

Teaching notes

- No human has ever visited Mars (updated 2022!) – it is a common misconception that astronauts have visited Mars.
- This activity is sometimes done with marshmallow astronauts. You may prefer to use a small wooden block about 3x3x3cm to represent the astronaut. In fact you can use anything that will fall out and tumble away when you drop a plain disposable cup from knee-height with the astronaut inside.

STEM Challenge Project

Mars lander
challenge



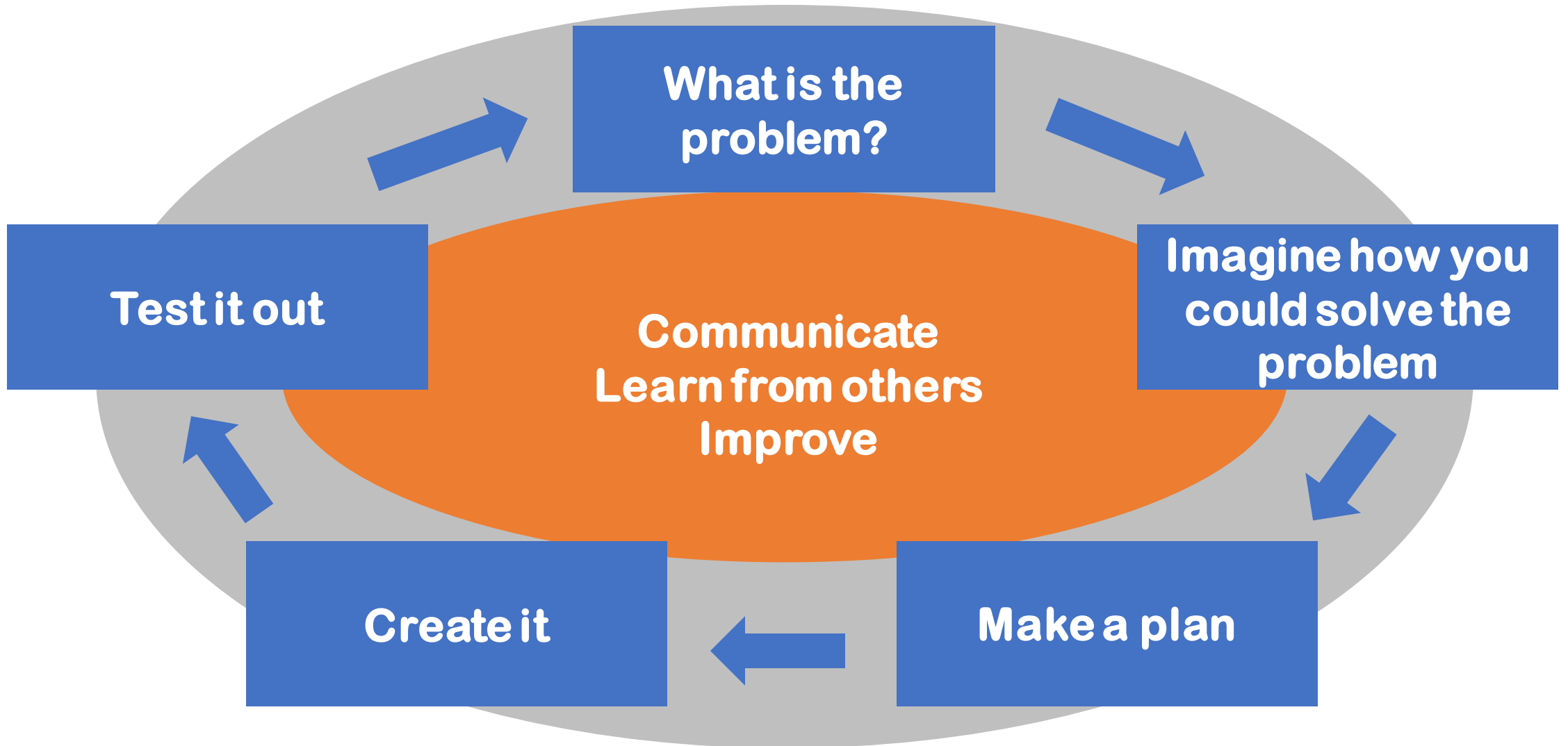
Learning Intentions

- To build up our skills such as **teamwork** and **communication**
- To use the **engineering design process** to solve a problem

How will you be successful today?

- What does successful **teamwork** look like?
- What can you do to be a good **communicator**?

The Engineering Design Process



Mars lander challenge

- You are a space engineer working on getting astronauts safely to Mars.
- The spacecraft engineers have already built the main part of the spacecraft (the cup).
- You have been given the task of making sure that the spacecraft lands safely on Mars. You are only allowed to attach things to the **outside** of the spacecraft.
- You must make sure that the astronaut is safe.



Mars lander challenge

- What are the problems with this task?
- What can you predict being difficult?
- **Imagine** how you could solve each problem.



STEM Challenge

- Design and build a **Mars lander** which can land safely.
 - You must make sure the cube does not fall out or bounce out of the cup.
 - You are not allowed to stick the cube down or strap it in, or cover the cup.
 - You are only allowed to stick things to the outside of the spacecraft, at the bottom.
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- You will be given a choice of materials:
 - **Plastic cup with wooden cube**
 - **A4 paper – max 1**
 - **Straws – max 5**
 - **Card scraps – max 2**
 - **Sellotape**
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- Test your Mars lander by dropping it from different heights and try to improve it. Start at knee height. Only drop on to the **floor**.





What can you learn from others?

- **Learning loop** – look at other people’s work.
- How did other groups tackle the STEM challenge?
- Which ideas did you see that were successful?
- What did you see that hadn’t worked, or that you wouldn’t use?

STEM Challenge Project

Mars lander challenge



Part 2

Learning Intentions

- To build up our skills such as **teamwork** and **communication**
- To use the **engineering design process** to solve a problem

How will you be successful today?

- What does successful **teamwork** look like?
- What can you do to be a good **communicator**?



What did we learn last lesson?

- How did other groups tackle the STEM challenge?
- Which ideas did you see that were successful?
- What did you see that hadn't worked, or that you wouldn't use?

Shock absorbers

- Shock absorbers reduce some of the forces felt by the astronaut when the spacecraft lands



Spring



Concertina – we can make one out of card



Cushion – made from a soft, squashable material

STEM Challenge

- Design and build a **Mars lander** which can land safely using shock absorbers.
- You must make sure the cube does not fall out or bounce out of the cup.
- You are not allowed to stick the cube down or strap it in, or cover the cup.
- You are only allowed to stick things to the outside of the spacecraft, at the bottom.
- You will be given a choice of materials:
 - **Plastic cup with wooden cube**
 - **A6 card – max 4**
 - **Straws – max 4**
 - **Cotton wool – max 1 piece**
 - **Sellotape**
- Test your Mars lander by dropping it from different heights and try to improve it. Start at knee height. Only drop on to the **floor**.



Evaluation

- Discuss how your team approached the STEM challenge today
 - What did you learn today?
 - Which skills did you develop?
- How could you improve your design?
- Can you think of another similar STEM challenge you could set yourself to try at home?

Mars lander clips

- <http://no-ads-youtube.com/video/heli/how-to-get-to-mars-very-cool-hd?v=XRCIzZHpFtY> 6m32 – first level. This shows Spirit, landed 2004
- https://www.youtube.com/watch?time_continue=13&v=Ki_Af_o9Q9_s 5m07 – second level. This shows Curiosity, landed 2012
- https://www.nasa.gov/pdf/418011main_OTM_Touchdown.pdf - original STEM activity material