

MISSION X

TRAIN LIKE AN ASTRONAUT



WHAT'S YOUR SPACE HEIGHT?

Team Leader Guide

MISSION OVERVIEW

Students will measure their body for height, leg length and arm span and compare measurements for the class.

LEARNING OBJECTIVES:

- Make and record observations about changes in body height.
- Understand the variations in body height on Earth and in space.

Skills: measuring, comparing, teamwork.

INTRODUCTION

So, how tall are you? That seems like a fairly easy question to answer. However, did you know our height changes throughout the day? In fact, our height changes from morning to night. We actually shrink a little bit as the day goes on because gravity compresses our bodies. When we lie down at night, gravity no longer pulls in a direction to make us shorter, so our bodies stretch and we return to our taller height again. Imagine what happens to astronauts who don't experience the effect of gravity for months at a time! That's right; they grow taller!

It was found that the height of astronauts increases by approximately 3% over the first 3 to 4 days of weightlessness in space. As soon as astronauts return back to Earth, gravity pulls on them once again and astronauts will typically return to their pre-flight height in a short amount of time. In space, almost all of this height increase comes from changes in the spinal column, which affects the total body height. An increasing spinal column length is an important factor to consider when designing spacecraft and habitats. Astronauts must be able to reach every button and switch or grasp objects! Spacecraft must be built correctly before they fly because changing the walls or control locations is either not possible or overly expensive once the craft has launched into space.

FAST FACTS

Subject: Physical Education

Age: 8-12

Lesson Time: 15 min

Location: classroom or outdoors



↑ Axiom 3 Mission crew training inside a SpaceX Dragon vehicle. From left to right, ESA project astronaut and mission specialist Marcus Wandt, commander Michael López-Alegria, pilot Walter Villadei, and mission specialist Alper Gezeravci.

LET'S TRAIN LIKE AN ASTRONAUT!

MATERIALS

Team Leader

- Tape measure.

Student

- Mission Journal and pencil.

Optional to be used in Mission Adaptations

- A rope.



PROCEDURE

1. In class, students measure their height, leg length and arm span and learn how to measure themselves when they are at home. Decide on which units you will use in measuring (cm, meters, inches).
2. At home, students will measure themselves at night, and then again in the morning when they first wake up. The students need to measure themselves as soon as they stand up in the morning before they walk around too much.
3. Students record heights and height changes in their height chart.
4. Graph the class results or analyse a graph provided by the teacher.

SET-UP

This activity does not require to follow a specific set-up.

The following guided questions can be used for the students to fill in when they measure themselves:

- a. How tall were you at night? _____ cm or _____ inches
- b. How tall were you in the morning? _____ cm or _____ inches
- c. How much is the difference in those two heights? _____ cm or _____ inches
- d. What is the reason your height changed?
- e. Do you think taller people or short people would have the greatest change in their height?



THINK SAFETY

This activity has no reasonable associated safety risks

MISSION ADAPTATIONS



Increase Difficulty

- You can test and discuss the following questions with your students:
- “What if there were no chairs in your classroom and you had to stand to write at your desk. How high off the ground would you want your desk?”
- Compare the different suggested heights of the students would want their desk.
- “How high from the floor are the doorknobs in your classroom? Are all the doorknobs at the same height in your school?” Discuss with the students why they think that height was chosen.



Increase Accessibility

- Height can be measured while seated in a wheelchair by only measuring from the lower back up to the head.
- This activity can be adapted according to physical abilities of the students.



Decrease Difficulty

- Use a rope instead of a tape measure to measure the students’ height. Place the rope under the feet and mark the lowest point on the rope at groundlevel and highest point on the rope at head-level. The length between the 2 points can then be measured by the teacher to define the student’s height.
- Use the rope to measure the height as described in the previous bullet point but instead, compare the students’ heights visually without measuring the length in cm or inches.



This resource has been adapted from NASA’s “What’s your Space Height?”.

Original Credits: Lesson development by the NASA Johnson Space Center Human Research Program Education and Outreach team with thanks to the subject matter experts who contributed their time and knowledge to this NASA Fit Explorer project.