

Module 2

SCRATCH



Module 2

Suggested Duration of Module

4 Hours

Objectives:

Content of Module 2:

Exploring numeracy in Scratch

Communicating in Scratch

Gaming in Scratch

Images and video

Discussion Time

In Module 2, we will consider Scratch in the context of the primary mathematics curriculum. We will further enhance Scratch capabilities of participants, with particular emphasis on concepts related to numeracy.

Exploring Numeracy in Scratch

The mathematics curriculum for primary comprises five strands:

| |
|-----------------|
| Number |
| Algebra |
| Shape and Space |
| Measures |
| Data |

Note that Scratch can be used in lots of different subjects while still incorporating these numeracy skills.

| Skill | Examples of its use in Scratch |
|------------------------------|--|
| Applying and problem-solving | <ul style="list-style-type: none">● Breaking down a problem into individual tasks● Creating solutions to solve problems |
| Communicating and expressing | <ul style="list-style-type: none">● Pair work or Group work● Class discussion at end of Scratch lesson - ask children what went well, what didn't work, ask children to solve Scratch errors for each other |
| Integrating and connecting | <ul style="list-style-type: none">● Connect informally acquired mathematical ideas with formal mathematical concepts● Carry out mathematical activities which involve other areas of the curriculum |
| Reasoning | <ul style="list-style-type: none">● Sequential and logical thinking● Reading through pieces of code |
| Implementing | <ul style="list-style-type: none">● Use appropriate Scratch tools to complete tasks |
| Understanding and recalling | <ul style="list-style-type: none">● Recalling the function of each block● Understanding which blocks will be most helpful in a specific project or a specific piece of code |

For more details on this see:

http://www.curriculumonline.ie/getmedia/9df5f3c5-257b-471e-8d0f-f2cf059af941/PSEC02_Mathematics_Curriculum.pdf

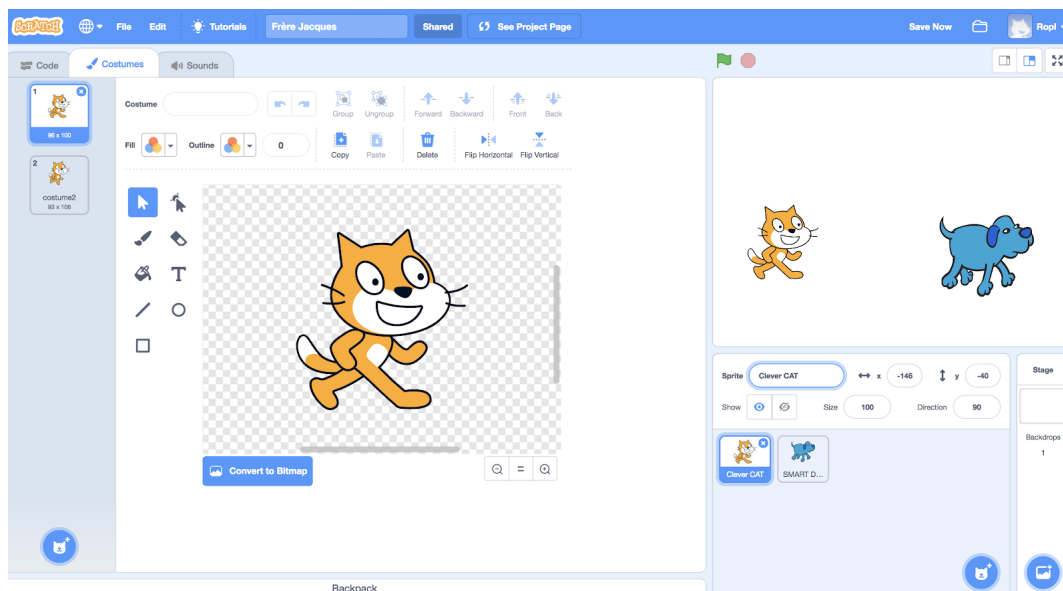
Communicating in Scratch

In Scratch we use broadcasts to communicate between sprites and between different parts of the programme. Broadcasting is a very useful tool to control the flow of a programme. We will cover this important concept now.

