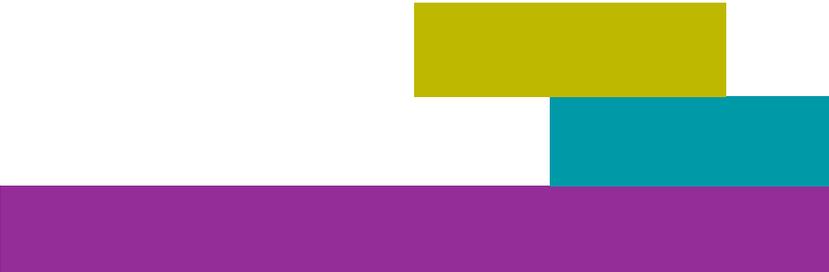




Guide TRAVELLING INTO SPACE

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TRAVELLING INTO SPACE

Margaret Hamilton was head of the Software Engineering Division for MIT's Instrumentation Laboratory where her team developed the on-board navigation software for the Apollo Space Program in the 1960s. She is one of the most important figures in the history of the space mission. In this workshop we will meet the engineer whose talent and passion were vital to the success of the mission to reach the Moon and create our own Scratch project to learn more about the space adventure.



Before we begin

What we are going to do

- Learn about and experience object-based programming.
- Learn about the Scratch programming environment and the function of each block used to conduct this activity.
- Develop a simple video game using object programming.
- Explore the interaction of play, imagination and technology.
- Raise awareness of the role of women in technology professions.

We will need

- Internet connection
- Access to Scratch <https://scratch.mit.edu/>
- Paper
- A ruler
- One 20-cent coin
- A packet of lentils

The competencies we will work on

- Mathematics, science and technology skills. Introduction to problem solving, so we can apply it to everyday situations.
- Digital competency. Enable experimentation with digital media, facilitating understanding of technology, logical and computational thinking.
- Critical thinking. Propose situations that enable us to question, pose problems, select information and draw conclusions. Encourage research and project development, problem solving and critical decision making, using digital applications and resources.
- Social and civic competencies. Develop individual and team-work habits, and attitudes of self-confidence, initiative, curiosity and creativity.

Development of the activity

On 20 July 1969, the Apollo 11 lunar module was close to landing on the moon, but there were problems that triggered error messages in the shuttle's computer. The program developed by Margaret Hamilton was designed to devote all resources solely to the lunar landing, and so the mission to reach the Moon was completed.

We have received a call from NASA. This is the Insight mission, tasked with reaching Mars. They have had a problem and the shuttle controls have been deprogrammed. Our mission will be to reprogram them, or the crew will not be able to return to Earth.

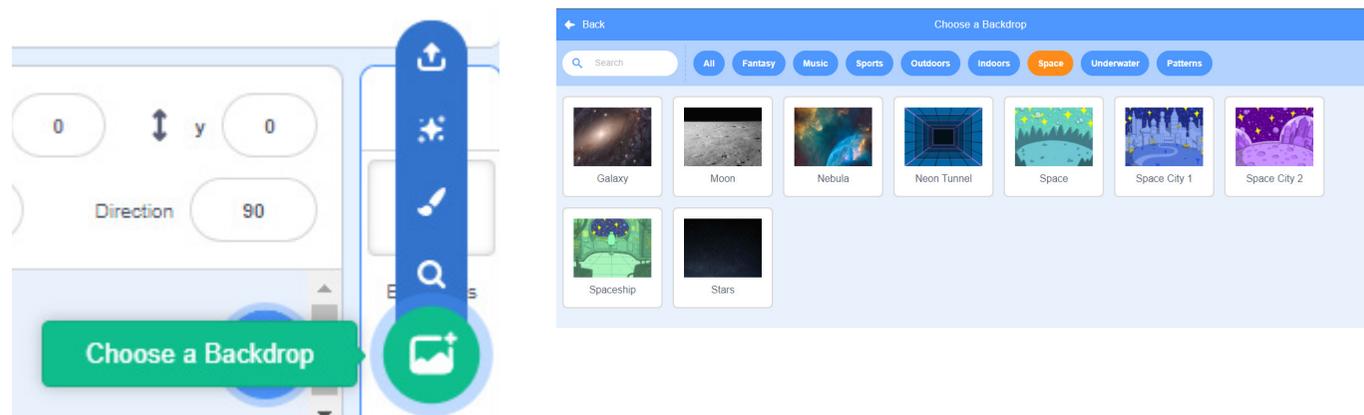
1. Open Scratch!

Visit the Scratch website <https://scratch.mit.edu/>

2. Space is our backdrop!

1.1 First we will choose our program's backdrop. As we will be piloting a rocket, it will be best to choose a space backdrop.

