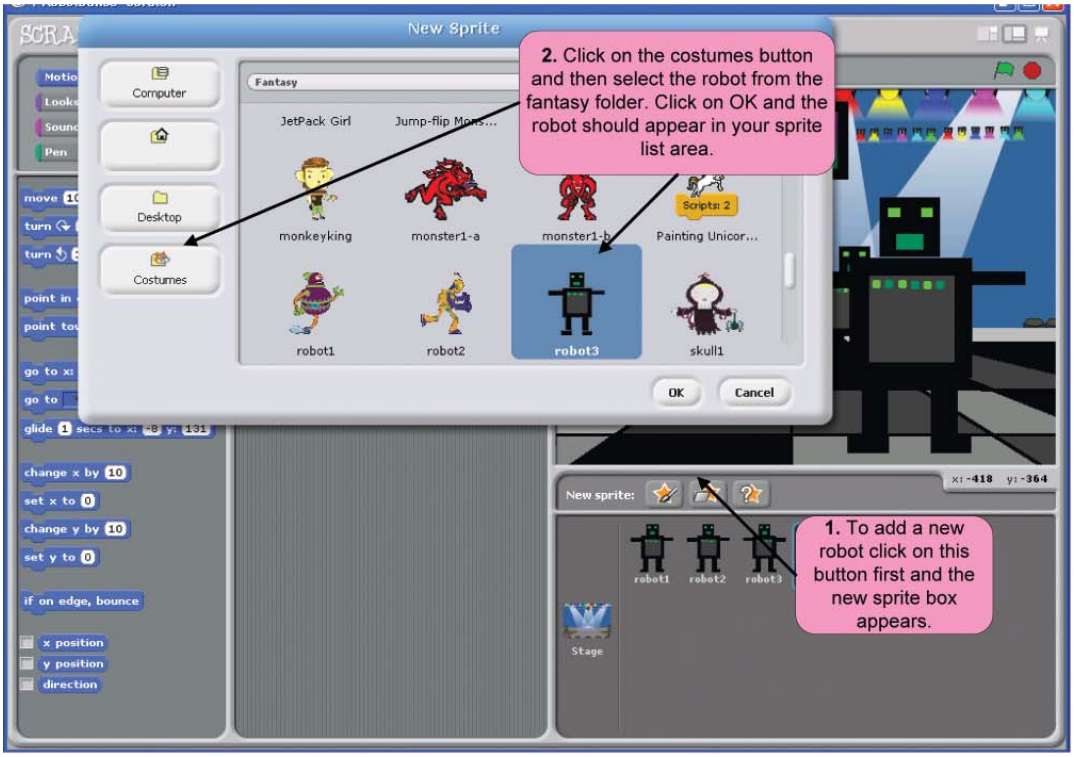
1. **Delete a robot from the floor.**

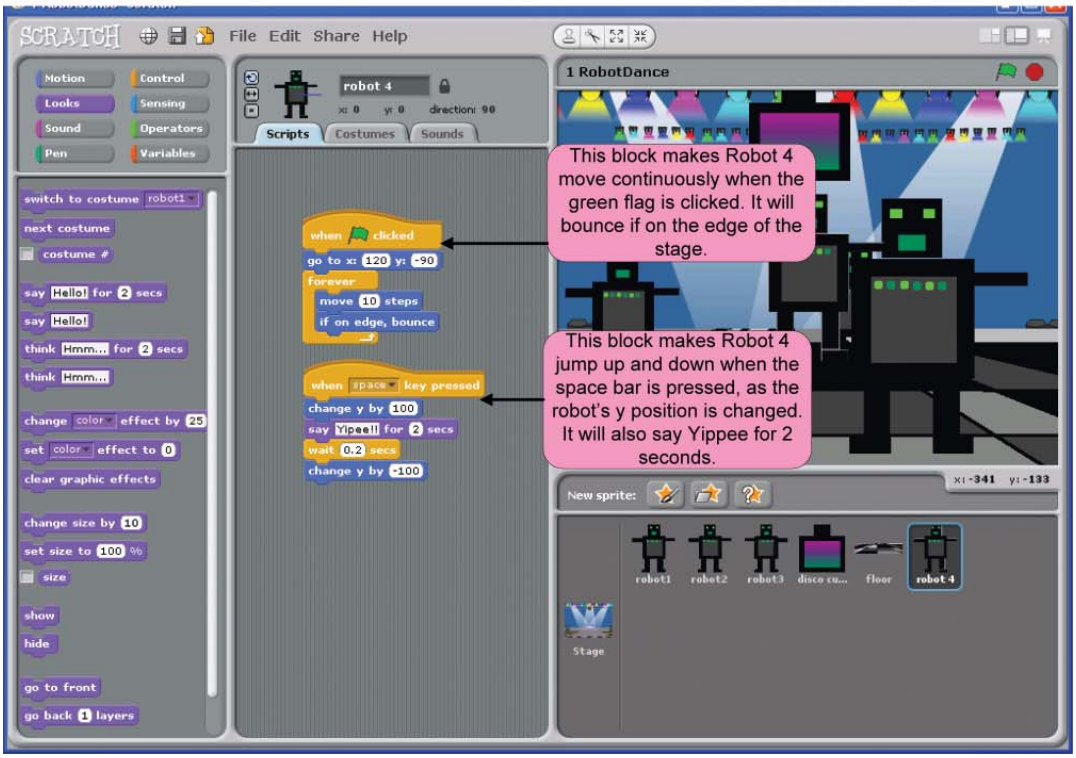


2. **Change the stage.**