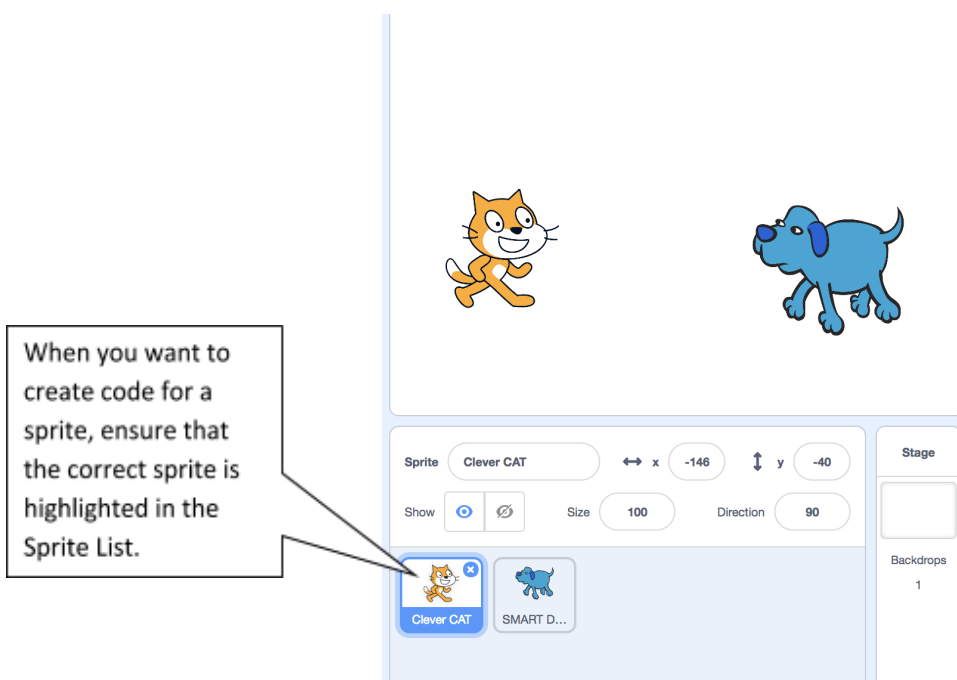
A broadcast is used to send a message from one sprite to another or from one part of the programme to another. A broadcast is like a radio signal. It is sent out from one sprite or background. It is received by all the sprites and the stage or background. Once a sprite receives a broadcast it can be programmed to react in a particular way.

Participant Activity

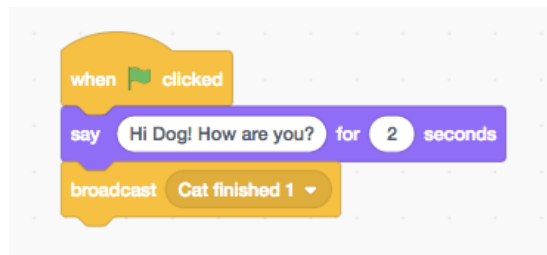
1. Select two sprites from the folders or draw two sprites.
2. We are going to code a conversation between these sprites so have them face each other.
 - a. If a Sprite is turned the wrong way, click on the costumes tab. This brings you into the Paint Editor. Click “Flip horizontal”.



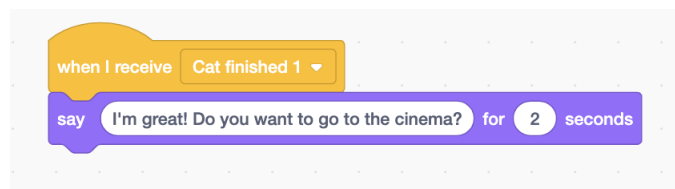
3. Give your Sprites meaningful names *e.g.* Clever Cat
4. We will code the first Sprite's first words. Ensure the Sprite is highlighted in blue in the Sprite List. Click on the Code tab.



