

# MISSION X

TRAIN LIKE AN ASTRONAUT



## BUILDING AN ASTRONAUT CORE

### Team Leader Guide

#### MISSION OVERVIEW

Students will perform the Commander Crunch and Pilot Plank within a given time frame.

#### LEARNING OBJECTIVES:

- Improve the strength of abdominal and back muscles.
- Make and record observations about improvements in muscle strength.

**Skills:** strength, endurance, perseverance, team encouragement.

#### FAST FACTS

**Subject:** Physical Education

**Age:** 8-12

**Lesson Time:** 10-15 min

**Location:** Classroom, outdoors or in the gymnasium.

#### INTRODUCTION

The back and abdominal muscles are known as the core muscles. They protect your spine, maintain proper posture, and transfer energy through your body for powerful movements such as swinging and throwing. These muscles work together as you sit up or lie down in bed, turn your body, pick up an object, and stand still. Core muscles also work together to maintain posture while wearing a heavy backpack. By improving the strength of your core muscles, you will find it easier to stabilize your body, maintain proper posture, and prevent injury.



↑ ESA astronaut Andreas Mogensen being lifted out of the space capsule 20 minutes after landing due to muscle weakness from microgravity.  
Credit: ESA

Just like on Earth, astronauts in space must be able to twist, bend, lift, and carry things. They must have strong core muscles so they can perform their tasks efficiently. It is important for astronauts on the International Space Station (ISS) to have a workout regimen that helps keep core muscles strong and their bones healthy. This is critical for ISS crew members because their bodies are experiencing different conditions in space than on Earth. Humans on Earth are always moving against the force of gravity, their muscles and bones support their body. In the microgravity environment of space, the body does not need the support of the muscles and bones since there is a minimum

noticeable effect of the force of gravity. Due to lack of use, the bones and muscles become weaker. In order to maintain muscle strength, they practice core-building activities before, during, and after their missions. Here on Earth, these activities may include swimming, running, weight training, or floor exercises. In space, they use specialized equipment similar to what you would find here on Earth to keep an exercise routine that will keep their core muscles fit for the job.

# LET'S TRAIN LIKE AN ASTRONAUT!

## MATERIALS

### Team Leader

- Watch or stopwatch

### Student

- Mission Journal and pencil



## PROCEDURE

Students will do the following activities with a partner.  
A warm-up/stretching and cool-down period always recommended.

### Commander Crunches

- Starting position: Students lie on their back, knees bent, feet flat on the floor. Chin should be pointed to the sky, arms crossed over the chest.
- Procedure: Using only the abdominal muscles, students lift their upper body until the shoulder blades leave the ground. Students can put one hand on the abdomen to feel muscles working as they raise their shoulders off the floor. Shoulders are lowered down using only the abdominal muscles to complete one crunch. At their partner's command, students begin to complete as many crunches as possible in one minute, timed or counted by their partner.

### Pilot Plank

- Starting position: Students lie down on their stomachs. Resting on their forearms, making a fist with each hand, they place their knuckles on the floor shoulder-width apart. Using only their arm muscles, students push their bodies off the floor supporting their weight on the forearms and toes. Their bodies should be straight as a board from head to feet.
- Procedure: Using the muscles in the abdomen and back, students stabilize their body by tightening these muscles. Students should try to keep this position for at least 30 seconds.

Students switch places with their partner and follow the same procedure.  
Observations before and after this physical experience can be recorded in their Mission Journal.

### SET-UP

Students should be at least an arm's length apart from each other.





## THINK SAFETY

- Remind students to continue breathing normally while conducting each part of the physical activity.
- Always stress proper technique while performing exercises. Improper technique can lead to injury.
- Avoid uneven surfaces.
- Wear appropriate clothes and shoes that allow students to move freely and comfortably.
- Proper hydration is important before, during, and after any physical activity.

## MISSION ADAPTATIONS



### Increase Difficulty

- Increase the time in which the Commander Crunches and Pilot Plank are performed.
- Repeat the Commander Crunch activity only this time students do not cross their arms but hold an object over their abdomen.
- Repeat the Pilot Plank activity only this time, students extend one leg to the side for 30 seconds.
- Place ball between stomach and floor and while in plank position using hands to walk out and back.
- Repeat the Commander Crunch activity only this time students touch the side of their heels alternately.



### Increase Accessibility

- When sitting in a wheelchair, place hands on arm rests and lift up using arms.
- Sit or lay down, lift legs and hold this for 30 seconds or more. Legs can be straight or bent.
- While sitting in a chair, lean forward 45 degrees for 30 seconds or more.



### Decrease Difficulty

- Decrease the time in which the Commander Crunches and Pilot Plank are performed.
- Students can perform the Pilot Plank with their knees on the ground, for extra support.



This resource has been adapted from NASA's "Building an Astronaut Core".

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