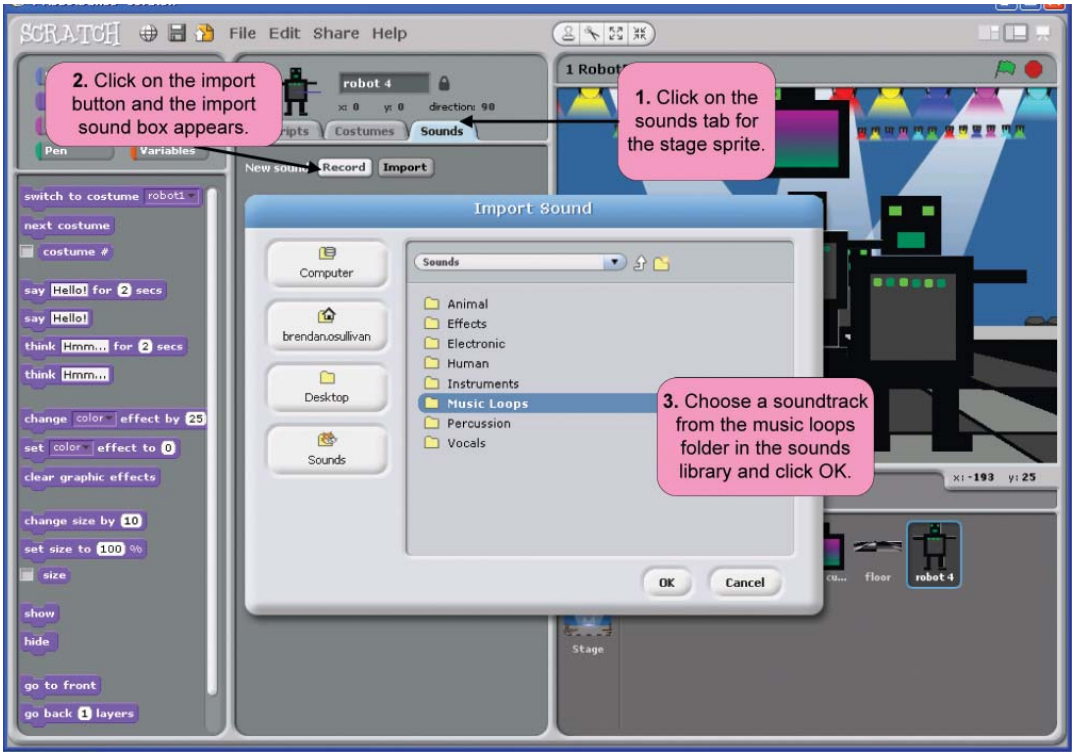


3. **Add a new robot called Robot 4 and make it jump up and down and say "Yippee" when the space bar is pressed.**

