

THE TELESCOPE MYSTERY



NO PREP

Gamify your students' learning with this interactive and engaging Mystery Activity.

SCROLL
to take a look inside!



The Telescope Mystery

Part 1 – Mission Briefing & Case Overview

Name: _____ Date: _____

Case File #671 – The Telescope Mystery

A team of students is studying photographs of distant stars, galaxies, and nebulae when they discover a major problem. Many objects in space are extremely far away and very faint. Some are hidden behind clouds of dust, and others give off kinds of light that human eyes cannot see.

During the investigation, students notice that scientists do not rely on just any telescope to study the universe. Telescopes on Earth can collect a lot of useful information, but Earth's atmosphere can blur images, block some kinds of light, and interfere with observations. Students also learn that telescopes placed in space can avoid some of these problems.

In one example, a space telescope captured a much sharper image of a distant galaxy than a similar telescope on Earth. In another, a telescope using infrared light detected objects hidden inside a dusty region where visible light could not pass through easily. Students also found that some space telescopes study ultraviolet, infrared, or X-ray light that is partly or mostly blocked by Earth's atmosphere.

Scientists know that space telescopes help scientists see distant objects by observing above Earth's atmosphere, collecting faint light, and detecting wavelengths that do not reach the ground easily. They also know that different telescopes are designed for different kinds of observation.

Possible explanations include:

- Space telescopes avoid image blurring caused by Earth's atmosphere
- Space telescopes can detect kinds of light that Earth's atmosphere blocks or weakens
- Large mirrors and sensitive instruments help collect faint light from distant objects
- Different telescopes are built to study different wavelengths and features
- Space telescopes are only because they are much closer to the stars

No single explanation, however, fully describes how space telescopes help scientists see distant objects.

You

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Teach With

Par. Fergy

Read

Distant

1. What
2. Why can a space telescope often see some objects more clearly than a telescope on Earth?



investigate this space observation mystery. Your Mission is to discover how space telescopes in space and how telescope design affect observations. Scientists study distant objects to see distant objects and what you discover.

How Space Telescopes Help Scientists See Distant Objects?

Read "Understanding How Space Telescopes Help Scientists See

DETECTIVE FILE ON SPACE AND SPACE EXPLORATION

★ A complete student case file with guided worksheets for every step of the investigation.

★ 10 detailed evidence cards based on *land and space telescope* research as well as real-world examples that include images, graphs, and text.

★ A full teacher answer key AND marking rubric with sample responses.

What You Get

NO-PREP. JUST PRINT TO GO!

Full investigation breakdown

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Part 3 – Evidence Log
For each Evidence Card, answer the questions below in 1–2 sentences in the chart.
1. Summarize the evidence in your own words.
2. Choose the one category that best fits each piece of evidence.
☐ Cause ☐ Pathway ☐ Impact
Example Evidence Log Entry
This evidence suggests a **pathway** because changing observing conditions can lead to different results.

Evidence #	Key Understanding
1	
2	
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Part 4 – Suspect List
How Do Space Telescopes Help Scientists See Distant Objects?
Rank the suspects from 1 (most responsible) to 5 (least responsible).
Suspect: _____
Ranking: _____
Why Did It Happen? _____

Evidence Card 3 – Faint Light Collection
Distant galaxies and stars can be so faint that telescopes need large mirrors and sensitive detectors to collect enough light to study them.

Note: The person is 1.75 m (5' 9") and the Hubble mirror is 2.4 m (7'10") and the James Webb mirror is 6.5 m (21' 4").
Detective Prompt: Why does collecting more light help scientists study very distant objects?

Evidence Card 4 – Infrared Through Dust
Infrared telescopes can often detect objects hidden inside dusty regions because infrared light can pass through dust more effectively than visible light.

Detective Prompt: Why would infrared observations reveal objects that visible-light images miss?

Interpretation & Recording Data

10 Evidence Cards to Determine Culprit

HOW THIS ACTIVITY HELPS YOU

- Saves prep time with a fully structured, print-and-go investigation.
- Drives high engagement while still meeting academic goals as students are interested in what they're doing.
- Builds deep understanding with **real-world relevance** as the students analyze real evidence, make connections, and using CER to explain everyday **space phenomena**.

