Teaching notes

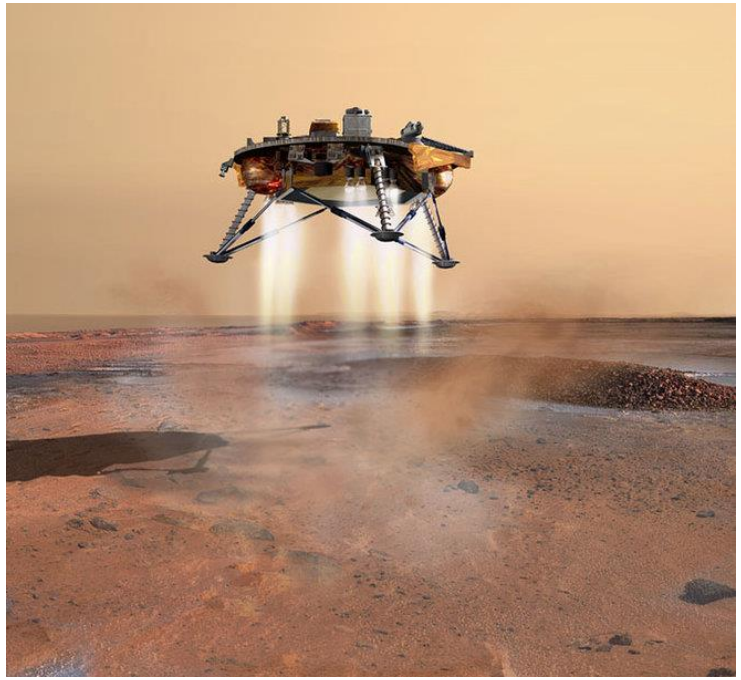
- This revisits and then progresses the Mars Landers STEM Challenge from First Level Year 2.

- 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**:
  - Teamwork
  - Communication
  - Creativity
  - Critical Thinking
  - Resilience

- To use the **engineering design process** to solve a problem

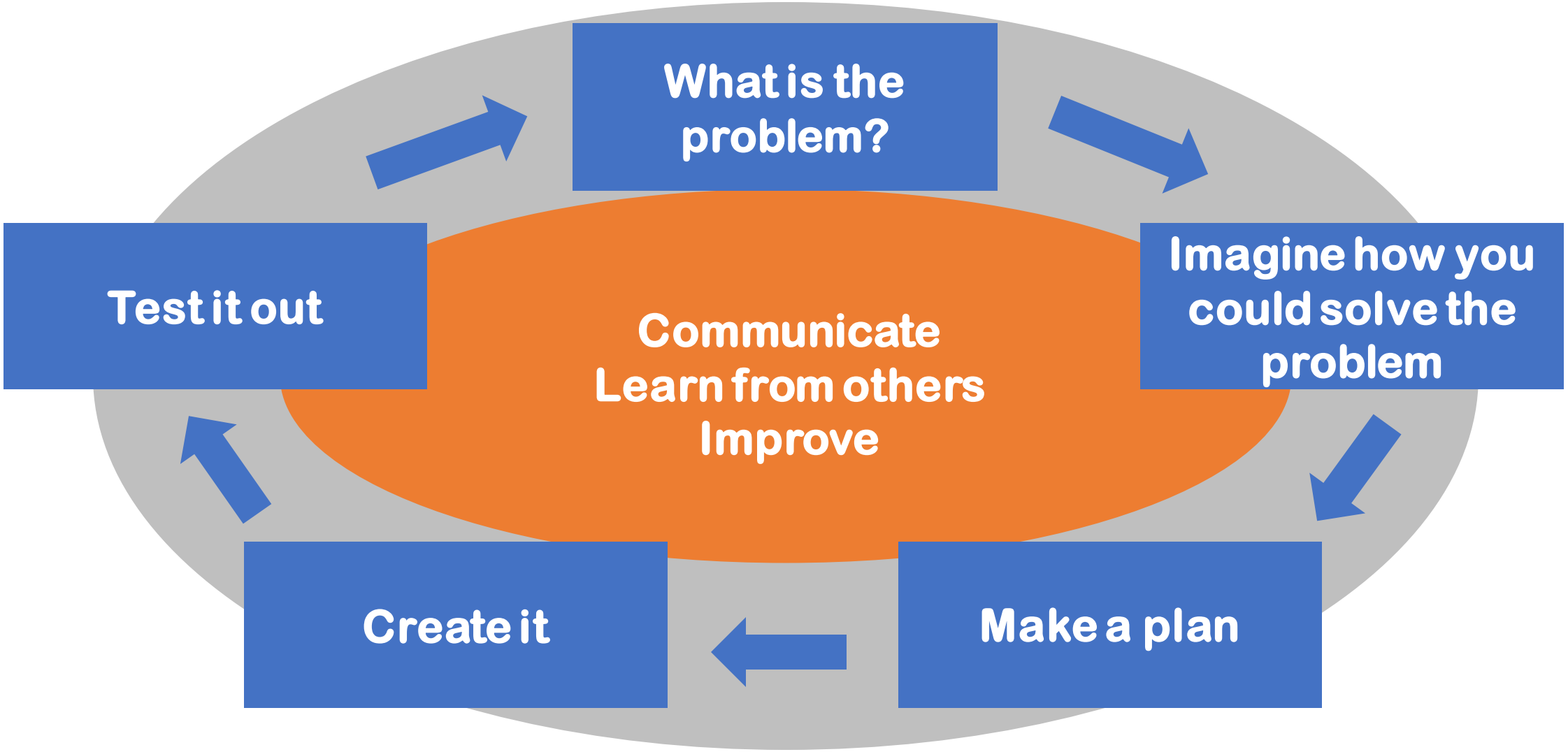
What are your success criteria for this project?