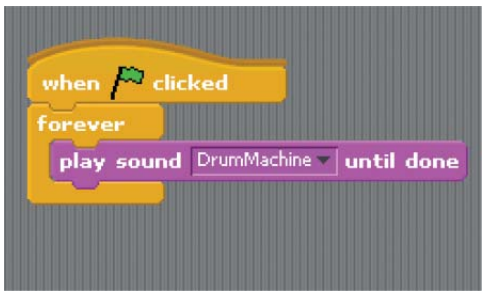




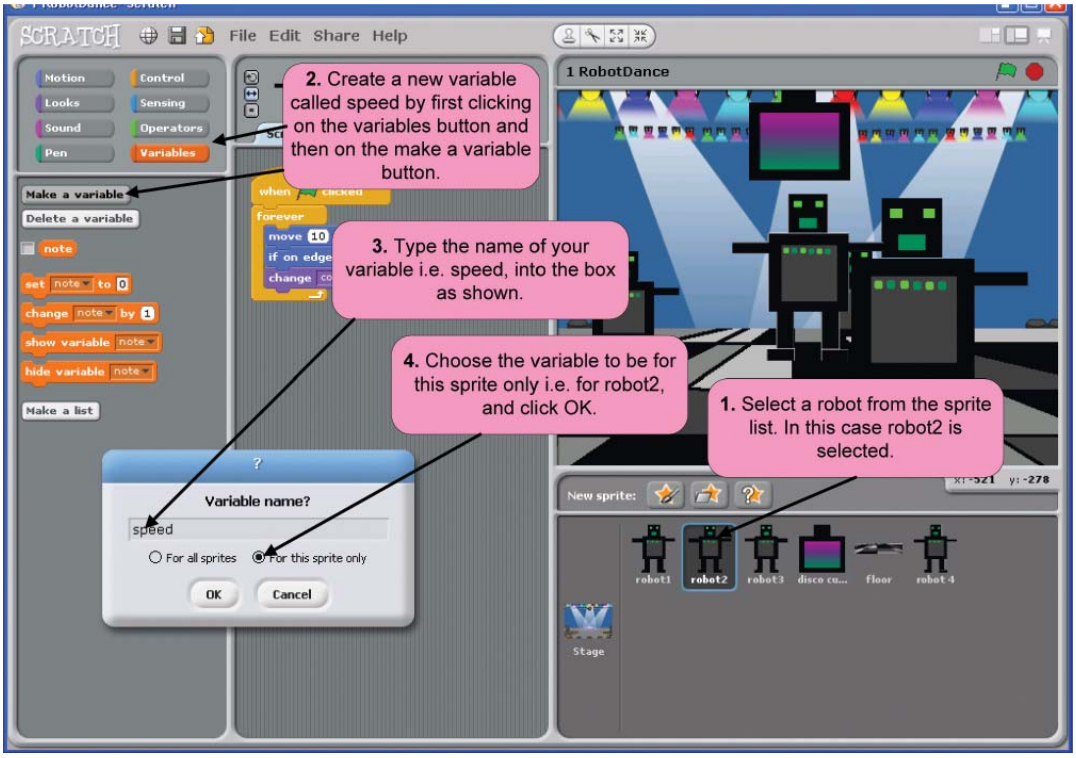
4. **Add a new soundtrack. You can add your own soundtrack or music from the Scratch library of sounds.**
The following shows you how to add a soundtrack from the Scratch library of sounds.



