

Design a rover

UK Space Agency Resources | Scouts |



Did you know?

There are a lot of different types of Space missions. Many of these involve launching robots into space. Equipped with scientific instruments to help us gather data more safely and cheaply than we would be able to using human explorers alone. Robots can help us to retrieve important insights about the other planets, especially if they are far away.

Below is a list of former and current space missions the UK has been involved in:

- Curiosity Rover
- Beagle 2
- ExoMars Rover
- Mars Express Orbiter
- James Webb Space Telescope and MIRI
- ExoMars Trace Gas Orbiter

More information can be found at scouts.org/ukspaceagency

What is a rover?

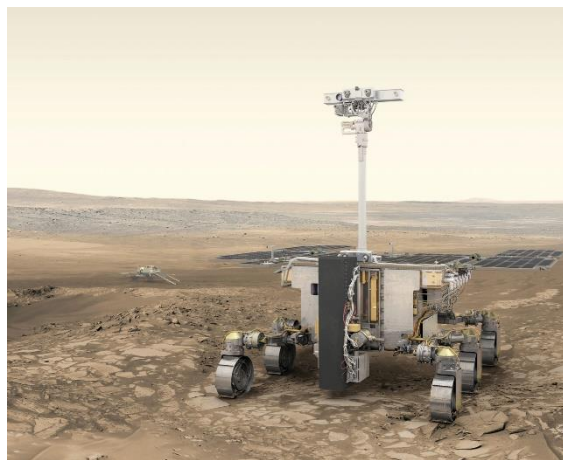
A rover is a specialised space vehicle, usually designed to land on a planet's surface, where it will explore the environment, collect data and feed the information back to us. Each rover will have specialist instruments and equipment onboard to allow it to do its job.

Time needed: 60 minutes

Equipment

paper.....
pens.....
rulers.....

This activity can be completed towards requirement 6 of the badge



Above: Artist impression of Mars Rover
Source: Airbus UK



Above: Part of PanCam, a camera designed for the Mars Rover which is being built in the UK. The filter wheel in front of it can move. This allows the machine to take pictures of Mars, using the different filters to allow different things to be seen.
Source: MSSSL

Instructions

1

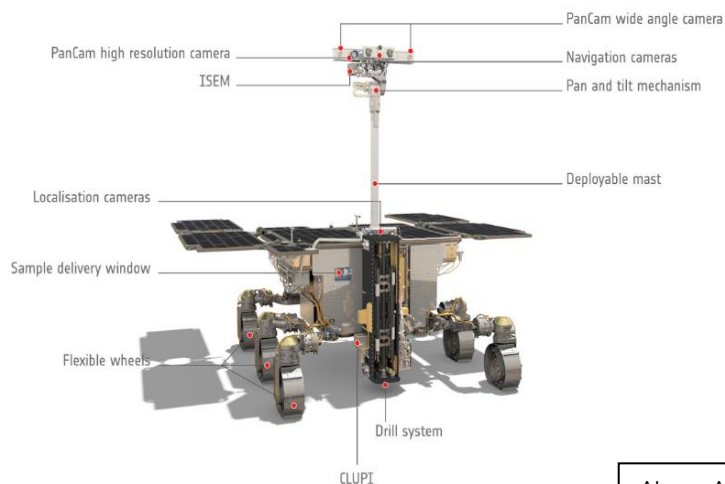
Research a current space mission together. You could discuss it as a whole group, split up into smaller groups, or ask Scouts to share information about a mission they have already researched at home.

2

Discuss what rovers are. What are they used for? How might they be useful to those who want to learn more about other planets? Information and images of the Mars rover are provided for reference.

3

Ask Scouts which planet they would most like to send a rover to and why. What would they most like to see and learn about? What sort of data would the rover collect?



Above: Artist impression of the Mars Rover, showing the instruments that help it to perform properly.
Source: Airbus UK

4

Split the Scouts into two groups. Group 1 will be designing the instruments for a rover that will soon be sent to space to collect data from a planet. What might these instruments look like? What sort of jobs will they need to perform? Group 2 will be designing the rover itself. They should consider the challenges of landing a rover on a planet. For example, ask them to think about what the terrain of the planet might be like, and how it will differ from the conditions on Earth. Is the planet hot or cold? Is there a risk that radiation could damage the rover? How can they work together to build something strong and durable?

5

Both groups are going to build a model of their designs next week. Ask them to identify which material they are going to collect in order to do this.

6

Bring both groups back together to share their ideas with each other.

TIPS FOR LEADERS

Your Scouts can have a look at the partner page to find out more information about specific space missions. Visit: [Scouts.org.uk/spaceagency](https://www.scouts.org.uk/spaceagency)

Tell your Scouts about the types of instruments that can be found on a rover by looking at the examples overleaf.

UK SPACE AGENCY Resources | Scouts |

Tips for leaders

Did you know?

What types of Instruments can you find on a rover?_

The instruments are often called payloads. The types of instruments on board will vary, depending on what aims of the mission are and the nature of the information to be obtained. Below are two examples of the instruments found onboard two space mission rovers.

1. Curiosity Rover: the instruments onboard were designed to gather information, in this case, about the environmental conditions on Mars, such as the atmosphere and the geology. There are various cameras, radiation detectors, environmental detectors and atmospheric sensors onboard to do this.
2. James Webb Space Telescope – there will be four science instruments onboard, contained within the Integrated Science Instrument Module (ISIM). These are:
 - a) Near infrared camera – as the telescope’s primary imager, this specialist camera is able to detect light from the earliest stars and galaxies in the process of formation.
 - b) Near infrared spectrograph – used to disperse light from an object into a spectrum. Analysing the spectrum can tell us about the physical properties of the object, such as the temperature, mass and chemical composition.
 - c) Mid-infrared Instrument – (MIRI) – this is both a camera and a spectrograph it will allow distant galaxies, newly forming stars and faintly visible comets to be seen.
 - d) Fine guidance sensor/ near infrared imager and slitless spectrograph – the fine guidance sensor allows the telescope to point precisely, while the near infrared imager and spectrograph are used to investigate various things such as first light detection.