- I would like to get better at
  - teamwork
  - communication
  - creativity
  - critical thinking
  - resilience

- How can you get better at this? Write down some strategies for yourself.

- At the end you will decide if you have been successful.

The Engineering Design Process



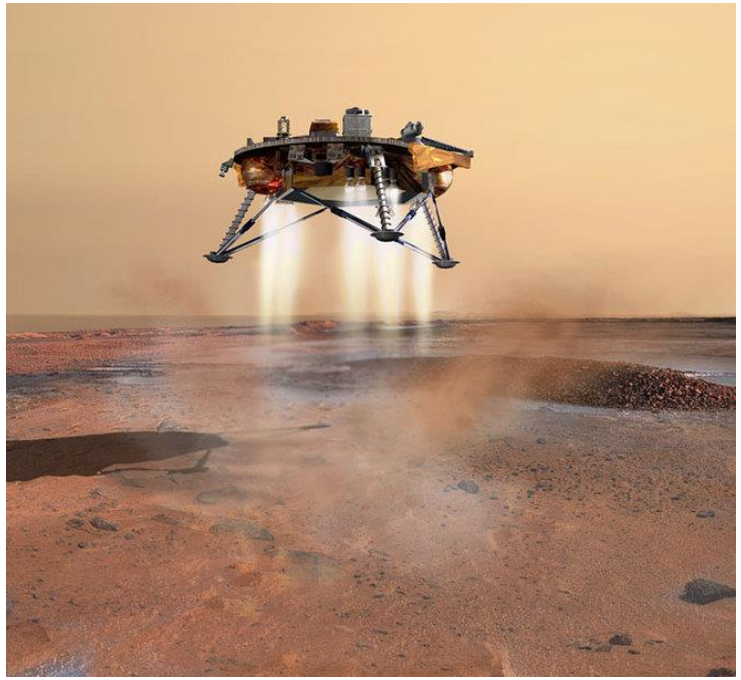
Mars lander clips

- 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_o9Q9s 5m07 – second level. This shows Curiosity, landed 2012

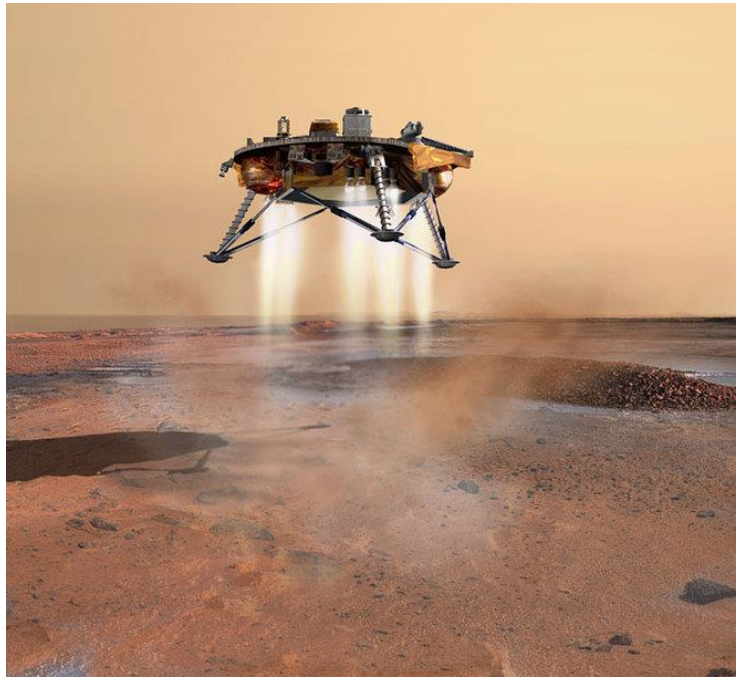
Mars lander challenge

- 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 this problem.



