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| **Make a terrarium to grow grass on the Moon** | | |
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| Growing grass to use in a football pitch on the moon | | |
| **Subject(s):** Design & Technology, Engineering, Science  **Approx time:** 35-65 minutes + growing time |  | **Key words / Topics:**   * atmosphere * charcoal * football * freezing * germinate * grass * moon * sterilise * terrarium |
| **Stay safe**  Whether you are a scientist researching a new medicine or an engineer solving climate change, safety always comes first. An adult must always be around and supervising when doing this activity. You are responsible for:  • ensuring that any equipment used for this activity is in good working condition  • behaving sensibly and following any safety instructions so as not to hurt or injure yourself or others  Please note that in the absence of any negligence or other breach of duty by us, this activity is carried out at your own risk. It is important to take extra care at the stages marked with this symbol: ⚠ | | |
| **Suggested Learning Outcomes** |  |  |
| * To understand the concept of living organisms surviving on the Moon * To be able to set up an experiment to grow grass in a terrarium * To be able to evaluate the findings of the experiment | | |
| **Introduction** |  |  |
| This is one of a series of resources that are designed to allow learners to use the theme of football on the moon to develop their knowledge and skills in Science, Design & Technology and Engineering. This resource focusses on creating a terrarium to show how grass could be grown on the moon, therefore overcoming some of the external temperature issues of growing grass in this environment. | | |
| **Purpose of this activity**  In this activity learners will make use of the theme of football on the moon to make an experiment of terrarium, so that grass can be grown for a lunar football game.  This could be used as a one-off main lesson activity to develop practical/experimental skills in Science and Engineering. Alternatively, it could be used as a part of a wider scheme of learning focussing on the engineering challenges associated with living on the moon. | | |
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| **Activity** |  | | **Teacher notes** |
| **Introduction and design brief (5-10 minutes)**  Teacher to introduce the activity and the theme of the travelling to the moon. Teacher to use the presentation (slides 3-5) to introduce and discuss the challenge with learners.  **Cleaning the jar (5-10 minutes)**  Learners to clean and sterilise the jar thoroughly to eliminate any dirt or bacteria.  This step could be completed in advance by the teacher. In this case the teacher could discuss the concept and purpose of sterilisation.  **Teacher demonstration 1 and practical activity (10-20 minutes)**  Teacher to demonstrate filling the jar with charcoal, showing how to pour/fill effectively and tidily without making a mess and wasting resources. Then add a layer of stones – discussion to take place on what the purpose of using the Charcoal (cleaning the water) and stones (filtering the water).  Learners complete first part of this task.  **Teacher demonstration 2 and practical activity (10-20 minutes)**  Teacher to show how to then fill with soil to the level required, sprinkle grass seed and then cover with soil again. Learners complete this part of the activity and water lightly under guidance of the teacher. Learners to fasten the lid on.  **Place in sunlight (5 minutes + growing time)**  Place on sunny windowsill and allow to grow – discussion then as to why this is important. |  | | **Introduction**  Discuss the challenge with learners.  Explain that the first moon landing was in 1969 by NASA – what progress have we made since then?  What would the challenges be with playing football on the moon? Explain the problems with growing grass for a football pitch on the moon.  Explain what is meant by a terrarium and how it could be used to grow grass for a football pitch – a good way of doing this is comparing it to an aquarium, but for grass rather than marine life.  **Demonstration**  Set up a system to clean safely the jars – sterilise if possible, in a controlled manner depending on classroom support and confidence.  Pre-mark jars for learners who will struggle with accuracy.  The use of a funnel or spoons to facilitate gentle and controlled working may make this activity more accurate and reduce the mess made.  **Labelling**  Label the jars with the names of the learners to avoid competition and confusion. |
| **Differentiation** |  | |  |
| **Basic** |  | | **Extension** |
| * Provide pre-measured amounts of materials. * Provide marked jar for learners to fill to. |  | | * Discuss and experiment with the effects of rotating the jars. What would happen if this didn’t take place? * Identify other plants that could be grown in the terrarium for use on the moon e.g. food plants. |
| **Resources** |  | | **Required files** icon-docicon-pdficon-ppt |
| * Clean jam jar and lid * Charcoal * Stones * Soil * Grass seed |  | | icon-ppt Presentation – Make a terrarium to grow grass on the Moon |
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| **Additional websites** | | | |
| * **NASA scientists grow plants in lunar soil:** <https://www.nasa.gov/feature/biological-physical/scientists-grow-plants-in-soil-from-the-moon> * **Temperature on the moon:** <https://www.space.com/18175-moon-temperature.html> * **How does grass grow:** <https://www.youtube.com/watch?v=FjW1GVqcyKc> * **How grass works:** <https://home.howstuffworks.com/grass.htm#:~:text=At%20the%20base%20of%20the,the%20plant%20(the%20crown> * **Prezi – Football on the moon:** A slideshow explaining some of the issues with playing football on the moon. <https://prezi.com/wyf5demmfga2/football-on-the-moon/> * **YouTube – If the football World Cup was on the moon:** A fun video that could be used as an introduction to this activity. <https://www.youtube.com/watch?v=o5tD7eP8izE> | | | |
| **Related activities (to build a full lesson)** |  | |  |
| **Starters** (Options)   * Discuss what the temperatures on the moon and how this makes growing plants and grass difficult. | | **Plenary**   * Show and tell to the class in terms of what has grown. * Discuss problems encountered and look at why some experiments have worked/grown better than others. | |

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| **The Engineering Context** |
| * Travelling and potentially living on the moon presents all sorts of challenges for engineers to overcome. For example, how will we breathe, how will we cope with much lower gravity, how will we play sports and keep fit? How will we grow plants, grass and food? |

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| **Curriculum links** | |
| **England: National Curriculum**  Science   * Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. | **Northern Ireland Curriculum**  Science   * How place influences the nature of life – how place affects the plant and animal life that live there. |
| **Scotland: Curriculum for Excellence**  Craft, design, engineering and graphics   * I can extend my knowledge and understanding of engineering disciplines to create solution * TCH 2-12a | **Wales: National Curriculum**  Science   * All living things require specific conditions and resources to survive and they may have to compete with other organisms to do so. |

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| **Assessment opportunities** |
| * Formal teacher summative assessment of completed experiments (using annotated photos). * Self/peer assessment of completed outcomes. |