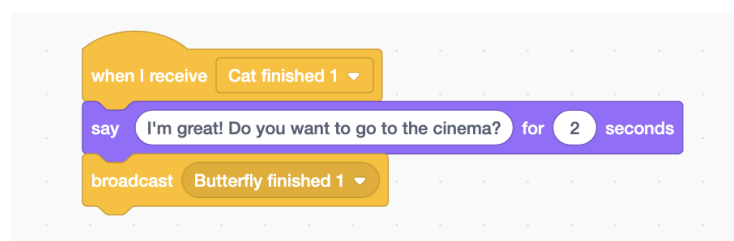
5. Use the purple Looks Palette. Pull out "Say Hello for 2 secs". Click on Hello to edit the speech. Add an event block.



6. To get the second sprite to speak we must first send out a signal that the first sprite is finished speaking. This is what a broadcast is for.
7. Click on the Events Palette. Pull out the “broadcast” block. Click on the black dropdown arrow. Select message1 or create a different name of your choice to name the message.
8. Broadcasts work in the code but do not appear on the stage.
9. If you run your code now this broadcast is sent out by the sprite and received by every sprite and the stage. We must now programme our second sprite to react once it receives the broadcast.
10. Click the second sprite in the Sprites Area.
11. Pull out the “When I receive Cat Finished 1” block from the Events Palette or use the dropdown arrow to select the name of your broadcast message. You can then reply and ask something else.



12. You can then add a second broadcast to this piece of code. This will send a broadcast out and the first sprite will receive it



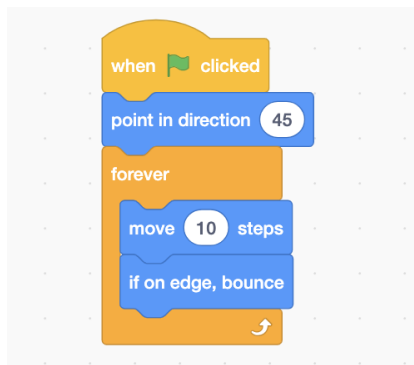
13. Continue in this way until the conversation is complete.

Broadcasts can be used to initiate any action within Scratch. The following activity uses broadcasts while also incorporating the Sensing Palette.

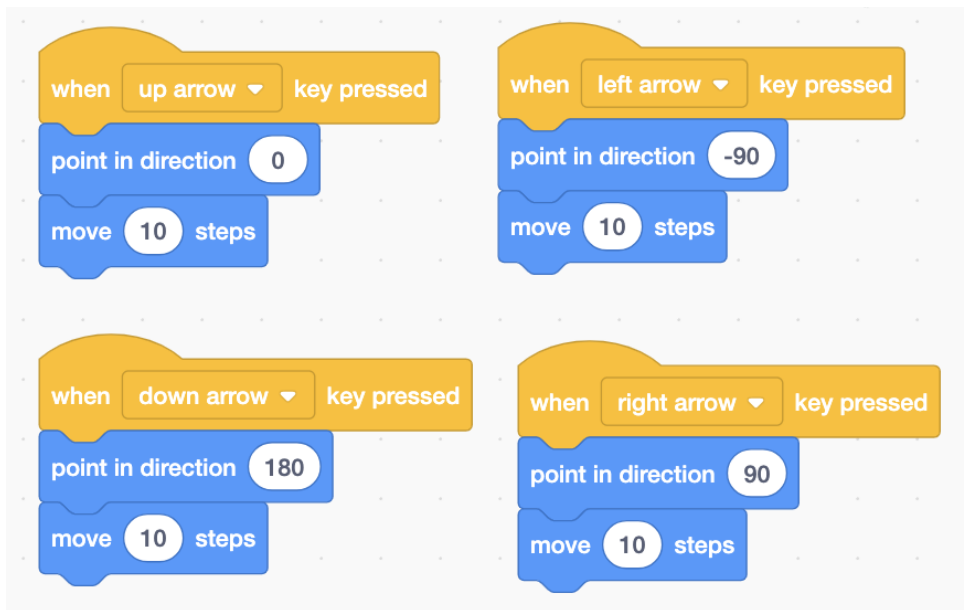
Gaming in Scratch

This is a simple chase game. One sprite will move randomly around the screen. A second sprite, controlled by the user, will move around the screen trying to avoid the first sprite.