10-PART INVESTIGATION

Students:

1. Step into the role of a Science Detective.
2. Examine real scientific space evidence from Earth and beyond.
3. Track the pathway of how different telescopes allow scientists to see distant objects in space using science and technology.
4. Interrogate suspects (*large mirrors, different light wavelengths, location, etc.*) and identify the main culprits.
5. Build a scientific case using Claim-Evidence Reasoning.
6. Propose real solutions that matter.

★★★★★ The added images and graphs enhanced the activity. Students were engaged and motivated during the case study, and it was an effective introduction to the topics. - Mystery Resource Buyer

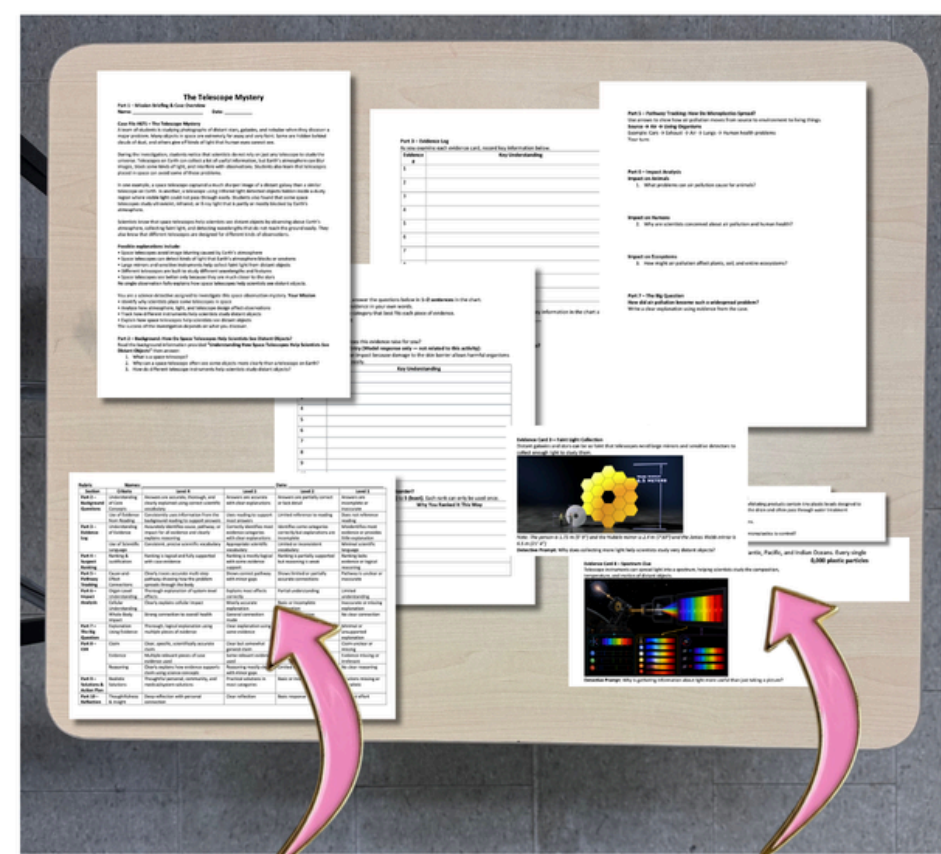
HOW THIS MYSTERY WILL HELP YOU



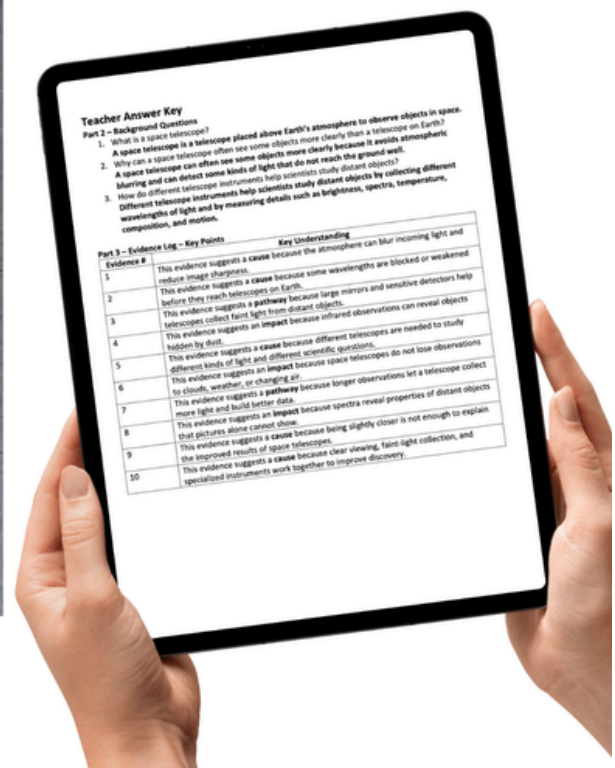
- Prep-FREE and fully editable Mystery Investigation - just print/upload and assign with no materials.
- **Evidence Cards** can be printed with and without images or projected on board.
- Engages every learner through hands-on, high-interest mystery investigations that boost motivation and participation.
- **Builds essential skills** such as graph interpretation, problem-solving, teamwork, creativity, and communication.

What Will Your Students Learn?

FULLY EDITABLE AND READY-TO-GO INVESTIGATION



FULL ANSWER KEY



★★★★★ This is very well crafted and it great to use for a subplan but also when I am in-class with students. They enjoy the detective layer of the work and it kept the students engaged. - Mystery Resource Buyer

- ✓ What a space telescope is
- ✓ Why a space telescope can often see some objects more clearly than a telescope on Earth
- ✓ How Earth's atmosphere can blur light and block some wavelengths
- ✓ Why scientists place some telescopes in space
- ✓ How large mirrors and sensitive detectors help collect faint light
- ✓ How infrared, ultraviolet, X-ray, and visible-light instruments reveal different information
- ✓ How spectra help scientists study temperature, composition, and motion
- ✓ Why being only slightly closer is not the main reason space telescopes work better
- ✓ How space telescopes help scientists learn about distant stars, galaxies, nebulae, and planets

Classroom Fit Guarantee

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Part 1 & 2

The Telescope Mystery

Part 1 – Mission Briefing & Case Overview

