

Earth Photography by ISS Astronauts

Learning Activity – Celebrating Diversity from Space Association of Space Explorers

Developed by Leah LaCrosse



Description

Students learn how astronauts photograph Earth from the ISS, and explore what these photographs reveal about Earth.

Grade Level

Grades 6-8 Science

Duration

5 classroom sessions (more or less, depending on teacher, students and time available)

Materials

- Picture book(s) or videos of diverse astronauts and space missions
- A large world map or globe
- Printable coloring sheets of astronauts in space
- Crayons or markers
- Stickers (space-themed or planet stickers)
- Construction paper
- Space-themed songs or music (optional)
- Simple handouts with pictures of astronauts and space-related items

- A model or toy astronaut figure (optional)

Learning Goals

- develop an appreciation of technological advances that allow for a view of Earth from above
- understand the approximate distances of the ISS and the moon from Earth
- begin to recognize various regions, landforms, and features of Earth from above
- share their curiosities and feelings of viewing the Earth from the ISS through poetry

From Ohio Learning Standards-

- This theme focuses on helping students use scientific inquiry to discover patterns, trends, structures and relationships that may be inferred from simple principles. These principles are related to the properties or interactions within and between systems.
- PS.4 An object's motion can be described by its speed and the direction in which it is moving.
- Science is a Human Endeavor Science has been, and continues to be, advanced by individuals of various races, genders, ethnicities, languages, abilities, family backgrounds and incomes.
- Scientific Knowledge is Open to Revision in Light of New Evidence Science is not static. Science is constantly changing as we acquire more knowledge.

Lesson Activities

5-E Phase	Planned Activity/Event	Details for Activity
Engage Time: 60 min ● Tap prior knowledge ● Focus learner's thinking ● Spark interest in topic	● Teacher projects to the Smart TV the 55 minute compiled video, "Celebrate Earth Diversity" over a period of three study hall periods (each 20 minutes each)	● Inform students that you have a video playing on the SMART TV during study hall. If anyone is interested in watching part or all of this video, they are welcome to. Present the viewing as somewhat of a "brain break" while students are working. ● Give background on the video only as students ask. ● Pause the video to resume play at the second and third day of viewing the video. ● Record student questions, comments, and reactions to share later. (optional)
Explore Time: 15 min ● Provide learners with common, concrete, tactile experiences with skills and concepts ● Observe and listen to students ● Ask probing questions ● Act as a consultant	● Use the "Celebrate Earth Diversity" video with students to discuss what they are Seeing, Thinking, Wondering, and Feeling.	● Play the first 15 minutes of the video. ● The teacher should verbally share comments about what he/she is viewing with the beginning phrases: I see, I think, I wonder, I feel. ● Allow students to tell the teacher when to pause the video. Students then verbally share a comment with the beginning phrases: I see, I think, I wonder, I feel. ● Follow up student comments with appreciation of their observations, thoughts, questions, and connections to the content. ● As students ask direct questions, the teacher can choose to directly answer the question, ask a follow up question, or record the question as one that will be researched.

Explain Time: 40 min ● Encourage students to explain concepts in their own words ● Ask for justification ● Use students previous experiences as the basis or explaining concepts ● Clarify and correct misconceptions	● This portion of the lesson will be a hands-on experience with modeling the Earth, low-Earth orbit objects (including the ISS), the moon, and the sun. ● Relative distances are being modeled, not exact. ● Variety in modeling materials can be used.	● Play the section of the “Celebrate Earth Diversity” video from 19:00-30:00. Ask students to describe what they are viewing. ● Tell students that now they have had a great view, you have a challenge for them! You would like them to model where the ISS is in relation to the Earth, Moon, and Sun. ● Describe the materials being used in the model for the students: ○ Earth=globe ○ Moon=small moon ball ○ Sun=table lamp ○ ISS=Lego built (Give one student a cup of Legos and a picture of the ISS. Ask them to do a quick build to create a model to represent the ISS.) ● While the ISS model builder is working, describe the rest of the challenge to the students. They will have to use the data that you are going to share about distance to create a model as a team. They will have to decide the distance of the objects in (possibly outside) the classroom. ● Share the statistics of distance (write on the board for reference): ○ Earth to Sun = 92.96 million miles ○ Earth to Moon = 238,855 miles ○ Earth to ISS = 250 miles ○ Earth to Hubble Space Telescope = 340 miles ○ Earth to Space = 62 miles ● Allow students time to discuss, model and share ideas for where they should approximate their objects. ● Keep in mind, objects in the model are NOT to scale, and approximate distances are the goal in this activity. We want students to recognize that 62 miles to get to space is something that they can relate to (distances between cities that they are familiar with). Getting to 250 miles for the ISS is also a relatable number. When thinking of the distance to the moon and the sun, it is really hard to imagine these! ● By the conclusion of the modeling activity, students may place the moon across the room and the sun in a whole other area of the building!
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Extend Time: 60-75 min

- Apply same concepts and skills in a new context resulting in deeper and broader understanding
- Encourage the students to apply the concepts/skills to new situations

- During this portion of the lesson, students will listen to and watch the Earth Light poem reading by Dr. Sian Proctor from the EarthMusicTheater website as a whole class
- Students will find a section from “Celebrate Earth Diversity” video that speaks to them to create their own poem
 - Students will utilize a template for creating their poem or create a free-style poem.
 - Paper will be available to write the drafts of the poem and create a picture to accompany the poem.