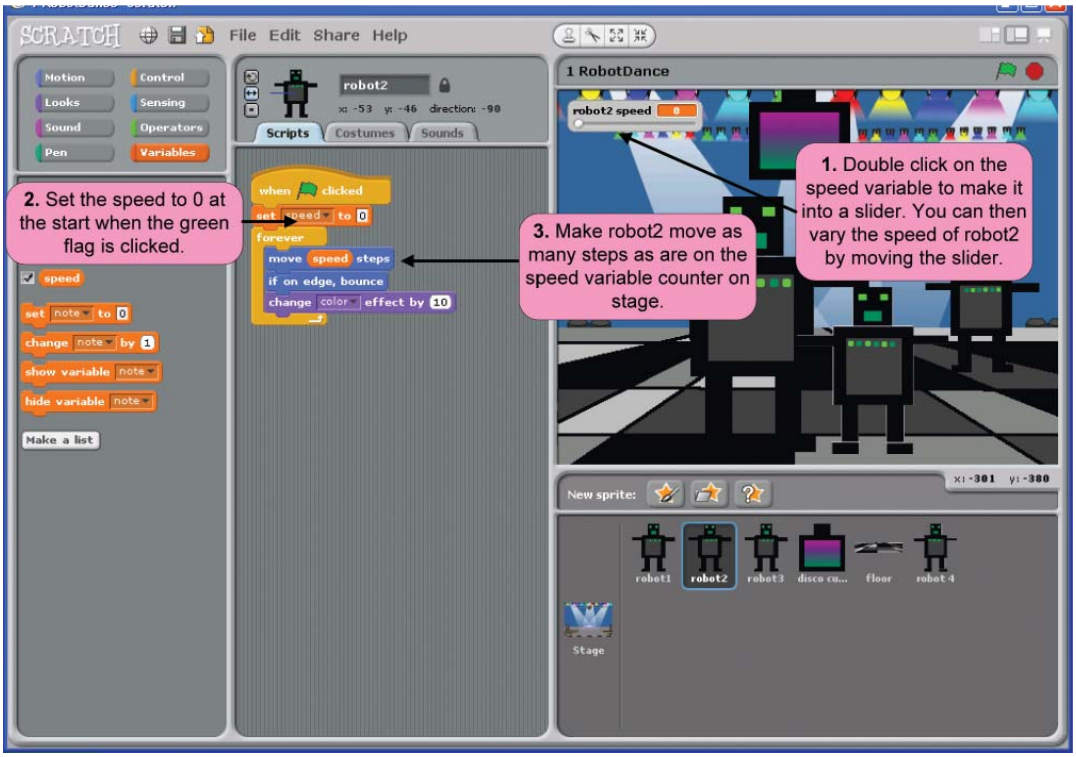
The following script should be added to the stage sprite to allow the imported soundtrack to play continuously when the green flag is clicked.



5. **Add a new variable 'speed' and change the speed at which one of the robots dances.**