Name: _____ Date: _____

Case File #671 – The Telescope Mystery

A team of students is studying photographs of distant stars, galaxies, and nebulae when they discover a major problem. Many objects in space are extremely far away and very faint. Some are hidden behind clouds of dust, and others give off kinds of light that human eyes cannot see.

During the investigation, students notice that scientists do not rely on just any telescope to study the universe. Telescopes on Earth can collect a lot of useful information, but Earth's atmosphere can blur images, block some kinds of light, and interfere with observations. Students also learn that telescopes placed in space can avoid some of these problems.

In one example, a space telescope captured a much sharper image of a distant galaxy than a similar telescope on Earth. In another, a telescope using infrared light detected objects hidden inside a dusty region where visible light could not pass through easily. Students also found that some space telescopes study ultraviolet, infrared, or X-ray light that is partly or mostly blocked by Earth's atmosphere.

Scientists know that space telescopes help scientists see distant objects by observing above Earth's atmosphere, collecting faint light, and detecting wavelengths that do not reach the ground easily. They also know that different telescopes are designed for different kinds of observations.

Possible explanations include:

- Space telescopes avoid image blurring caused by Earth's atmosphere
- Space telescopes can detect kinds of light that Earth's atmosphere blocks or weakens
- Large mirrors and sensitive instruments help collect faint light from distant objects
- Different telescopes are built to study different wavelengths and features
- Space telescopes see better only because they are much closer to the stars

No single observation fully explains how space telescopes help scientists see distant objects.

You are a science detective assigned to investigate this space observation mystery. **Your Mission**

- Identify why scientists place some telescopes in space
- Analyze how atmosphere, light, and telescope design affect observations
- Track how different instruments help scientists study distant objects
- Explain how space telescopes help scientists see distant objects

The success of the investigation depends on what you discover.