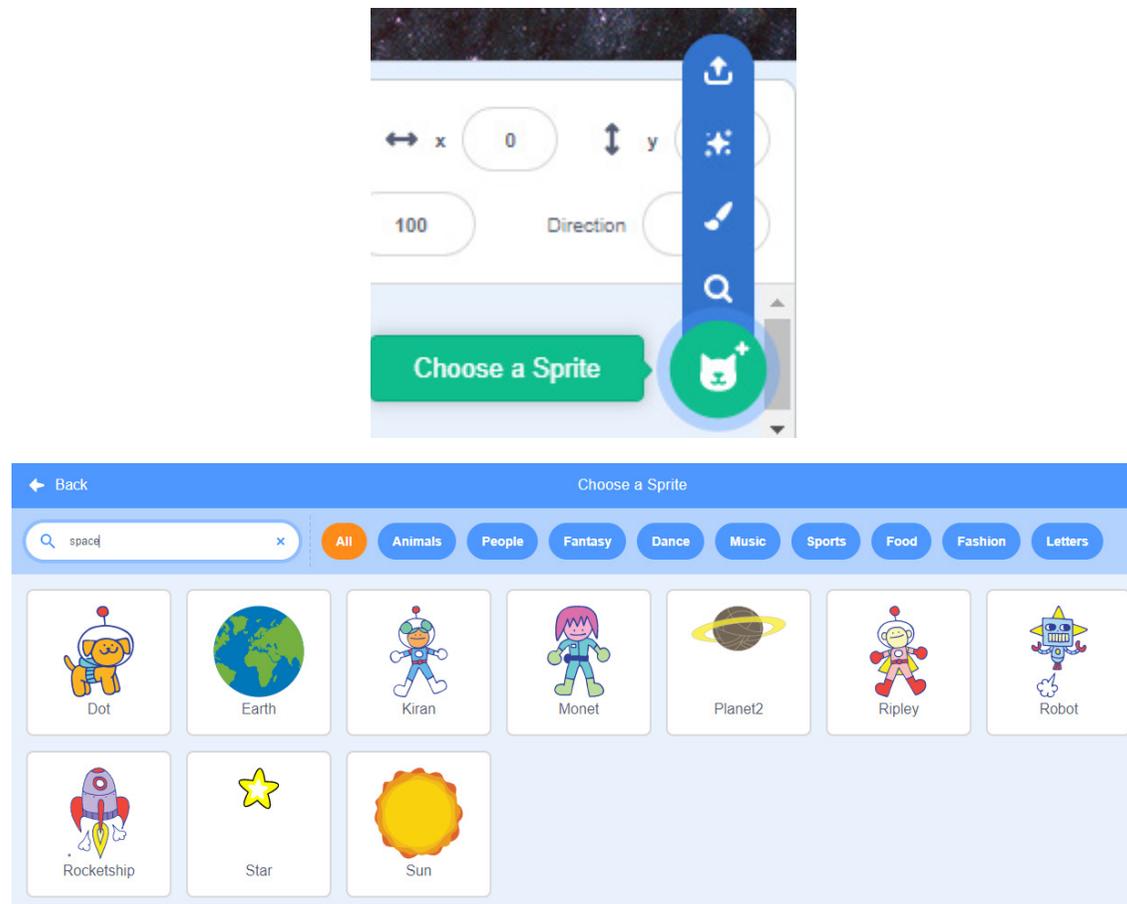
1.2 Illustration it on your computer in a convenient place because we will need it a bit later.



3.The spaceship

2.1 Choose the object to be programmed from the library; this will be your rocket. In the library you will find a selection of space objects (and many others that are not but might be).

2.2 Illustration



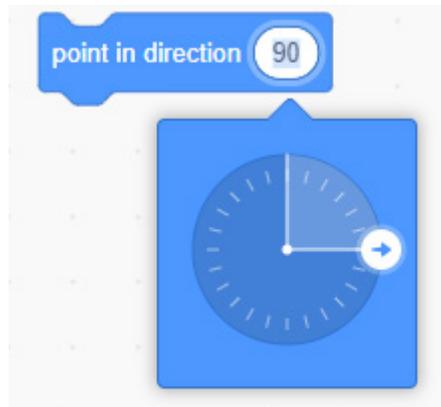
4. Take control...

and program the movement of the object.

4.1 Use the when __ key pressed block to assign a key to each movement of the rocket. You will need: up, down, left and right.



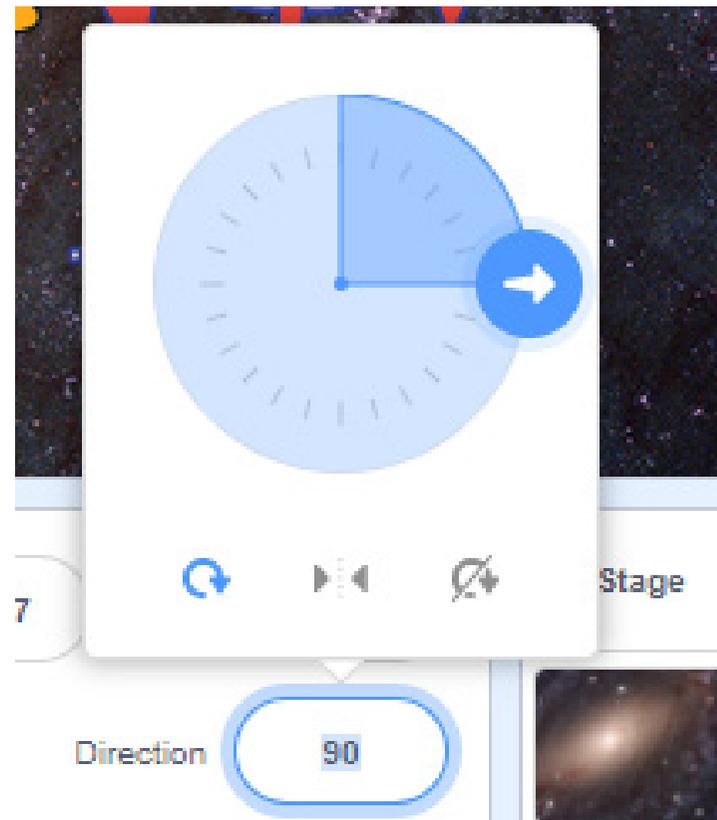
4.2 Then use the point in direction block to indicate in which direction you want the object to move.



