

*Easily digestible Aerospace Principles revealed for K-12 Students and Educators. These lessons will be sent on a bi-weekly basis and allow grade-level focused learning. - AIAA STEM K-12 Committee*

## LIVING IN SPACE

Human spaceflight was one of the most singular and defining scientific endeavors of the 20<sup>th</sup> century, and lengthier human missions in space are vital to future human exploration and discovery. The questions of how we can live in space – how we can create suitable environments, adapt daily tasks to microgravity environments, and maintain safe and reliable space infrastructure – and the political, social, and cultural implications promise to be defining issues of the 21<sup>st</sup> century.

### GRADES K-2

I invite you to expose your students to the idea of human spaceflight, and to encourage them to consider what it means to live in space by asking questions such as: What is space? How do people breathe in space? How would life be if we didn't have gravity? What do astronauts do in space? Encourage students to compare astronauts' lives to their own. Why can't astronauts eat their food off of plates? Could they eat their favorite foods or snacks in space?

You may find the following media links helpful:

[Astronauts Eating Food](#)

[Looking out the Window of the International Space Station \(ISS\)](#)

### GRADES 3-5

In addition to the Grades K-2 activity, I invite you to introduce the idea of space stations. Students should learn about the need for space stations and early space stations such as Skylab and Mir, as well as the International Space Station. Encourage students to think about the challenges of living in space, and how simple tasks become much more complicated (see media links). For example, astronauts exercise two and a half hours every day to stay healthy – otherwise, their bodies start to break down in microgravity.

You may find the following media links helpful:

[Commander Chris Hadfield exercising](#)

[Astronaut Karen Nyberg demonstrates how she washes her hair](#)

## **GRADES 6-8**

I invite you to introduce more detailed aspects of human spaceflight, from either a STEM perspective or a socio-political perspective.

Science: Focus on the various challenges of living in space - muscle atrophy, psychological distress, hygiene, etc. Human beings are not suited to living in space; their bodies and minds can deteriorate rapidly. How can astronauts combat these effects?

History: Examine space stations as examined through the lens of the Space Race - Sixty years ago, people envisioned huge hotels and residences floating in orbit. Why did this never happen? Why did space technology advance so quickly in the 1960s?

Math: Apply basic math principles to human space habitation. For example, it is imperative that space stations function with as few supplies as possible, as it costs thousands of dollars to launch every pound of cargo into space (the Space Shuttle had a launch cost of \$10,000 per pound). Use math principles to calculate, for example, how much food is required by astronauts aboard the ISS depending on how long each astronaut is in orbit. How much does it cost to fly a day's worth of food to space?

You may find the following media links helpful:

[2001: A Space Odyssey \(Spacecraft approaching a space station\)](#)

[2001: A Space Odyssey \(hostess preparing food\)](#)

[Commander Chris Hadfield exercising](#)

[Astronaut Karen Nyberg demonstrates how she washes her hair](#)

## **GRADES 9-12**

I invite you to explore the concepts outlined in the Grades 6-8 micro-lesson more deeply. Students could delve into the science behind any number of human factors issues, or consider the political and economic motivations for historic, present, and future space station attempts, as well as the political ramifications of establishing human outposts in space or on other planets.

You may find the following media links helpful:

[2001: A Space Odyssey \(Spacecraft approaching a space station\)](#)

[2001: A Space Odyssey \(hostess preparing food\)](#)

[Commander Chris Hadfield exercising](#)

[Astronaut Karen Nyberg demonstrates how she washes her hair](#)