For 5 to 7 year olds

Context

Robots can do wonderful things but only when programmed to do so. Robots help astronauts and scientists to safely gather information that can then help to prepare space missions. The European Space Agency's (ESA) new robotic rover Rosalind Franklin will explore Mars and send back data vital for human exploration in the future. The rover will drive 70m across the Martian surface per Martian day and carry out planned science experiments. The rover will operate for at least seven months and drive 4km after landing. It is designed to navigate by itself using navigation software. In this activity, the children are introduced to robots through story and video; they become human robots to complete a challenge involving simple programming and teamwork and draw a robot following spoken instructions.

National curriculum links

Computing:
- Know what an algorithm is
- Know that robots use computer programs
- Know that programs need to have precise instructions

Maths:
- Use the language of position, direction and movement

Resources
- Activity sheet 1
- Sand
- Small bucket or container
- Stickers, tape or chalk
- Scarf or blindfold
- Small whiteboards
- Felt tips

### Lesson starter

Watch the short video clip showing an introduction to the film 'The Iron Giant': www.youtube.com/watch?time_continue=52&v=JgjmFBX34zc Who is the Iron Giant? What is a robot? Do you know of any robots that help us?

Here is an example of a robot on Mars. Show a rover navigating across the Martian surface eg NASA's Curiosity rover moving independently and taking samples of Mars soil. Here is the rover's eye view of driving, scooping and drilling during Curiosity's first year on Mars, August 2012 to July 2013: www.youtube.com/watch?v=8Alq08Poqb0

Explain that a new robot rover called Rosalind Franklin is being tested before being sent to Mars: www.youtube.com/watch?v=2-kLyxhwSn0

Robots can move independently and do a lot of tasks using their computers. However, these computers must first be programmed by humans.

The Iron Giant

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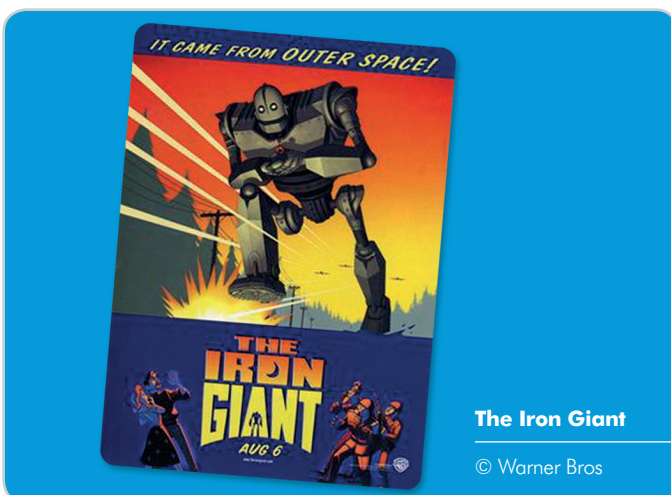
Main activity

Explain that today they are going to program human robots moving across a pretend Martian terrain, searching for samples of Martian soil. They must give clear instructions to the robots. The human robots can only move forwards and turn left or right; they can also only move one step at a time. The robots must collect and return the sample of Mars soil.

The class stands in a circle around a space marked out in squares using tape or chalk. Demonstrate using a blindfolded volunteer. Place the sample of Mars soil in one of the squares. Move the blindfolded volunteer so that they are facing away from the sample. Ask members of the class to take turns to give directions to their human robot. Eg turn right, forward three, turn left. Divide the class into teams. Each team has one blindfolded volunteer to act as a human rover. Place the sample on the grid. The human rover can only move forwards one square at a time. Teams take turns to give clear directions to their human rover until the sample is collected and returned.

The Rosalind Franklin Rover

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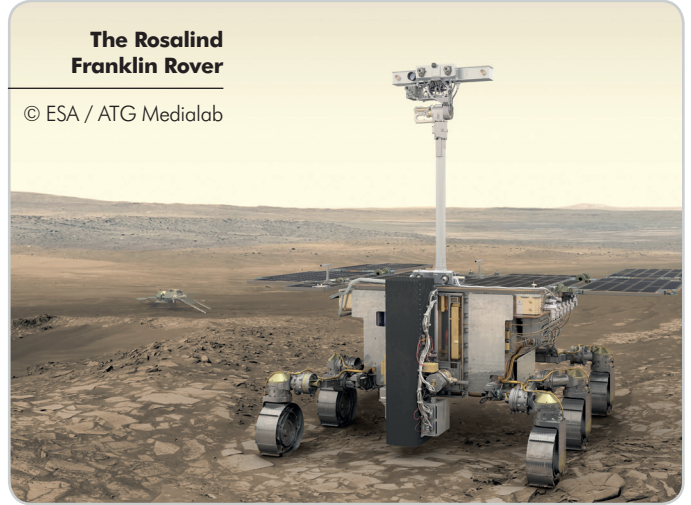
Further activities

- Draw a route for a robot to follow on Mars. Then create a set of simple instructions for the robot to navigate the route. Use a toy figure for the robot. Test out your algorithm with a partner.

- Design and build a robotic hand or arm that will lift a small object.

- The Iron Man was made from metal and ate metal. Can you name any objects made from metal and plan a tasty meal for him?

Plenary

Discuss their experience. Did they find the task easy or difficult to do? Explain why.

Space rovers are robots that have to be programmed very carefully. We call these instructions 'algorithms'. What might happen if the wrong instructions are put into the rover's computer?

End the session by giving the children a robot-drawing task, following an algorithm read out by you (Activity sheet 1.) Are the drawings the same? Why not? How could we improve our algorithm?

STEM Vocabulary

Robot	Turn
Direction	Left
Program	Right
Forward	

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Suggested algorithm (detailed instructions) for drawing a robot with an example of a robot drawing.

Draw a circle for a head

Draw four little eyes

Add a triangle hat

Draw a big square for a body

Add six arms

Draw two long rectangles for legs

Add two small squares for feet

Give the robot a happy smile

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