

# Calisthenics

## Train Like An Astronaut

### 5E Lesson Plan

Source Material: [Train Like An Astronaut](#)

Mission focused area: [Earth Science](#)

### Lesson Overview

In this lesson, students perform an investigation to increase heart rate, muscle endurance, and bone strength.

### NASA Connection

On the [International Space Station](#), astronauts need to ensure their bones are strong enough to endure their assigned mission by undergoing physical training. On Earth, gravity pulling on the human body applies a constant force or loading effect. This constant force is essential for building the healthy, strong bones we need on Earth. The force can be increased and bones can be made stronger by doing regular weight bearing physical activities such as jumping, walking, running, or dancing.

### Objectives

- Students examine how the body systems interact during exercise
- Students evaluate why exercise is important to maintain certain body systems in space

### Guiding Questions

- Why is it important to exercise?
- What health benefits are there to working out?
- How could you perform a physical activity that would increase bone strength, as well as heart and other muscle endurance?
- How does a lack of gravity affect an astronaut's bones?

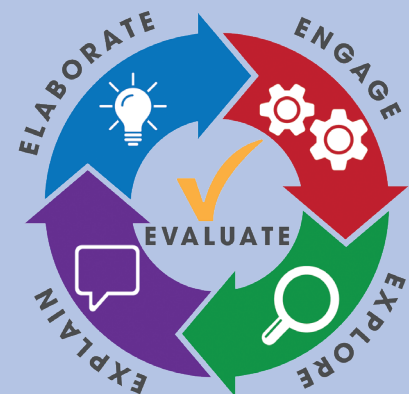
### Materials

- Mission journal
- Pencil
- Jump rope (one per student)
- Watch or stopwatch
- Optional equipment: Heart rate monitor
- [Teacher edition](#)
- [Student edition](#)

### National STEM Standards

- **NGSS**
- **MS-LS1-3** From Molecules to Organisms: Structures and Processes – Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

### 5E Instructional Model



## Teacher Action

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### ► Play [Train Like an Astronaut Video](#)



#### **Engage** - Cardio in Space

##### *Scripted CFU questions*

- How many of you like to work out?
- What do you do for physical activity?
- What are your favorite spots to play?
- Why is physical fitness important?
- Are there any advantages or disadvantages to exercising?



#### **Explore** - Jumping Rope

- Help students create data charts or provide them before beginning activity
- Provide materials and instructions to students
- Model proper technique for jumping rope
- Note: If using this activity inside a classroom, students perform investigation without the jump rope
- Monitor students as they jump in 30 second increments
- Allow students to hydrate before, during, and after activity
- Monitor that students are jumping correctly and landing on the balls of their feet

##### *Scripted CFU questions*

- How many of you like to jump rope? Why or why not?
- Why is jumping rope or other cardio activity important?
- How many jumps do you think you can do in 30 seconds?



#### **Explain** -Data Table

- Students will need to make their data charts ahead of time or have them provided by the teacher
- Along the top of chart “Trial 1, 2, 3, 4” should be written
- Along the side of the chart should be the exercise name “Jumping rope” and “Jumping while Moving”
- Extension: Find the class average for each activity

##### *Scripted CFU questions*

- How do you feel?
- How long did you jump without stopping?
- How does staying stationary feel different from moving?
- What happened to your heart rate? Did you sweat?
- How do you think this activity might help your bone strength?
- Why might maintaining bone strength be a challenge for astronauts in space?
- What muscles do you feel you are working while jumping rope?



#### **Elaborate** - Why Should Astronauts Exercise?

- Have students watch the video [“Exercise Helps Keep Astronauts Healthy in Space”](#)
- Instruct students to record answers in their notebooks or an anchor chart

##### *Scripted CFU questions*

- Why is it important for astronauts to exercise during missions?
- What is “orthostatic intolerance?”
- What are the three main forms of exercise on board the International Space Station?
- How long do the astronauts exercise for each day in space?

## **Evaluate** - Future Astronauts

- Using the prompt below, have students complete the questions

### *Scripted CFU questions*

- If you oversaw the exercise program for future astronauts, what exercises would you recommend?
- Why did you choose that activity?
- How does this exercise help astronauts to increase bone strength and improve their heart and muscle endurance?

## **Student Action**

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### **Engage** - Cardio in Space

- Students watch video and answer discussion questions posed by teacher

### **Explore** - Jumping Rope

- Students should record number of jumps in the Mission Journal
- Students answer questions posed by teacher
- Students will jump rope in 30 second intervals and record data

### **Explain** -Data Table

- Students participate in a class discussion about the data

### **Elaborate** - Why Should Astronauts Exercise?

- Students read or listen to story and identify key information
- Students put new information into their notebooks or on an anchor chart

## **Evaluate** - Future Astronauts

- Students should complete this in their notebooks or a piece of paper to be turned into their teacher
- Students share responses with rest of class

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