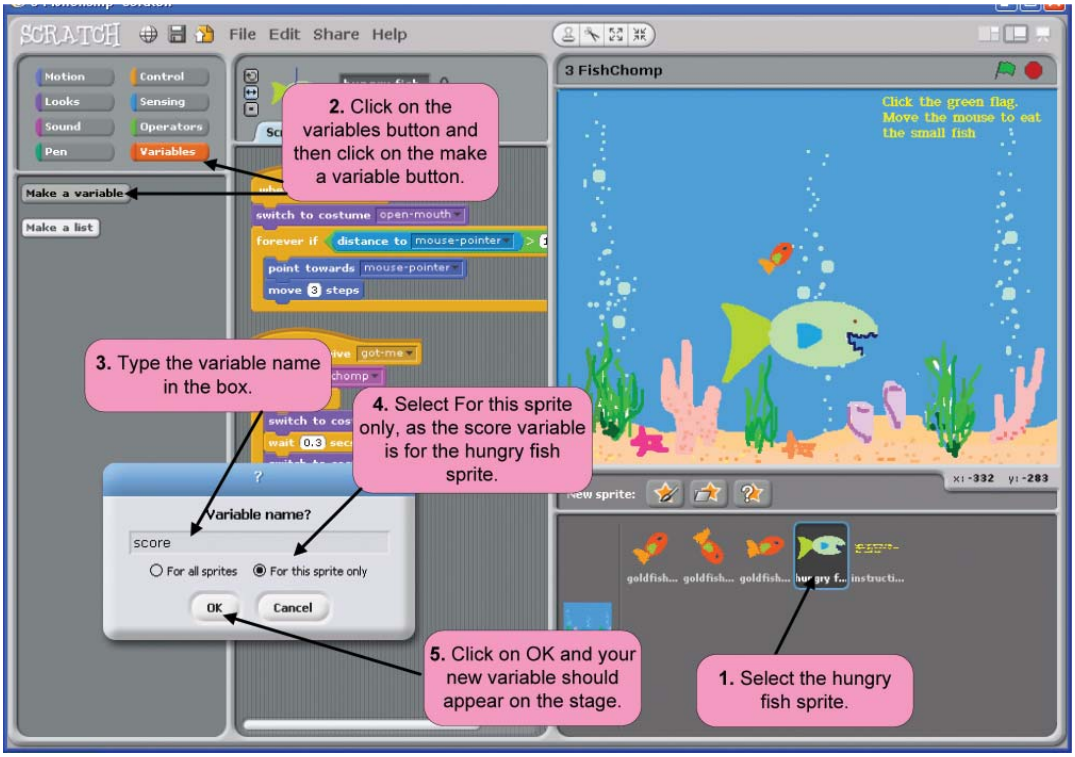


You can double click on the variable on stage to make it into a slider and then the code below will change the speed of robot 2 as you move the slider.



