Aerospace Engineering Challenges
Syllabus

Students are presented with a variety of engineering challenges that are required for a successful space mission. Through study of the various aspects of a lunar mission and completion of various engineering challenges, students are able to learn and reinforce the engineering process: Design, Test, Build and Modify. Students will tackle aerospace challenges such as rocket design, landers, rovers, water and air supply, and return to earth.

Week 1 – Rocket Design

- Students learn about rocket design by building a model rocket and start learning about forces on rockets.
- Each student builds a balloon powered rocket.

Week 2 – Water Recycling

- Water is required for drinking, washing and using the toilet. Astronauts cannot take enough water with them, so they need to recycle water.
- Each student builds their own water filtration system from a soda bottle, sand, gravel and other materials and learn about pH testing.

Week 3 – Landers

- Students learn that there is not much atmosphere, so parachutes are not an option for landing.
- Students design and build a lander out of various shock-absorbing materials and then test it by dropping their creations from different heights.

Week 4 – Rovers

- Students are introduced to the geology of the moon and Mars. They study the differences in vehicle design that enables travel on different planetary surfaces.
- Students build a rover that is able to move on a rocky surface.

Week 5 – Oxygen for EVA

- The atmosphere on the moon does not allow for human Extra-Vehicular Activity without a spacesuit and oxygen tanks.
- Students learn about the role of oxygen in the body, then design and carry out an experiment to determine how much oxygen they will need to perform different tasks on the lunar surface.

Week 6 – Retrieval System

- Students explore lunar rocks.
- Student learn how machines multiply forces, then design and build a mechanical crane for lifting rocks so we can take them back to the base.

Week 7 – Use of Robotics

- Students learn about the importance of unmanned exploration.
- Students make a model of a robotic hand.

Week 8– Return to Earth

- Students design and build their own parachute device from various materials to allow an egg to drop to the ground without breaking.

- Students review what was learned during the course.