
FROM THE DIRECTOR OF
IMAX
HUBBLE 3D
IMAX
A BEAUTIFUL
PLANET
EXPERIENCE EARTH LIKE NEVER BEFORE
NARRATED BY JENNIFER LAWRENCE
IMAX ENTERTAINMENT PRESENTS "A BEAUTIFUL PLANET"
IN COOPERATION WITH THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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THE INTERNATIONAL SPACE STATION

EDUCATOR'S RESOURCE GUIDE Grades 3-5

IMAX® A BEAUTIFUL PLANET

EXPERIENCE EARTH LIKE NEVER BEFORE

Dear Teacher:

Take your students on an awe-inspiring trip around our world: a magnificent blue planet, dotted with gossamer clouds and gleaming in sunlight, whose beauty transforms and evolves with each passing day.

We invite you and your students to look through the eyes of astronauts on the International Space Station (ISS), witnessing breathtaking views of Earth and taking a hopeful look into the future of humanity and beyond in *A Beautiful Planet*. Book a field trip to your local IMAX® theatre to give your students a closer look at the wonders of our world. The engaging classroom activities in this guide, inspired by the film, will enhance your students' understanding of the Earth, the importance of the ISS, and the work that's being done to conserve our planet and its resources. Visit **imax.com/abp** for additional activities and fun facts.

Enjoy the show!

To book a field trip, contact your local IMAX theatre today. Visit www.imax.com/subscribe to sign up for the latest news and updates on IMAX educational programs and events. For locations near you, visit IMAX.com.

	EARTH OBSERVATION FROM THE ISS	ENGINEERING MARVEL	DESIGN A SPACE STATION
Objectives	Students will identify the regions, landmarks, and activities presented by each astronaut photograph taken from the ISS.	Students will understand the uniqueness and importance of the ISS from a science, engineering, and cultural point of view.	Students will use teamwork to design, engineer, and build their own Space Station.
Teacher Prep	Introduce students to an overhead perspective of Earth from the ISS approximately 250 miles above the planet's surface. Discuss how parts of the planet may look different from space than they do from the ground. Once students complete the activity, lead a discussion based on each image.	Begin by going over all the different modules of the ISS with students and discuss why each part is important to the Space Station's success. Discuss why the ISS and the astronauts who live on it are important.	Lead students in a discussion on what rooms, or modules, a house has; for example, a kitchen, a sleeping area, a bathroom, and a living room. The ISS has the same rooms that a house might have in addition to a laboratory for experiments. Use the items below to demonstrate how to connect bottles with PVC connectors in order to build their own Space Station. **You Will Need:** PVC pipe connectors (T-connectors, elbow connectors, and straight connectors); two-liter bottles; stiff cardboard; foil; sharp scissors; glue; tape; colored permanent markers.
Extension Activity	Visit http://www.windowsonearth.org to see more beautiful images of the earth from space.	Engage students by visiting the following website and watching videos about the ISS: http://www.SpaceStationExplorers.org These videos will highlight all the modules of the ISS and give students a more visual understanding of the Space Station as a whole.	Try adding a robotic arm to service your Space Station. Learn more about the robotic arm of the ISS at: http://bit.ly/Canadarm2

Lessons address NGSS standards: Engineering Design; Motion and Stability: Forces and Interactions; From Molecules to Organisms: Structures and Processes; Ecosystems: Interactions, Energy, and Dynamics; Biological Evolution: Unity and Diversity; Heredity: Inheritance and Variation of Traits; Earth's Systems; and Organization for Matter and Energy Flow in Organisms. For additional educational support, more extension activities about the ISS and further information on *A Beautiful Planet*, visit imax.com/abp

Special acknowledgment and thanks to the Center for Advancement of Science in Space (CASIS) and NASA for their contributions.

CASIS™

WHAT ON EARTH IS THAT?

EARTH OBSERVATION FROM THE INTERNATIONAL SPACE STATION

GRADE NAME

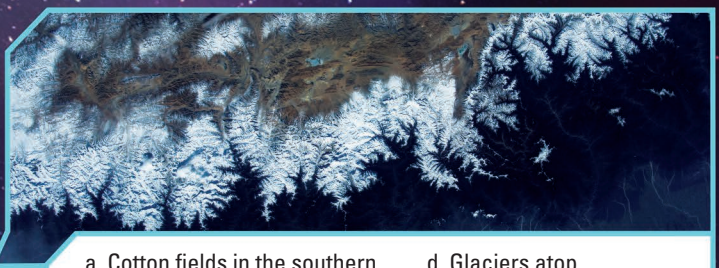
The International Space Station (ISS) has a module, or room, called the cupola. The cupola is a dome-shaped room with seven windows where astronauts control the Space Station's robotic arm, communicate with other crew members, and observe spacewalks. It is also a favorite hangout for astronauts who take hundreds of photos of the Earth each day! These photos help us understand and appreciate our home planet.

YOUR MISSION

Below are five images of different locations on Earth. Pay close attention to the details in each image to determine its location.