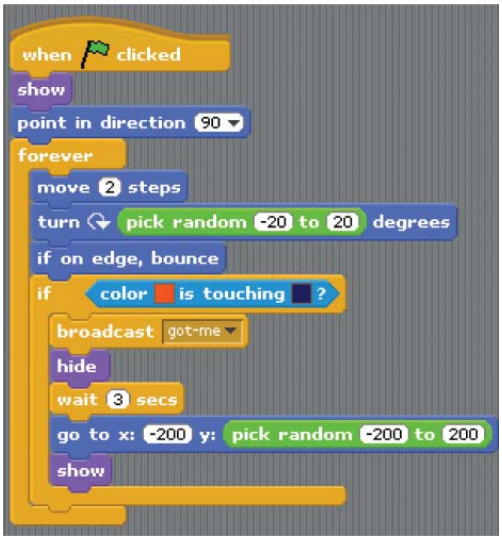
Fish Chomp Project

1. **Add a variable called score for the hungry fish sprite.**

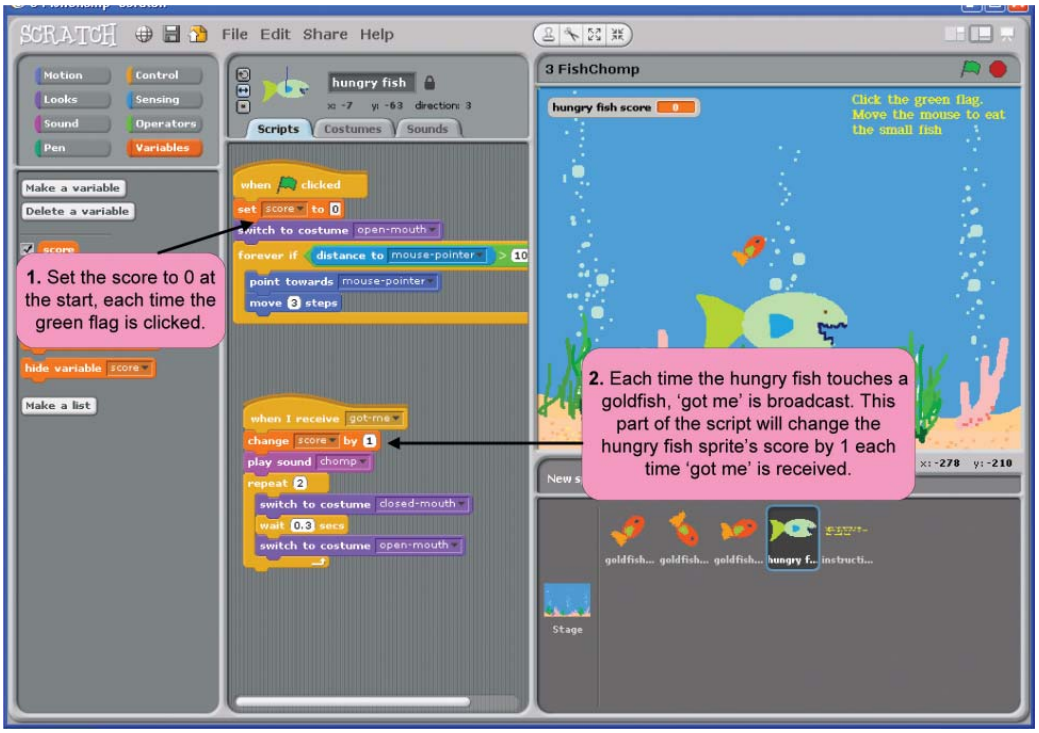


2. **Change the score if the hungry fish sprite eats any of the 3 goldfish sprites.**

Remember each of the gold fish sprites has the following script, so that if the blue mouth of the hungry fish touches the orange of the goldfish, the message 'got me' is broadcast:

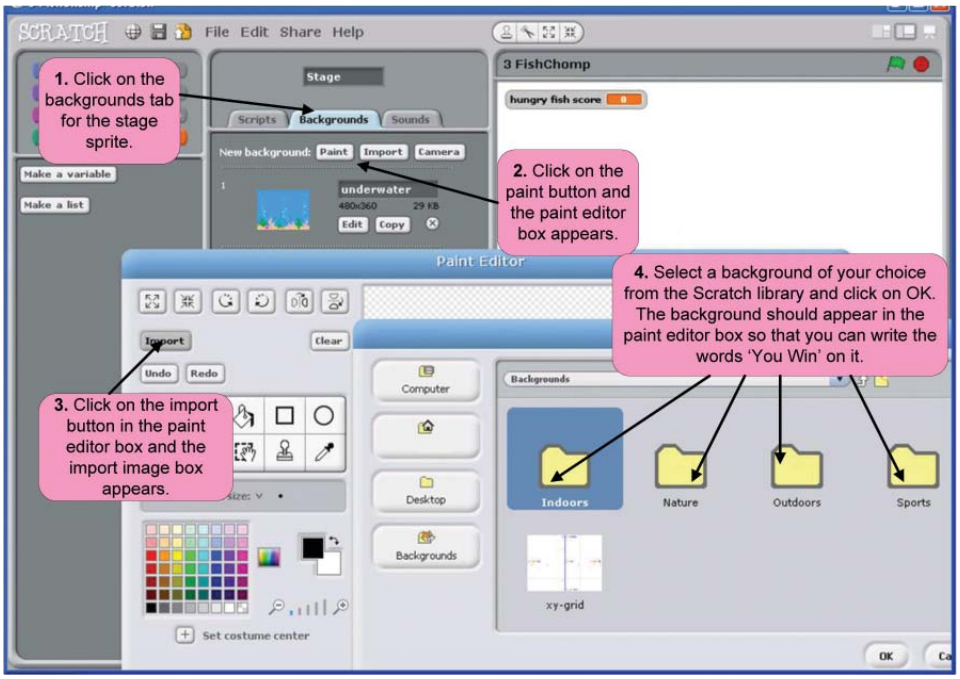


The following image shows the script for the hungry fish sprite. When the message 'got me' is received by the hungry fish sprite (i.e. it has eaten one of the goldfish), the score will change by one. Remember to set the score to 0 each time the green flag is clicked.