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.
- 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.

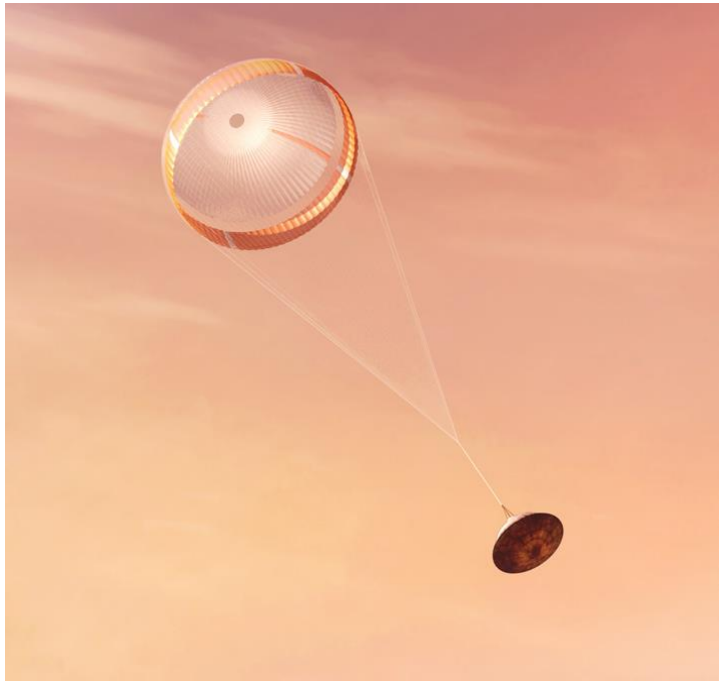
- You will be given a choice of materials:
  - **Plastic cup with wooden cube**
  - **A6 card – max 4**
  - **Straws – max 4**
  - **Cotton wool – max 1 piece**
  - **Sellotape**

- 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**.

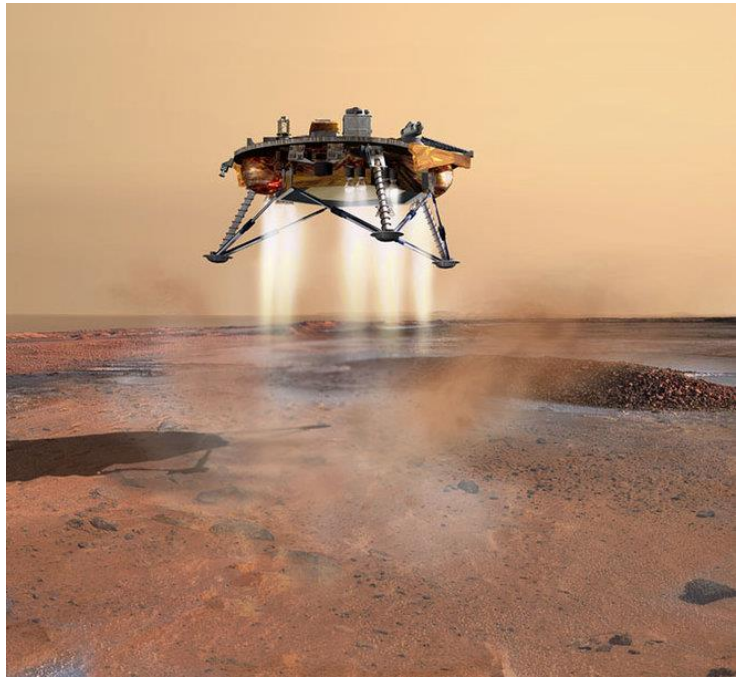
What can you learn from others?

- **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**:
  - Teamwork
  - Communication
  - Creativity
  - Critical Thinking
  - Resilience

- To use the **engineering design process** to solve a problem

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?

STEM Challenge

- Design and build a **Mars lander** which can land safely using shock absorbers and a parachute.
- You must make sure the cube does not fall out or bounce out.
- 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

- 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**
  - **Bubble wrap – max 1 piece**
  - **Plastic bag – max 1**
  - **Bin bag pieces – max 1**
  - **String**
  - **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**.

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?

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?