1. Choose a sprite. We will call it The Chaser. Create a script that allows it to move randomly around the screen.

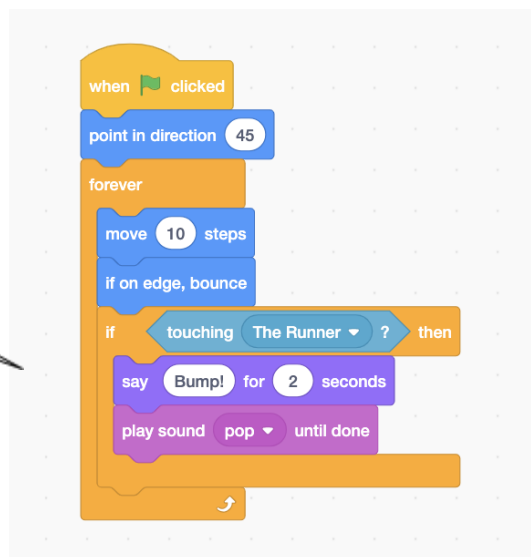


2. Choose a second sprite. We will call it The Runner. Create scripts that allow it to move up, down, left and right.

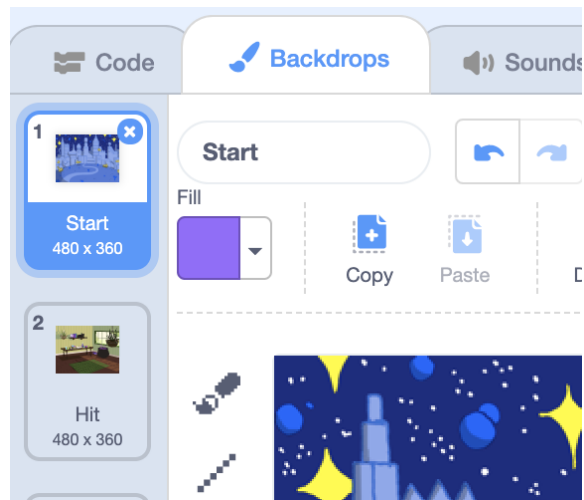


3. We want a reaction when The Chaser catches The Runner. This requires the “if” loop and the Sensing palette.

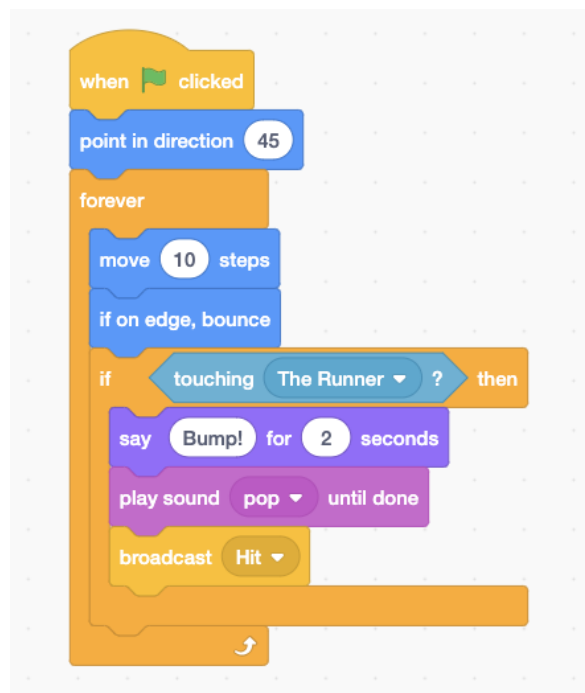
Choose any reaction e.g. movement/ sound etc.



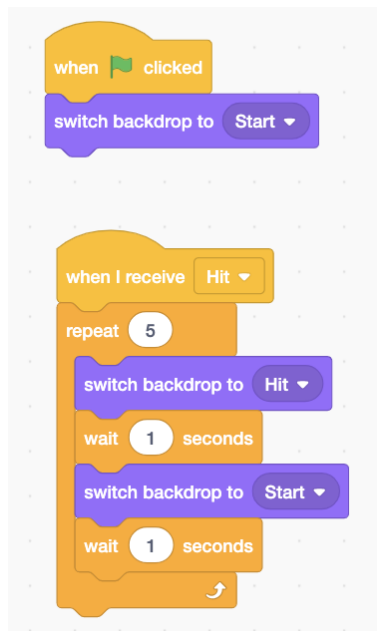
4. Create or import two backdrops for your game. One will show while the game is running. One will show when the sprites are touching and the game ends.