4.3 Finally, you will need to tell the ship how much to move, which you will do by using the move _ steps block.

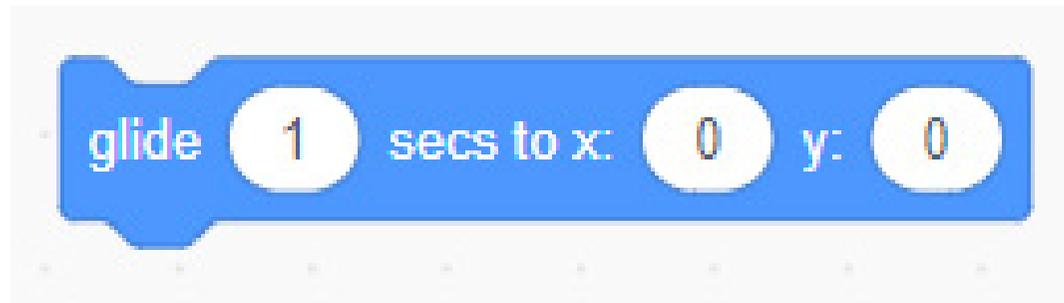


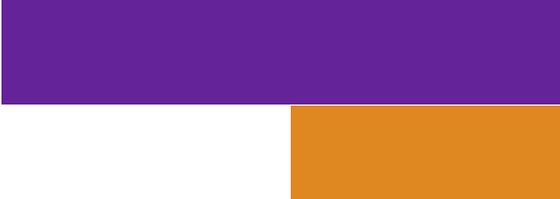
4.4. Does the spacecraft spin when it is travelling through space? Lock the object's spin to prevent the object from spinning in space.



5. Autopilot

The crew has asked us to make their mission easier by programming an autopilot to let them rest. Assign two keys to program take-off and landing and use the glide block to move the spacecraft to a specific place in space.





6. Play and create!

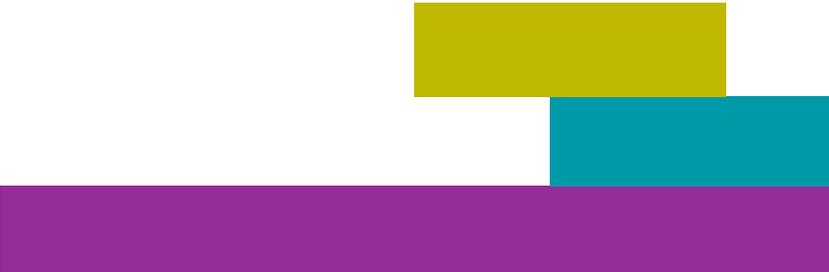
What other objects could you add to your video game? Think that space is full of objects you might encounter on the journey to Mars. This is a good opportunity to include them and explore the *Motion* group blocks. You can also add sounds.





Activities

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1. Extends programming

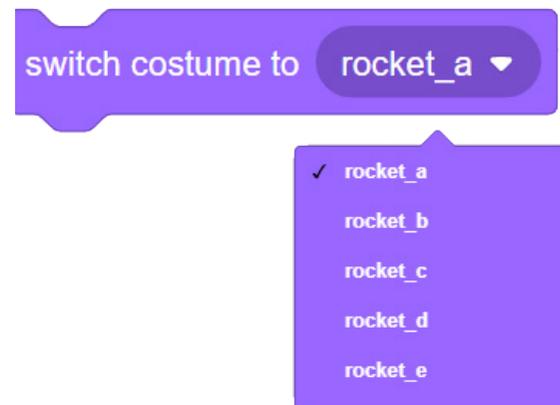
Here are some programming challenges that require you to be quick-witted and creative. Once you have overcome them, your video game will be much more interesting.

Challenge 1. Improve your rocket

Did you know that the first space rockets were launched in the 1950s? Since then, they have evolved a lot. It's time your program design did too.

In the Costumes tab, add more details to your design such as thrusters, windows, navigation antennas, and other things.

Use the change costume blocks with the ones you have already programmed and change the appearance of the rocket when you use different movement keys.





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