This portion of the lesson will run concurrently with the Evaluate portion. This will allow for small groups of students (2-4) to have a more intimate discussion with the teacher while other students are creating their poetry.

- Begin by giving students background on Dr. Sian Proctor. Explain that she is an astronaut from the 2021 SpaceX Dragon mission. She is also a geoscientist, pilot, and poet. If possible, project the site, <https://drsianproctor.com/about> and share a little of her story. An area of particular interest would be the section “Experience & Expertise- Here’s a brief summary of Sian’s areas of expertise and experience.”
- Share with students that they will watch and listen to Dr. Proctor’s poem, Earth Light which she wrote about viewing the Earth from above.
 - <https://www.earthmusictheater.org/>
 - OR
 - <https://youtu.be/ib6W-M8HKeA?si=HbrB3litgYpW3Sm2>
- Begin by listening to the video 1 time without viewing or without any interruption.
- Ask students to share how they felt while just listening to the poem.
- Tell them that this time, you would like them to listen **and** watch the video. Tell students that they should listen for the phrases:
 - tasered by the pulsating Earth glow
 - clear beacon of hope and longing
 - love struck
 - so much meta transcending time and space
 - I hold court among the stars
 - all our hopes set adrift
 - if only we could all be baptized by Earthlight
- Listen and watch the video together.
- Discuss the new feelings and thoughts after seeing and hearing. Discuss the phrases and ask students to comment on how the language paired up with the images.
- Tell students that they will get to share a poem about their view of the Earth from the ISS. They will use a section of the “Celebrate Earth Diversity” video to build their poem.
- If possible, the teacher should create and share a poem of their own from the video to model how they found a portion that spoke to them, used the visuals to build their poem, and revised the poem until they felt it shared their vision.
- The Poetry Templates website (<https://sites.google.com/view/drivingdigitallearning/poetry-templates>) can be used to select various poetry styles to give students access to.
- The students will use the paper, pencils, coloring tools with their devices and possible templates to create the poem.
 - Ask students to load the 55 minute video to their device first to select their portion to write about. Set a timer for 10 minutes to have sections made. Students should record the exact minutes of viewing that inspired their poem.
 - Then, students can begin building their poem.
 - Groups can begin rotating back to the teacher for the evaluation portion of the lesson.

Evaluate Time: 60-75 min ● Observe as students apply new concepts and skills ● Assess, formally and/or informally student progress toward achieving the learner outcomes ● Assess students' knowledge and/or skills ● Allow students to assess their own learning and group process skills	To evaluate students of the following objectives: ○ develop an appreciation of technological advances that allow for a view of Earth from above ○ understand the approximate distances of the ISS and the moon from Earth ○ begin to recognize various regions, landforms, and features of Earth from above run this portion of the lesson concurrently with the Extend portion (student poetry creation). This will allow for small groups of students (2-4) to have a more intimate discussion with the teacher while other students are creating their poetry.	● Ask students to share with you what they enjoyed, learned, and still wondered about the lesson. Allow time for each student to share their ideas. ● Ask guiding questions such as: ○ How did we capture such amazing views of the Earth? (understanding of ISS view) ○ Where is the ISS located in comparison to us? ○ Who lives and works there? ○ What were some of the regions you observed in the video? ○ What were some of the landforms that you observed in the video? ○ What were some of Earth' features that you observed in the video? ○ How did a sunrise on the ISS look compared to Earth bound sunrise? Why is that? ● Also, ask students to look back at the video paused at 9:00 minutes. Can students describe what they are viewing? Allow the video to play until 10:25 while students talk. ○ Earth view in darkness- cloud coverage on portions, coastal area, night lights from urban areas, aurora borealis on the horizon, sunrise on the horizon ○ Can students identify where the ISS and sun are in relation to Earth? General discussion can be followed up with use of the modeling materials if desired. ● Finally, ask students to demonstrate the motion of the ISS and the Earth compared to the Earth and Moon relationship. Use the models for this portion.
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Assessment:

Impromptu student to student or student to teacher discussions developed over the three days. Topics included:

- speed of the station
- who was taking the video
- what created the flashing light
- weather patterns (tornadoes vs hurricanes)
- the map view
- reality of the colors
- sunrise, sunset
- aurora borealis
- the beauty of the view