

ACTIVITY 4.1 TEAM WORK

From the Chapter Four of the Mission Mars Diary

marsdiary.org/activities/team-work

LEARNING LEVEL

KS2, P5-7, Y4-6

CURRICULUM LINKS & DIFFERENTIATION IDEAS

View detailed curriculum links for England, Scotland, Northern Ireland and Wales in the Teacher Toolkit, plus differentiation ideas for your region and year level.

marsdiary.org/resources/#teacher-toolkit

TEAM WORK

Your rover has located some important Mars rock samples but it needs your help to reach them. This will take careful planning and team work between you and your robotic friend.

In Peter McCowan, a robotics expert, help your rover locate the Mars rocks by plotting its path to the centre of the maze. Then create a set of commands to programme your rover to follow the path. The first five commands are shown, can you work out the rest?

Start here

Commands available: \leftarrow \rightarrow \uparrow \downarrow

TIP The rover needs exactly 53 commands to reach the rocks.

Resources Required

- Smartphone or device for Zap code (optional – see Useful Links)
- Images from ExoMars rover
- Labelled diagram of the rover
- Blind folds
- Access to laptop (optional)
- Roamer (optional)

Background to this Activity

This activity encourages students to use their problem solving abilities as they try to find a way to pilot their rover through a maze using the provided commands.

ExoMars 2020 is an unmanned mission. No astronauts are travelling with the rover to Mars, or will be stationed on Mars to control it. This means that the rover will be programmed to operate almost autonomously, and will be controlled and monitored from ESA's Mission Control on Earth.

Students who followed Tim Peake's mission in 2015-16 may remember that while he was on the ISS, Tim controlled a test rover located at Airbus Defence and Space in Stevenage, England. This experiment involved Tim guiding the rover through a mock-Mars environment, to test whether we can operate robots while we are orbiting a planet. This activity gives students the opportunity to think about what is involved in navigating through uncharted territory in a harsh terrain.

Running the Activity

Explain to the children that the ExoMars rover combines human and machine, working together. The rover has to work autonomously on Mars but Mission Control need to be able to monitor and regulate its work from Earth. Show the children a detailed diagram of the ExoMars rover (see Useful Links), looking at its design and features

including how it moves on challenging terrain and communicates with Earth.

Set up a short assault course (in the hall if available). Split the children into pairs (blindfolding one person). Take it in turns to act as the controller and the rover. Alternatively in the classroom, children could explain simple tasks – like a drawing a simple pattern – to a blindfolded partner. Discuss with the children how easy or difficult is it to control something remotely.

Questions for the Class

- How can the rover communicate with Earth?
- What features of the ExoMars rover's design enables it to function on Mars?
- How does it navigate the difficult rocky terrain?
- How does Mission Control guide the ExoMars rover?

Additional Challenges / Extension Activities

Design your own maze for a partner to complete.

Use a Qbot or roamer. Create a maze or course and program the roamer to complete it. Alternatively, use Purple Mash (where available) to design a 3D interactive maze to complete on screen.

Write a diary entry 'A day in the life of the ExoMars rover'.

Make a 3D Martian landscape including model ExoMars rover.

Ideas for Differentiation

Lower:

- Describe the journey in terms of turns

Upper:

- Describe using compass points
- Introduce grid references to describe journey through the maze

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Fin Peter McCowan, a robotics expert, helps your rover locate the Mars rocks by plotting its path to the centre of the maze. Then create a set of commands to programme your rover to follow the path. The first five commands are shown, can you work out the rest?

Zap for the answers!

HINT: The rover needs exactly 53 commands to reach the rocks.

Useful Links

Zappar Content: Download or view the Zappar content for this activity on its webpage (URL to the left) or access it via the Zap.

Diagram of the ExoMars rover <https://www.youtube.com/watch?v=6C1V1JHHOJ0>

Article about Tim Peake controlling ‘Bridget’ the rover: http://www.esa.int/ESA_in_your_country/United_Kingdom/ESA_astronaut_Tim_Peake_controls_rover_from_space

Clip of Tim guiding rover through obstacle test site from the ISS: <https://www.youtube.com/watch?v=vzxdYrQU8>

Clip about ExoMars testing site in Stevenage: <https://www.youtube.com/watch?v=wx9VrZDnWag>

ZAP! Students can independently access multimedia resources using the Zappar mobile/tablet app. See Zappar instructions at the link below and note that the mobile/tablet will need to be on a WIFI connection:
marsdiary.org/resources/#teacher-toolkit

If you don’t have access to the internet in the classroom, all Zap code content is available to download on the activity’s web page (see link to the left) as a PowerPoint presentation or as bundles of images.

**GET ZAPPAR
 ZAP THE CODE**

zappar

Download on the App Store

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Find more great space-themed STEM resources at <https://www.stem.org.uk/esero>