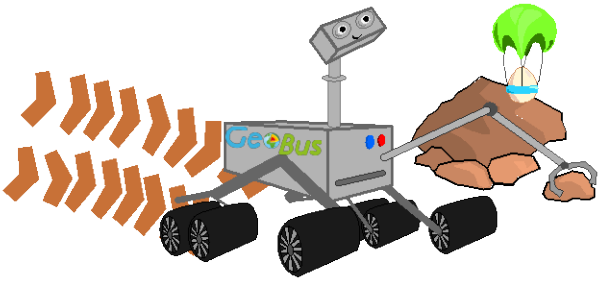
Landing a Rover

Teacher Notes

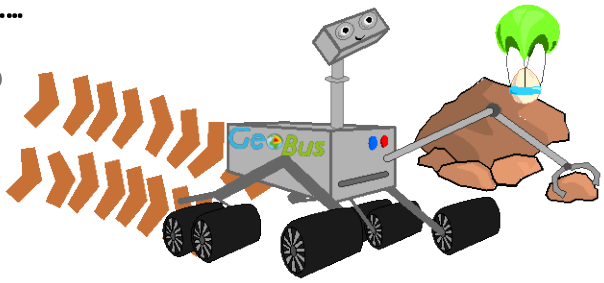


Activity title:	Exploring Mars: Landing a Rover
Target Age Group:	Upper Primary – Lower Secondary (approximately 10–14 years)
Preparation:	Collect required materials ('junk/recycling' for building landing pods), print student worksheet
Activity Description:	Working as a landing team, pupils use household items to create a landing pod, designed to protect delicate scientific equipment (represented by an egg). Teams then test their designs and compete to see which allows the safest landing. The worksheet includes an evaluation/reflection exercise to help pupils consider the strengths and weaknesses of their design.
Time:	5mins introduction/preparation, 25mins activity, 5-10mins testing, 10mins reflection **Total: 50minutes**
Learning Outcomes:	Understand the steps/considerations involved in landing a rover on Mars Understand the considerations necessary to ensure a delicate item lands safely from a height (i.e. reducing velocity and force of impact) Evaluate where improvements could be made on a design and process
Materials Needed:	Sufficient newspaper, straws, tape, plastic cups, string, plastic shopping bags + other recycling items for each group to build with 1 egg per group
Student Organisation:	This activity works best in small groups (4-6 pupils working as a team)

Instructions:	Discuss some of the considerations when trying to safely land breakable scientific equipment on Mars (slowing velocity, cushioning impact), allowing the class – or groups – to brainstorm ideas. Show pupils the materials they will have available to create their landing pod, then allow them some time to design. Hand out materials and allow groups to build their landing pod Test designs by adding the egg and dropping from a measured height – measure how extensively the egg has cracked in each case, dropping from successively higher heights if multiple designs are successful Encourage pupils to reflect on the strengths/weaknesses of their design
Tip:	To avoid/reduce mess, use hard boiled eggs – or the chocolate version!

Name: …… Date ……

Landing a Rover On Mars



Draw a sketch of your landing pod design in the space below:

Make a note of the materials you will need:

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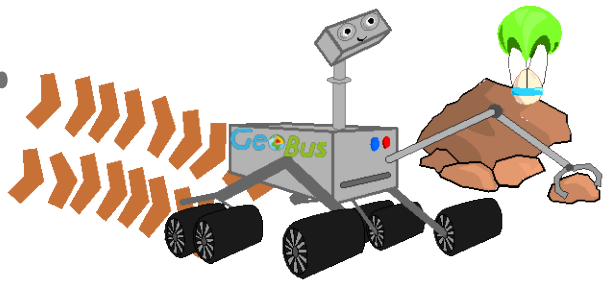
Landing a Rover On Mars



Reflection is a very important part of the design process – understanding and thinking about what has gone wrong is the best way to make sure that a future attempt is more successful. This is particularly true with planning and designing Mars missions because of the time and money involved in the process. Scientists have studied all of the past landings on Mars (some have been successful, some have failed!) and use this knowledge in future planning – for example in the design of the European Space Agency ExoMars 2020 lander.

Reflection Questions:

1. What was the best feature of your landing pod?

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2. Did your landing pod successfully protect its cargo? Explain.

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3. If you had the chance to re-design another landing pod, what changes would you make?

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Extension: *When landing teams are planning a rover mission, they also need to choose a safe place for the rover to land where the terrain is consistent and without too many obstacles. Consider what things they might have to consider and what design modifications they might have to make.*