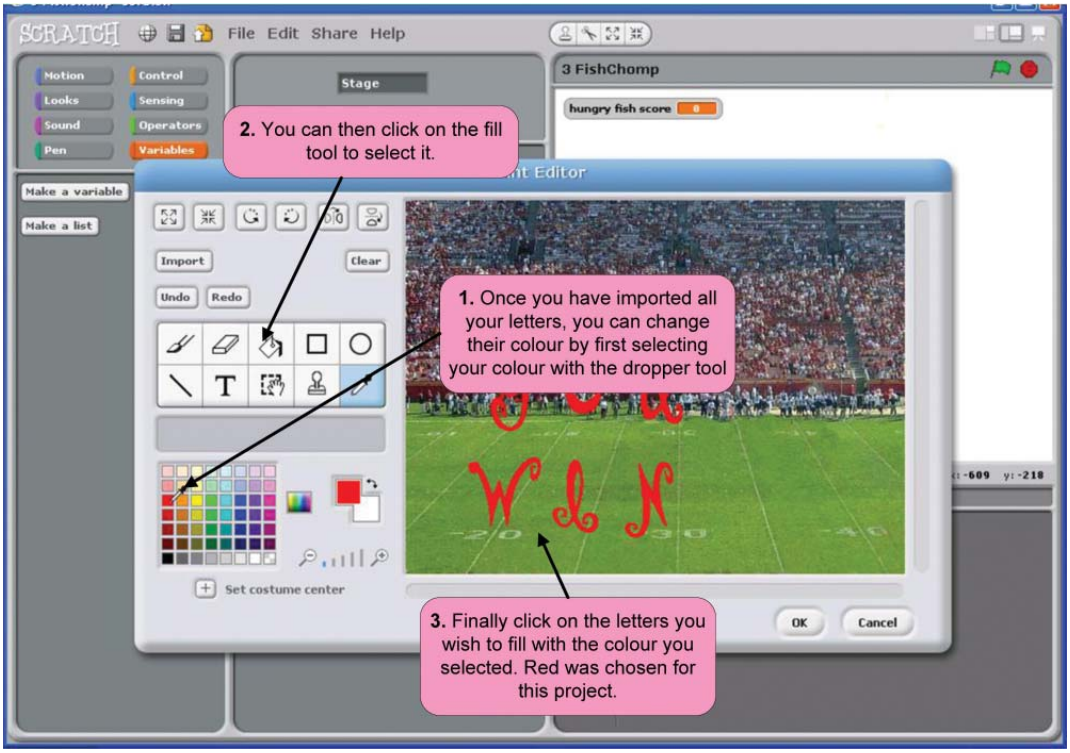


3. **If the score is equal to 10, change the background, hide all the sprites and display the message 'You Win'.**

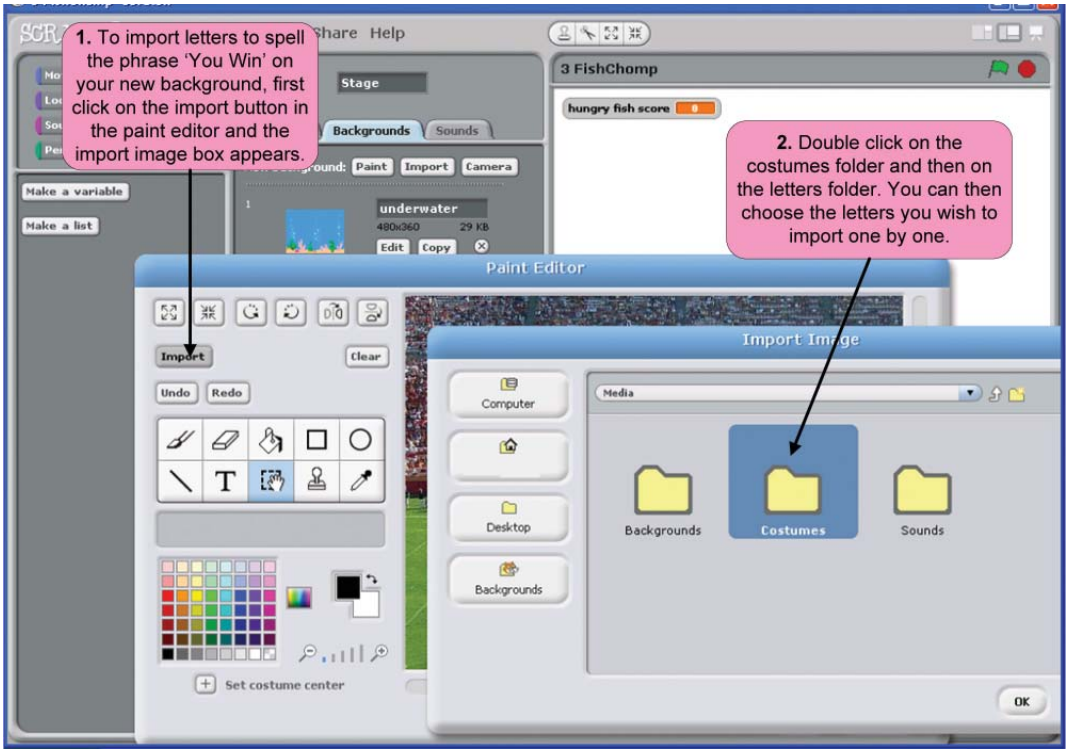
A new background displaying the message 'You Win' is created first.



