

Lesson Overview and Teacher Preparation



Lesson Overview

Students learn to distinguish between what they observe and what they infer. They gather evidence using their senses, compare details, and build conclusions based on that evidence—just like scientists.



Learning Objectives

By the end of this lesson, students will be able to:

- ✓ Define observation, inference, and evidence.
- ✓ Identify and record observations using their senses.
- ✓ Make inferences based on observable evidence.
- ✓ Support inferences with logical evidence.



NGSS Science & Engineering Practices

Primary Practice: Analyzing and Interpreting Data

Students make careful observations, compare information, and use evidence to support interpretations and reasonable inferences.

Supporting Practice: Constructing Explanations

Students use observations and evidence to develop and justify reasonable inferences.



Materials Needed

- Student Packet
- Pencils
- Internet access (NASA Visible Earth)
- Projection system or screen
- Observation Challenge (optional extension or homework)



Estimated Time

2 Class Periods
(45–60 minutes each)



Lesson Sequence Overview

- 1 **Satellite Earth** – Students explore a NASA image and record details.
- 2 **Comparing What We See** – Students compare three images for similarities and differences.
- 3 **Observations, Inferences, and Evidence** – Students learn key definitions and examples.
- 4 **Using Evidence to Build Inferences** – Students connect evidence to conclusions.
- 5 **Observations vs. Inferences** – Students classify statements as observations or inferences.
- 6 **Application: What Do You Notice?** – Students apply skills to a real-world image.
- 7 **Which Inference Fits Best?** – Students choose and justify the best-supported inference.
- 8 **Reflection** – Students reflect on how good scientists use observations and evidence.



Teaching Tip

Observations are information gathered directly through the senses or with measuring tools. In science, students should use only senses that are safe and appropriate for the investigation. Inferences go beyond what is directly observed and use evidence and reasoning to explain what the observations might mean.

Resources, Supports & Connections for the Teacher



Real-World Connection

From satellite images to everyday environments, scientists rely on careful observations and logical inferences to understand and explain the world around them.



Before You Teach

- Preview the Student Packet and Classroom Slides.
- Confirm students can access the NASA image used in the opening activity.
- Decide whether students will work independently, with partners, or as a class during image-analysis activities.
- Decide whether the optional Observation Challenge will be completed in class, assigned as homework, or used as an extension.
- Have the Teacher Answer Key available for discussion and review.



Vocabulary Preview

Observation: Information gathered using the senses.

Inference: A conclusion based on evidence and prior knowledge.

Evidence: Facts or details that support an idea.

Compare: To examine similarities and differences.

Detail: A small but important part of something.

Conclusion: A decision or judgment based on evidence.



Cross-Curricular Connections

ELA: Analyzing details in texts, making inferences about characters and events.

Math: Interpreting data displays and drawing conclusions from graphs and charts.

Social Studies: Analyzing primary sources and drawing conclusions about historical events.

Art: Observing details in artwork and inferring the artist's message or intent.



Assessment Opportunities

- ✓ **Formative Assessment:** Monitor student responses and discussion for accurate observations and evidence-supported inferences.
- ✓ **Student Packet:** Review written responses for students' ability to distinguish observations from inferences and justify their thinking with evidence.
- ✓ **Reflection:** Use the final reflection to check students' understanding of how observation and evidence contribute to scientific thinking.
- ✓ **Optional Observation Challenge:** Use as additional independent practice or an informal assessment of skill transfer.



Extension Ideas (Optional)

- Use real-world images (satellite, microscopic, or environmental) for additional observation practice.
- Conduct a "Mystery Object" activity where students observe and infer what an object is.
- Create a class Anchor Chart of observations vs. inferences to reference all year.
- Encourage students to keep an "Observation Journal" to record daily observations.
- Invite a scientist or naturalist to discuss how they use observations in their work.

Teaching the Lesson: Step-by-Step Guide

Use this page to guide students through each part of the lesson.

Slide numbers refer to the Classroom Slides. Page numbers refer to the Student Packet.