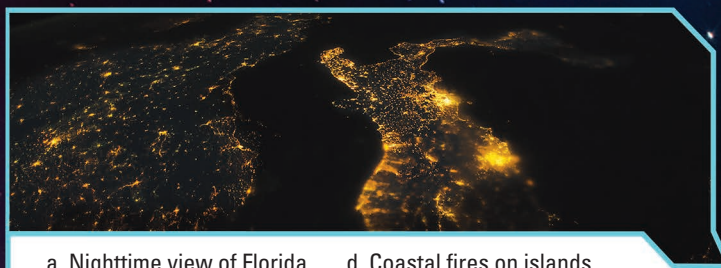
YOUR TASK

Select the correct description to become an Eagle-Eye Astronaut!



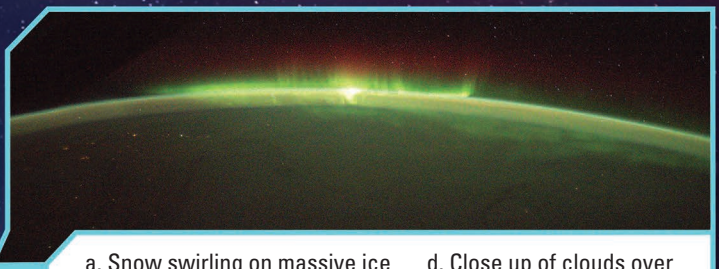
1

a. Cotton fields in the southern United States
b. Puffy, cumulus clouds over the eastern coast of Africa
c. Air pollution over Beijing, China
d. Glaciers atop Mt. Everest in the Himalayan Mountains
e. An iceberg floating in the Arctic Ocean



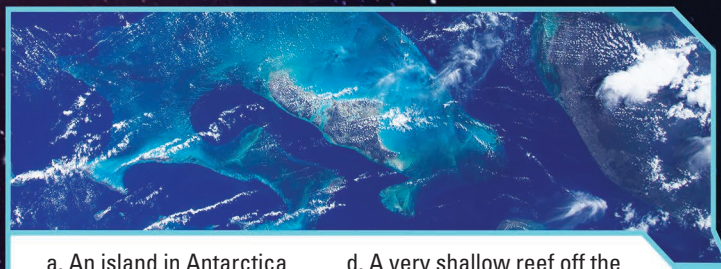
2

a. Nighttime view of Florida
b. Nighttime close-up of a city near a Russian mountain range
c. Nighttime view of Italy
d. Coastal fires on islands off mainland China
e. Highway lights at night in Chile, near Patagonia



3

a. Snow swirling on massive ice floes near Barrow, Alaska
b. A rare tropical snowstorm
c. Northern lights (Aurora) over the North Pole in winter
d. Close up of clouds over mountains above a city
e. Transportation routes between Russia and the United States in winter



4

a. An island in Antarctica
b. An island in the Bahamas off the U.S. coast
c. The Great Barrier Reef in Australia
d. A very shallow reef off the coast of South America
e. An underwater mountain in the middle of the Pacific Ocean

BONUS An astronaut on the Space Station photographed Hurricane Olaf as the orbiting laboratory passed over the Pacific Ocean, as part of a study on severe storms.

Hurricanes north of the equator spin, in a counterclockwise direction. Which way do hurricanes rotate south of the equator?

a. They do not rotate
b. Clockwise direction
c. Counterclockwise direction

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THE INTERNATIONAL SPACE STATION

AN ENGINEERING MARVEL

NAME

GRADE

YOUR MISSION

Read the passage on the right about the International Space Station (ISS). Even though there are missing words, can you guess which word belongs in each blank? Use the Word List to complete the selection. Each word will only be used once.

WORD LIST

crane
Space Station
modules
solar arrays
soccer
Earth
telescope
sleeps
orbit
plant
spacewalk
90 minutes
automobiles

The ISS is an engineering marvel! It was constructed in space by 16 different countries over 10 years. The ISS weighs 460 tons – that's more than 320 _____! It is approximately the size of a U.S. football field, or more than 1.5 _____ fields. A crew of six people live and work on the ISS, which travels at a speed of 5 miles per second (8 km per second). At that speed, it takes _____ _____ to make one complete path, or _____, around the Earth! This is why astronauts on the ISS see about 15 sunrises and sunsets every 24 hours.

The ISS is made up of many rooms, or _____. Some are used for storage and contain life-support systems, and others are where the crew works and _____. In 2005, Congress designated the U.S. part of the ISS as the nation's newest national laboratory. It is here that astronauts work on life and _____ science experiments that may benefit people living on Earth. The Cupola module is a favorite spot for astronauts. It is a 7-window observation area where astronauts can view _____ from 250 miles (402 km) straight up!

More than one acre of _____ _____ provide power to this orbiting laboratory, making it the third-brightest object in the night sky. The ISS is so bright, that it can be seen without a _____ at night. It looks like a fast-moving airplane, but it is many times higher and travels much, much faster than an airplane.

Another important feature of the _____ _____ is the Canadarm2. It is a huge, remote-controlled robotic arm that works like a _____. It can be used to help astronauts perform tasks outside of the Station during a _____.

