



Introduction

The Australian Virtual Astronaut (AVA) Challenge is a 9-step STEM design sprint based on challenges facing NASA's Artemis and the Australian space industry. AVA teams will choose from a set of four scenarios and design a solution presented in the form of either a 90-second video pitch or poster. A number of teams will then be selected to pitch their ideas at the Young Space Explorers event in Sydney. The goal of the AVA Challenge is to engage young people in a real space challenge and to inspire them to address the emerging challenges in space and on Earth.

Scenario 3: Home on the Moon



Aldrin Family Foundation

The [Aldrin Family Foundation](#) is a US-based not-for-profit organization that is creating the next generation of space leaders, entrepreneurs, and explorers. They offer STEAM-based educational tools, curriculum, and programs that excite and prepare the next generation to take on space. They create the game-changers of tomorrow – dedicated to making breakthrough discoveries and improving life on Earth..



The Mission Overview

Design a [Family Home Outpost \(FHO\)](#) on the Moon with Jim Christensen from the Aldrin Family Foundation. Students are asked to create a proposal for the design and construction of a Family Home Outpost to be constructed at a location of their choosing on the Moon. The FHO must provide a livable and sustainable habitat for a family and potential guests.



Choosing the best location for your outpost

- Research the six possible locations and choose one for your site. Consider the following: Range of temperature, Length of day and night, topography, lunar gravity, and science to be conducted.

Who is going with you to the Moon?

- Identify and briefly describe your family members, including pets, who you expect to be living with you on the Moon.

What do you need on the Moon?

- Conduct research to establish a baseline spreadsheet or chart of consumables your family uses in a week-long period. Consider the following: Oxygen, Water, Food and Energy (electricity and gas).
- Create a list of items and quantities you must have to survive and explain the source of each item.
- Define things you would like to have to make yourself and your family comfortable and productive.
- Conduct research to establish a baseline of waste your family produces in a week-long period. Consider the following: Carbon dioxide, wastewater, solid waste and paper.

What does your Family Home Outpost (FHO) look like?

- Create images and possible floor plans of your Family Home Outpost (FHO).
- Construct an architectural model of the selected FHO.

Communicate your results

- Produce a 90-second video or poster of your idea.



Age Divisions

The Australian Virtual Astronaut (AVA) Challenge is open to all students from Year 5 to Year 10. There are three age divisions for judging:

- Stage 3 – Years 5 and 6
- Stage 4 – Years 7 and 8
- Stage 5 – Years 9 and 10 (Eligible for Phase 2)



Mission Schedule

The Australian Virtual Astronaut (AVA) Challenge missions will be delivered by subject matter experts and will provide relevant information for the team to complete the challenge in a systematic way using the iSTEM Engineering Design Process as a guide.

Step-by-Step Schedule

Run these missions at your own pace. Use as little or as much of the AVA resources as needed.

- Mission 1: Introduction and Webinar
- Mission 2: Define
- Mission 3: Identify
- Mission 4: Brainstorm
- Mission 5: Design
- Mission 6: Prototype
- Mission 7: Evaluate
- Mission 8: Iterate
- Mission 9: Communicate

The culmination is submitting your pitch to be judged. Finalists will be invited to pitch at the Young Space Explorers event in Sydney



Phase 2: - Pitch Session

Teams in Year 9 or 10 will be eligible to be selected for Phase 2. In this phase teams will be given 3 minutes to pitch their idea to an expert panel at the Young Space Explorers event. If you cannot attend the face-to-face event, teams will be able to pitch to leaders from the space industry and venture capitalists virtually in order to be crowned the overall winners.

Team Deliverables

The team is to prepare a slide deck that will be presented to a panel of experts. The slide deck should:

- Identify the primary science objectives/goals to be solved;
- Show a graphical representation of the FHO design solution;
- Outline any science experiment(s);
- Identify the resource(s);
- Identify the team and why it is best to design the mission;
- Outline why this FHO should be chosen.