Step	Lesson Part & Focus	Slides	Student Packet	What the Teacher Does / What Students Do	Key Teaching Tips
1	 Satellite Earth Students explore a NASA image and record details.	2	p. 2	- Introduce the lesson and show the NASA Visible Earth website. - Students choose one satellite image. - Students record three details they directly observe (no inferences yet). - Share a few class observations.	Remind students to record exact details they see, not guesses or explanations.
2	 Comparing What We See Students compare three images for similarities and differences.	3	p. 3	- Show the three images side by side. - Students identify similarities first, then differences. - Discuss findings as a class.	Encourage students to be thorough and look for small differences.
3	 Observations, Inferences & Evidence Students learn key definitions and examples.	4–6	pp. 4–5	- Teach the definitions of observation, inference, and evidence. - Provide clear examples and non-examples. - Model how evidence supports inferences. - Students take notes or complete guided practice.	Use think-alouds and real examples to make the concepts clear and concrete.
4	 Observations vs. Inferences Students sort statements as observations or inferences.	7 & 12 (Drag-and-Drop Activity)	p. 6	- Students sort each statement into the correct column: Observation or Inference. - Check answers together. - Use the “Why?” follow-up questions to deepen understanding.	Ask, “How do you know it’s an observation or an inference?” Support answers with evidence.
5	 Application: Beach Observations & Inferences Students apply the skill to real-world images.	8–9	p. 7	- Show the beach images. - Students list observations. - Students write inferences and cite the evidence that supports each one. - Discuss as a class.	Circulate and prompt students to justify their inferences with specific evidence.
6	 Which Inference Fits Best? Students choose the best-supported inference and explain their reasoning.	— (Not represented as its own slide in this deck)	p. 8	- Students read the evidence and the three inference choices. - Students select the best-supported inference. - Students explain their choice using evidence from the images. - Discuss answers and reasoning as a class.	Emphasize that the best inference is the one most directly supported by evidence.
7	 Exit Reflection Students reflect on what they learned and how it connects to science.	11	No corresponding page	- Guide students to reflect on how observations and evidence help scientists. - Students complete the exit reflection prompt. - Invite a few students to share.	Connect to real-world science and the importance of careful thinking.
	 Optional Extension: Observation Challenge Students observe a nearby place and record observations, inferences, and reflect.	10	Separate Observation Challenge resource	- Introduce the Observation Challenge (take it further!). - Students choose a nearby place. - Students record 5 observations and 5 inferences, each supported by evidence. - Students answer the reflection question.	Reminder: Only write what you directly notice first. Support every inference with evidence.



Wrap-Up

Reinforce the big idea: Good scientists observe carefully, rely on evidence, and think critically before drawing conclusions.



Next Steps

Use the Observation Challenge (optional) as an extension or homework activity.

Teacher Notes and Facilitation Guide



Common Misconceptions

- **An observation** is not necessarily something you see. It can come from any appropriate sense or measurement (hearing, touching, smelling, measuring, etc.).
- **An inference isn't a "guess."** It must be supported by evidence from observations.
- **Two students can make different reasonable inferences** from the same observation.
- **More than one inference** can sometimes fit the evidence, but some are better supported than others.



Questions to Ask Students

- 1 What did you actually observe?
- 2 Which part of your statement is an inference?
- 3 What evidence supports that?
- 4 Could there be another explanation?
- 5 What additional observation would help you decide?



What to Look For

As you observe student work and discussions, look for evidence that students:

- ✓ Describe specific, observable details clearly.
- ✓ Distinguish observations from inferences.
- ✓ Connect inferences to evidence.
- ✓ Explain why an inference is reasonable.
- ✓ Consider multiple possibilities and select the best-supported inference.
- ✓ Use scientific thinking and careful language.



Using the Observation Challenge

The Observation Challenge can be used in a variety of ways to support learning:

- **Extension Activity** – For students who finish early or need additional practice.
- **Homework** – Reinforce observation skills and inference-making at home.
- **Independent Practice** – Use during class while you work with small groups.
- **Informal Assessment** – Gauge understanding of observations and inferences.

An answer key with explanations is provided to help you review and discuss student thinking.



Answer Key Reference

A separate Teacher Answer Key is included with this lesson.

It provides:

- Sample responses
- Justifications

Use it to support feedback, guide discussions, and help students improve their scientific reasoning.



Remember

Good scientists observe carefully, gather evidence, and think critically before drawing conclusions. Encourage curiosity, careful thinking, and respect for different—but evidence-based—ideas.