The letters to spell 'You Win' are then imported. It is also possible to paint the letters using the paintbrush tool in the paint editor.

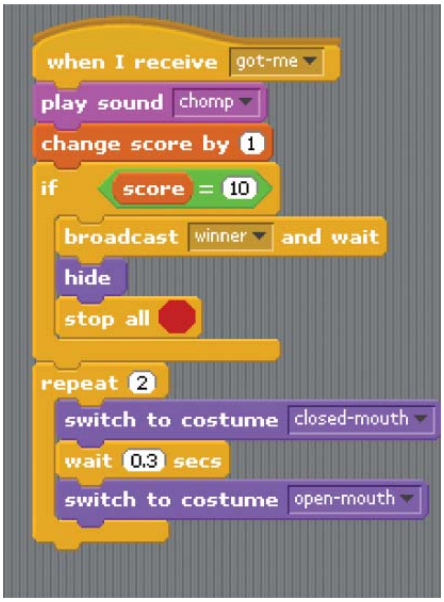


You can change the colour of the letters you imported as shown.



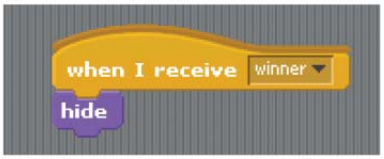
Finally you need to change the script for the hungry fish and the gold fish when the score is equal to 10.

The script for the hungry fish sprite looks like this.



The 'if score = 10' block means that if the score is equal to 10, the message 'winner' is broadcast to all sprites. The hide command hides the hungry fish and the stop all stops everything at the end, once the score is equal to 10.

The sprites goldfish 1, goldfish 2, goldfish 3 and the instructions sprite all have the following script.



This means that they will all be hidden then they receive the 'winner' message at the end of the game.

The stage sprite has the following script.

Module 7

Towers Of Hanoi

❶ For 15 disks $(2^n-1) = 215-1 = 32768-1 = 32767$
For 25 disks $(2^n-1) = 225 - 1 = 33554432 - 1 = 33554431$
For 1,099,511,627,775 moves $1,099,511,627,775 = (2^n-1)$
$1,099,511,627,775 + 1 = 2^n$
$1,099,511,627,776 = 2^n$
$\text{Log}_2(1,099,511,627,776) = n$
$n = 40$

Number of Disks	Number of Moves Required to Solve the Problem
6	63
9	511
15	32,767
25	33,554,431
40	1,099,511,627,775
64	9,223,372,036,854,775,808

The Travelling Salesman Problem

❷

Date	Journey From	Journey To	Distance
Jun-21	Dublin	Portlaoise	85
Jun-22	Portlaoise	Thurles	65
Jun-23	Thurles	Tipperary Town	45
Jun-24	Tipperary Town	Limerick	45
Jun-25	Limerick	Tralee	110
Jun-26	Tralee	Cork	120
Jun-27	Cork	Clonmel	100
Jun-28	Clonmel	Waterford	55
Jun-29	Waterford	Kilkenny	60
Jun-30	Kilkenny	Dublin	125
		Total Distance	810

End of Module 7 Quiz

1. B.
2. D.
3. A.
4. C.
5. B.

End of Module 8 Quiz

1. D.
2. B.
3. C.
4. D.

End of Module 9 Quiz

1. C.
2. B.
3. C.
4. B.

End of Module 10 Quiz

1. C.
2. B.
3. A.
4. C.