ScienceNews
EDUCATOR GUIDE

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Postcards From a New Space Telescope

SOCIETY FOR SCIENCE

SN EDUCATOR GUIDE

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About this Guide

Have you heard about the James Webb Space Telescope's stunning first images of deep space? Use this Guide to help students explore the science behind pictures of exploding stars, dancing galaxies, cosmic cliffs and more, and discuss how images can be thought of as data.

This Guide includes:

Article-based Comprehension Q&A — Students will answer questions about the *Science News* article "Here are the James Webb Space Telescope's stunning first pictures," which highlights dazzling cosmic wonders seen in farthest and clearest views yet of deep space. A version of the article, "Postcards from a new space telescope," appears in the August 13, 2022 issue of *Science News*. Related standards include NGSS-DCI: HS-ESS1.

> **Student Comprehension Worksheet** — These questions are formatted so it's easy to print them out as a worksheet.

Cross-curricular Discussion Q&A — Share a universal celebration in science with images of deep space from the James Webb Space Telescope. Have students collaborate to think about the science shown in the images and the implications of images as data. Learning outcomes: Observe, interpret and compare data in images; explore universal questions about science. Related standards include NGSS-DCI: HS-ESS1.

> **Student Discussion Worksheet** — These questions are formatted so it's easy to print them out as a worksheet.

SN EDUCATOR GUIDE

August 13, 2022

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Article-based Comprehension, Q&A

Directions for teachers: Ask students to read the online *Science News* article "Here are the James Webb Space Telescope's stunning first pictures," which highlights dazzling cosmic wonders seen in farthest and clearest views yet of deep space, and answer the following questions. A version of the article, "Postcards from a new space telescope," appears in the August 13, 2022 issue of *Science News*.

1. What is the James Webb Space Telescope?

The James Webb Space Telescope is a new telescope that is based in space and that can see the farthest of any space telescope.

2. What do the first images from the telescope show?

Gas and dust that make up a structure where stars are born called the Cosmic Cliffs; galaxies more than 13 billion years in the past; a group of five galaxies that spin around each other; a shell of gas and dust expelled by a dying star.

3. What is special about the quality of the images?

The images push the limits of how far and how clearly humankind can see into outer space.

4. Why are the images "a long time coming?"

The James Webb Space Telescope was dreamed up more than 30 years ago, but only launched in December 2021.

5. What do you think senior project scientist John Mather means when he says, "The mysteries of the universe will not come to an end anytime soon."

The telescope will help solve universal mysteries and uncover new ones.

6. The version of the article that appears in the print edition of *Science News* is titled "Postcards from a new space telescope." What literary device does the title use? Explain.

The title uses metaphor to liken the images to postcards.

SN EDUCATOR GUIDE

August 13, 2022

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Student Comprehension Worksheet

Directions: Read and answer questions about the online *Science News* article "Here are the James Webb Space Telescope's stunning first pictures," which highlights dazzling cosmic wonders seen in farthest and clearest views yet of deep space. A version of the article, "Postcards from a new space telescope," appears in the August 13, 2022 issue of *Science News*.

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SN EDUCATOR GUIDE

August 13, 2022

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Cross-curricular Discussion, Q&A

Directions for teachers:
Humankind now has the farthest and clearest view yet of outer space thanks to new images from the James Webb Space Telescope. Ask students to read the *Science News* article "Here are the James Webb Space Telescope's stunning first pictures" and choose one of the images to study and answer questions about. Students should answer the first set of questions on their own before teaming up with a partner or small group to answer the remaining questions.

A version of the article, "Postcards from a new space telescope," appears in the August 13, 2022 issue of *Science News*.

For more resources on the science behind why the James Webb Space Telescope is innovative, check out the Educator Guide "The Origami Satellite." For more resources on exploring scientific questions in outer space, check out the Educator Guide "Bacteria Can Survive for Years in Space."

Want to make it a virtual lesson? Post the online *Science News* article to your virtual classroom. Discuss the article and questions with your class on your virtual platform.

Inspiring images
1. Which image is your favorite? Why?

Student answers will vary. Answers might describe colors, shapes or relative sizes of objects in the image.

2. What does the image show? Be as specific as possible.

Use article captions of images to assess student answers. Student responses should also emphasize that the images depict celestial objects in infrared wavelengths of light. That light traveled billions of years to reach and get recorded by the James Webb Space Telescope.

3. What does the image make you wonder about science?

Student answers will vary. Students may say: How many planets are really in outer space? Does life exist elsewhere? Will we ever be able to reach another galaxy? What other scientific questions haven't been answered yet?

4. How does the image inspire you?

Student answers will vary. Emphasize to students how this global collaboration is the beginning of a quest to answer major scientific questions such as: How old is the universe and how has it evolved over time? Could planets around other stars host life?

Pictures as data

1. Brainstorm ways that images can help us understand scientific concepts.

Student answers will vary. Students may say that images can be used to help diagnose infections and diseases, show things that are not always visible to the naked eye, or document how a phenomenon progresses over time. Images can display data on large and small scales — from the far reaches of outer space to microscopic worlds on Earth.

2. Can images can be considered data? Why or why not?

The images from the James Webb Space Telescope display the incoming wavelengths and patterns of light, or electromagnetic radiation, collected from outer space. These images could be thought of as maps of data points.

3. Look at this website, which compares images from the James Webb Space Telescope with images from the Hubble Space Telescope. How are the images similar and different?

Student answers will vary. Generally, celestial objects in the images from the James Webb Space Telescope are much clearer and more well-defined than images taken by the Hubble Space Telescope.

4. What about the James Webb Space Telescope explains the differences in image quality? What makes the telescope innovative?

The James Webb Space Telescope is the largest, most complex telescope ever sent into space. Unlike most space telescopes, which house a single lens or mirror within a tube that blocks out sunlight, the James Webb Space Telescope's 6.5-meter-wide mirror — which is so large that it had to be folded up to be launched into space — is protected from light from the sun, Earth and moon by a multilayered shield. The giant mirror lets the telescope see deeper into the cosmos in high resolution and the massive light shield radiates heat away from the telescope, keeping it cool and allowing it to detect infrared wavelengths of light.

Curiosity corner

1. Write a scientific question based on what you wonder about one of the images in the article. Could the James Webb Space Telescope be used to answer your question? Why or why not?

Student answers will vary.

SN EDUCATOR GUIDE

August 13, 2022

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Student Discussion Worksheet

Directions: Read the *Science News* article "Here are the James Webb Space Telescope's stunning first pictures," choose one of the images to study and answer the first set of questions. Then complete the remaining questions as instructed by your teacher.

Inspiring images

1. Which image is your favorite? Why?

2. What does the image show? Be as specific as possible.

3. What does the image make you wonder about science?

4. How does the image inspire you?

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