5. The Chaser will send out a broadcast when it touches The Runner.



6. When the stage receives this broadcast it will switch backgrounds.



7. Save this game with a meaningful name.

Variables

A variable is a value that is not constant, it changes. While variables are only mentioned explicitly in the sixth class Maths Curriculum, they can be seen at younger levels too:

Area = Length*width ($a = l*w$)

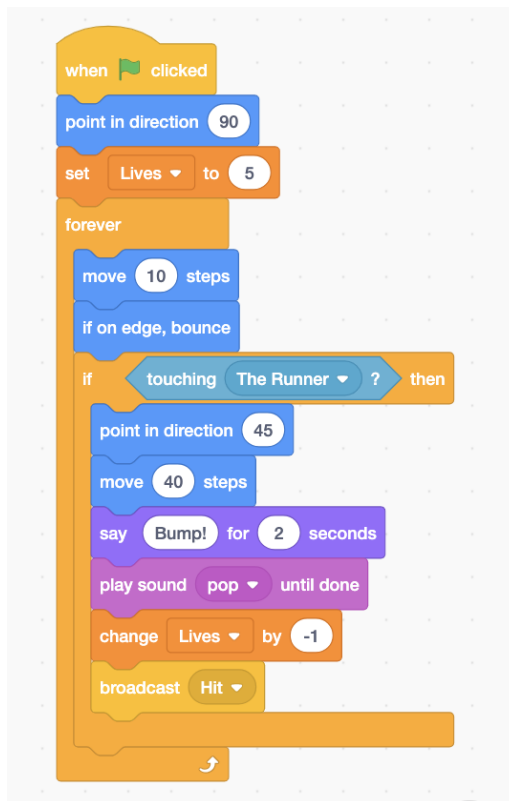
Diameter = 2*radius ($d = 2*r$)

Speed = Distance/Time ($S = D/T$)

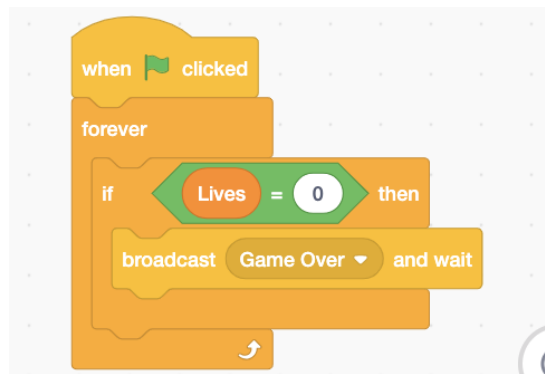
In Scratch, the children can use simple variables to enhance their games.

