

Lesson Plan: Lunar Landers

Duration: 35-45 mins

Learning objectives:

1. Be able to explain why lunar craft need to be able to make gentle landings
2. Follow the engineering process - design, build, test, amend
3. Understand the properties of materials and select accordingly

Links to Curriculum:

- TY Project - a more advanced version
- JC Science - Earth and Space, The Nature of Science

Activity	Procedure	Materials	Time
Introduction to Moon landings - class discussion	<ul style="list-style-type: none"> ● Pose questions such as what do you know about the first moon landing? Who was there? What was the spacecraft called? ● Show gifs of first moon landing 	PowerPoint presentation	5
Class discussion about how to build a lunar lander	<ul style="list-style-type: none"> ● What needs to be taken into account when trying to build a lunar lander? <ul style="list-style-type: none"> ○ No atmosphere - how to slow down? ○ Environment ○ Safety of astronauts ○ No damage to equipment ○ Soft landing ● How do we land safely when we jump off the ground? <ul style="list-style-type: none"> ○ Have students try it and discover how their knees provide a safe, bouncy landing ● Ask how this spring mechanism we use in our legs could be applied to a lunar lander 		5
Building the lunar module	<ul style="list-style-type: none"> ● Start by building the lunar module where the astronauts will be ● Cut up into a toilet roll tube about a third of the way, all the way around, to make a 'skirt' out of one end of the tube ● Flatten out the cardboard skirt and tape it onto the flat cardboard piece ● Place an astronaut inside the toilet roll tube. This is the lunar module 	Toilet roll tube, piece of flat cardboard about A5 size, 'astronauts' (game pieces/ Lego / etc), scissors	5-10

Engineering process - adding legs	<ul style="list-style-type: none"> ● Set the students a challenge - to design some sort of legs for this lunar module that will allow the spacecraft to land softly, not get damaged, and not let the astronaut fall out, from a drop of, say, 30 cm ● With the materials available to the students, allow them to try out different designs for their legs - reminding them of the spring mechanism previously discussed ● Suggest ways to make a spring from cardboard if necessary - eg: concertina strips of cardboard or circles of cardboard ● Show examples from PowerPoint for inspiration or problem solving if necessary ● Extensions to this activity: <ul style="list-style-type: none"> ○ Increase the drop height ○ Change the landing position - the Moon isn't a nice flat surface like the floor, what would happen if you had to land on something lumpier such as your shoes? ○ Add features to the spacecraft - a name, seatbelts, safety equipment, design details 	Plenty of cardboard of different lengths / widths / stiffness, tape, scissors, ruler, PowerPoint, markers (optional)	15-20
Classroom discussion - explain your design	<ul style="list-style-type: none"> ● Have students explain their design and its features and demonstrate how it works ● Have students walk through their different ideas / failed attempts that led them to this working prototype 		5-10

Additional resources:

Video explaining the design process of the first lunar landing and other info on Apollo 11
<https://www.youtube.com/watch?v=oX8-IXdABuc>

Link to source of activity:

<https://www.stem.org.uk/system/files/elibrary-resources/2019/06/Mission%20to%20the%20Moon.pdf>