For a tour of the ISS visit:
http://www.SpaceStationExplorers.org

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ANSWERS (in order): automobiles, soccer, 90 minutes, orbit, modules, sleeps, plant, Earth, solar arrays, telescope, Space Station, crane, spacewalk.

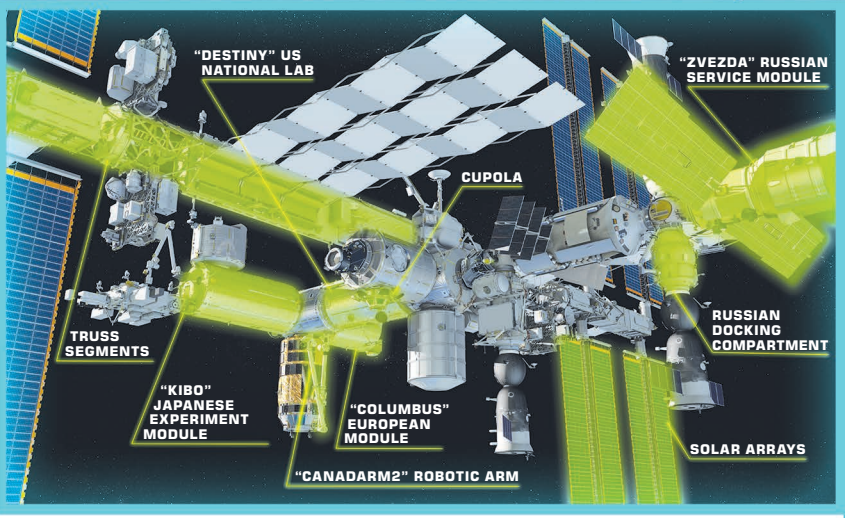
GRADE NAME

DESIGN A SPACE STATION

The International Space Station (ISS) travels in a path, or orbit, above Earth. It makes one complete orbit every 90 minutes traveling at 5 miles per second, or 17,500 mph (28,163kph)! Astronauts live and work there conducting science experiments and learning about life in space. Astronauts are transported to the ISS via rocket.

YOUR MISSION

An engineer designs tools and machines to solve problems. Imagine you are an engineer. How could you design a Space Station like the one the astronauts are living and working in?

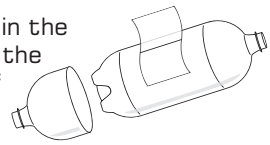


YOUR TASK

1 BRAINSTORM Work as a team to brainstorm a design for your Space Station. What does a Space Station need to keep humans alive? What is it like to live in space? Would you float instead of walk? How would you sleep? How would you exercise? How will you provide electricity for living and working?

2 LIST Examine the materials your teacher has made available. Make a list of the materials you will use to create your Space Station and draw a sketch of your team's design before you build it.

3 DESIGN Cut out a window in the side of each one of the bottles and design the inside of each room, or module.

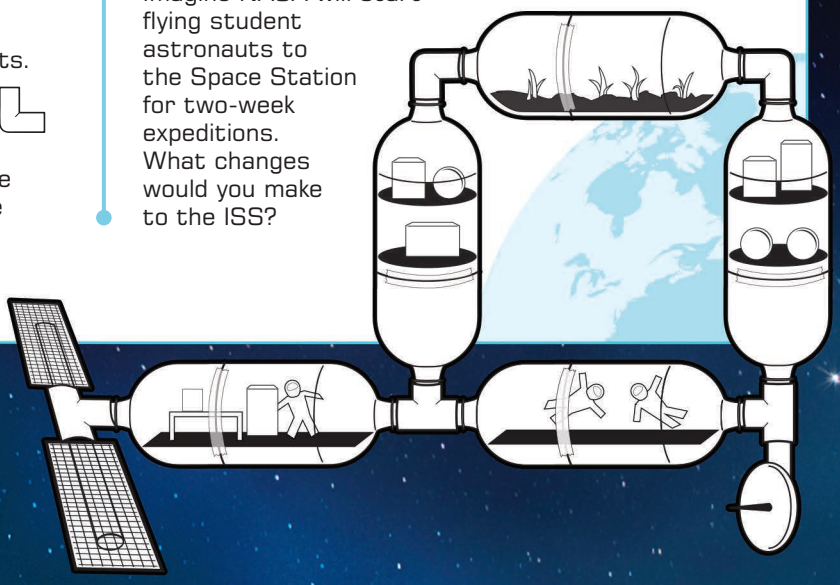


4 ASSEMBLE Connect your Space Station's modules using glue and PVC joints. You can use tape to hold the joints together while the glue dries.

5 TEST Test your team's Space Station to make sure it is strong and will not break where the modules connect. List the strengths and weaknesses of your design and note any ways you could make it more functional and livable.

6 DEBRIEF Discuss with your team:

- Did your team use all the materials provided? Why or why not?
- Which materials were most important in your Space Station design?
- How did working as a team help in the design process?
- Were there any disadvantages to designing and building as a team?
- What did you learn from seeing what the other teams developed?
- What advice would you give to a team that was about to complete this same task?
- Imagine NASA will start flying student astronauts to the Space Station for two-week expeditions. What changes would you make to the ISS?



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