Participant Activity

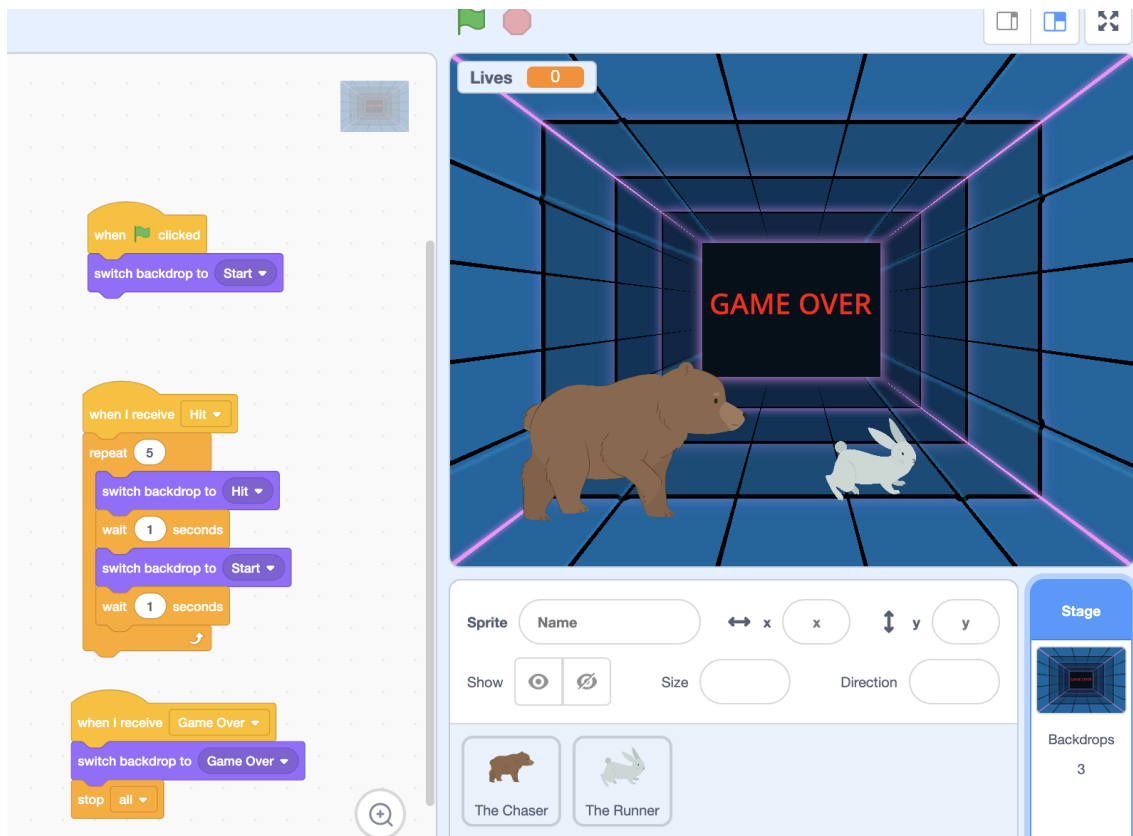
1. Reopen the chase game you created earlier.
2. Click on the Variables Palette and select "Make a variable".
3. Create a variable called "Lives".
4. We want to start with five lives. Each time the sprites touch we will lose a life.



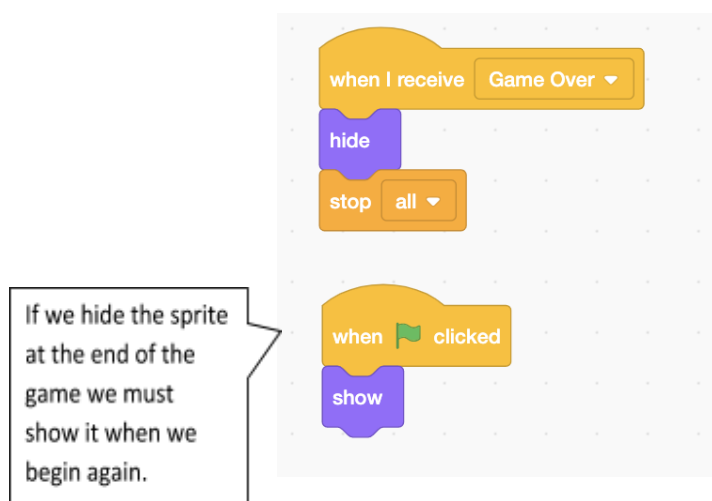
5. What happens when the lives reach 0? We need to create a programme to tell the sprites what to do. This will require a broadcast.
6. The piece of code will constantly check the lives. If the lives are 0, it will send out a broadcast. We can call this broadcast Game Over.



7. Create another background that will appear when the game ends.

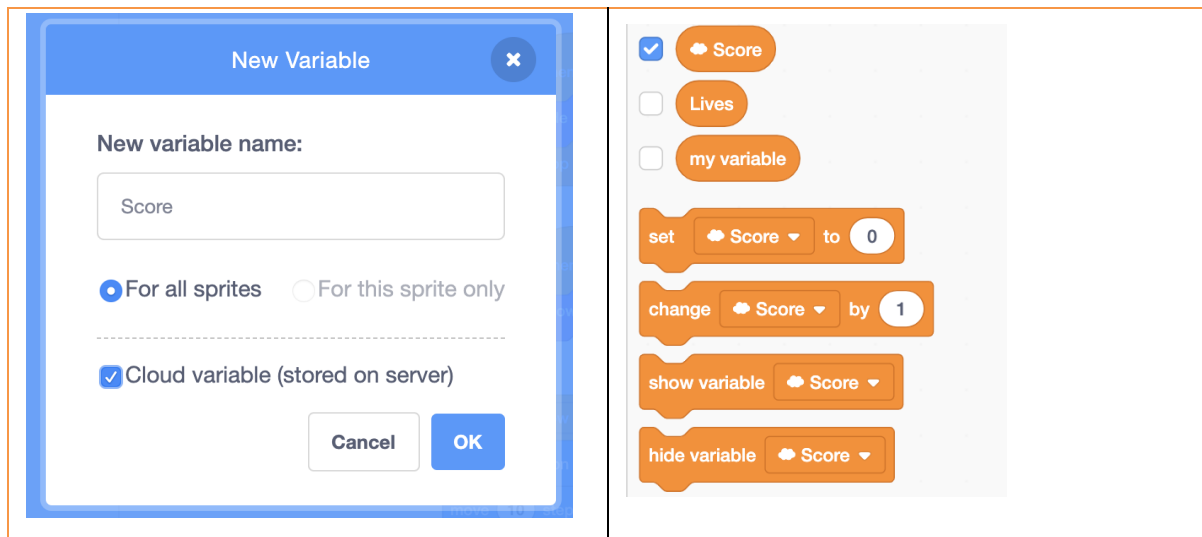


8. We can hide the sprites at the end of the game.



Scores in the Cloud

When working online in Scratch, you have the option to create a variable in the cloud (denoted by the cloud!). For example, a score cloud variable in your game is shared and seen by everyone running your Scratch project. You could use this to keep a high score for your Scratch game.



Images and video

Scratch projects may use images and video to increase the engagement factor and to allow students to personalise their projects.

The use of images in Scratch

In order to make Scratch projects personally meaningful to children, it may help to use a greater range of images. These may be downloaded from the internet, uploaded from external devices such as digital cameras, or taken from files already saved on the computer.

search.creativecommons.org

The Creative Commons search functionality allows users to search Google Images, Flickr, Fotomedia, Wikimedia and Pixabay for images that have a Creative Commons License and can be downloaded and edited without any copyright infringement.

Finding suitable images for Sprites

Children often want to use images of their favourite characters from the

internet in their Scratch projects. If the image has a lot of colour and detail in the background it can be difficult to edit and use in Scratch. It is suggested that transparent or png files be used. If a child is searching for a cat image to use they could enter the search term “cat transparent”.

Participant Activity – Downloading images from the Internet

1. Create a folder on your desktop.
2. Label it “Scratch Resources”. This is where you will save all images and sounds that you intend to use in Scratch.
3. Find an image you wish to use on search.creativecommons.org or through an alternative search engine. Remember to look for transparent images if possible.
4. Save the image to your new folder, giving it a meaningful name.

Participant Activity - Save an image from a digital camera or mobile phone

1. Find an image you wish to use on the digital camera.
2. Open the “Scratch Resources” folder.
3. Drag the image into the “Scratch Resources” folder.
4. Once the image is saved to the folder you can open it in Scratch.

Participant Activity – Using Images in Scratch

1. Open Scratch interface.
2. Delete the cat sprite.
3. Click on “Upload sprite from file”.
4. Navigate to the desktop.
5. Choose the folder you created earlier, “Scratch Resources”.
6. Select the photo you wish to use.
7. When you import a photograph it may contain other images that you do not want, *e.g.*, a white background that has to be deleted.
8. Click on the photograph in the sprites area.
9. Click on the costumes tab
10. Click on edit. This will open the paint editor where you can delete

backgrounds, alter colours and size and add text.

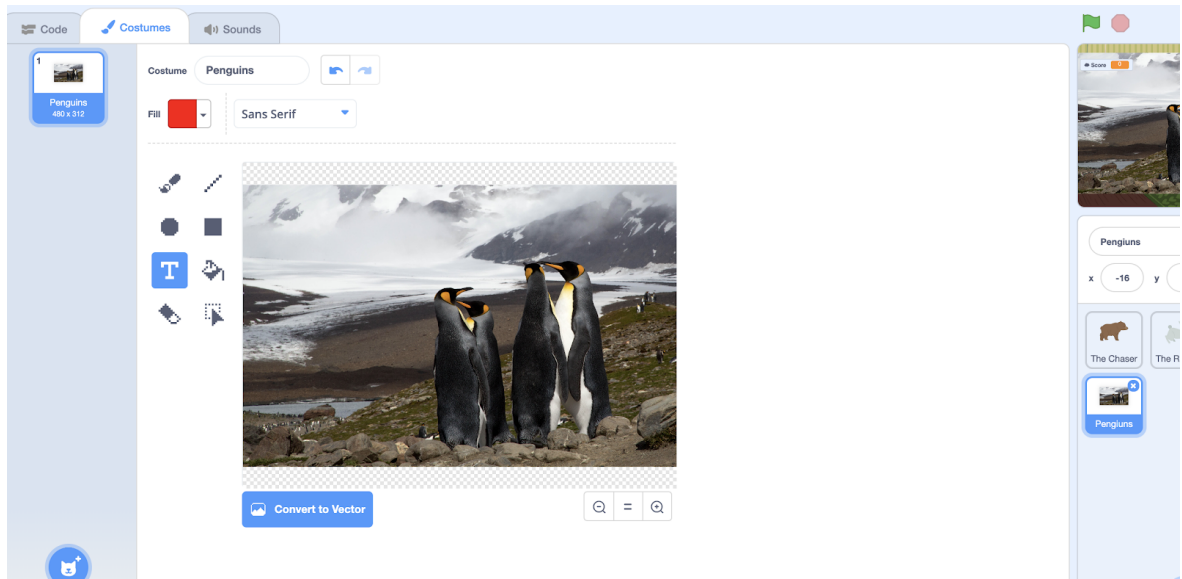


Photo by Brian McMahon on Unsplash

11. For full details on the Scratch Paint Editor see:

http://wiki.scratch.mit.edu/wiki/Paint_Editor

Participant Activity – Create a Scratch Project that Incorporates Images

1. Working in pairs, take images using your smartphone or alternatively find suitable images from the internet
2. Incorporate sounds and images into a numeracy focused Scratch project.

Participant Activity - Images in Scratch

1. Go to www.scratch.ie or to where you have saved the downloaded lessons.
2. Open Lesson Plan 4 – A Cartoon About Me!
3. Complete the Ultimate Challenge.

Video in Scratch

The new Video feature in Scratch 3.0 is definitely worth checking out and introducing to your students. Browse the Video Sensing projects on

http://scratch.mit.edu/starter_projects/ to experience the video capabilities.

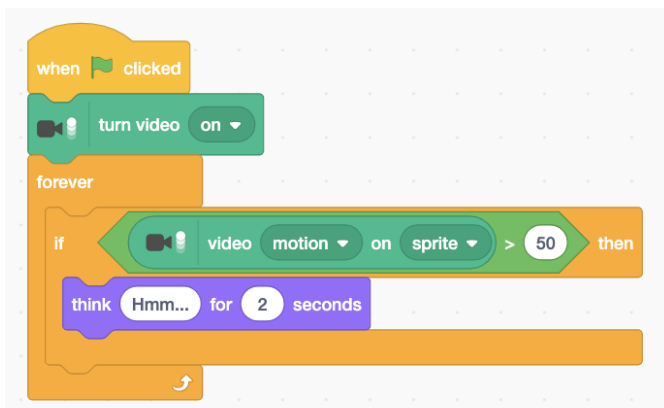
You will need a webcam on your machine to explore video.

To get started with video, get a sprite on the Stage and turn on the video. Click on the “Extensions” and then click on “Video Sensing”.

Once you turn on video, you will be asked to Allow Camera and Microphone Access. Click “Allow”.



Check the video motion on the sprite and perform an action if motion is detected on the sprite. (In this case we say Hello)



You can check the value of the video motion by checking the “video motion on this sprite” box so it displays on the screen.

Participant Activity – Explore Video Functionality

Working in groups to build a Scratch project using video blocks. Share your project in the group studio and explain how you created it.