Part 2 – Background: How Do Space Telescopes Help Scientists See Distant Objects?

Read the background information provided "Understanding How Space Telescopes Help Scientists See Distant Objects" then answer:

1. What is a space telescope?
2. Why can a space telescope often see some objects more clearly than a telescope on Earth?
3. How do different telescope instruments help scientists study distant objects?

Part 1 – Mission Briefing & Case Overview

Students take on the role of science detectives and are introduced to *how telescopes allow us to see into space.*

Part 2 – How Do Space Telescopes Help Scientists See Distant Objects?

Students read a short background passage and answer guiding questions to build foundational understanding before analyzing evidence.

Part 3 & 4

Part 3 – Evidence Log

For each Evidence Card, answer the questions below in **1–2 sentences in the chart**.

1. Summarize the evidence in your own words.
2. Choose the one category that best fits each piece of evidence.

☐ Cause ☐ Pathway ☐ Impact

Example Evidence Log Entry

This evidence suggests a **pathway** because changing observing conditions can lead to clearer scientific data.

Evidence #	Key Understanding
1	
2	
3	
4	
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Part 4 – Suspect List

How Do Space Telescopes Help Scientists See Distant Objects?

Rank the suspects from **1 (most responsible)** to **5 (least responsible)**.

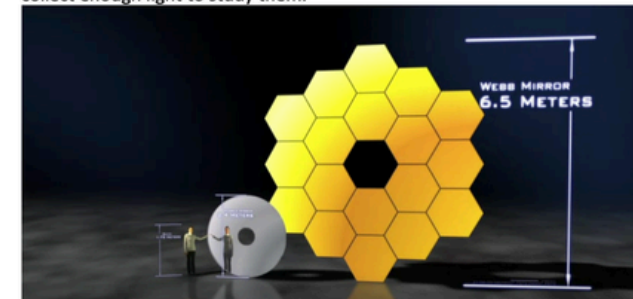
Ranking	Suspect	Why You Ranked It This Way
	Different telescopes are built to study different wavelengths and features	
	Space telescopes see better only because they are much closer to the stars	
	Large mirrors and sensitive instruments help collect faint light from distant objects	
	Space telescopes can detect kinds of light that Earth's atmosphere blocks or weakens	
	Space telescopes avoid image blurring caused by Earth's atmosphere	

Part 3 – Evidence Log

Students begin examining the evidence cards and record key information, observations, and insights in their evidence log.

Evidence Card 3 – Faint Light Collection

Distant galaxies and stars can be so faint that telescopes need large mirrors and sensitive detectors to collect enough light to study them.

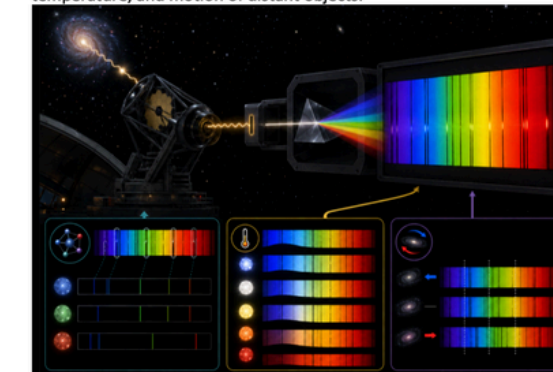


Note: The person is 1.75 m (5' 9") and the Hubble mirror is 2.4 m (7'10") and the James Webb mirror is 6.5 m (21' 4")

Detective Prompt: Why does collecting more light help scientists study more distant objects?

Evidence Card 8 – Spectrum Clue

Telescope instruments can spread light into a spectrum, helping scientists study the composition, temperature, and motion of distant objects.



Detective Prompt: Why is gathering information about light more useful than just taking a picture?

Evidence Card 7 – Long Observation Time

A space telescope can sometimes observe a faint object for a long time to collect more light and create a more detailed image.

Observation	Space telescope	Total exposure time	What the long observation produced
Hubble Deep Field (1995)	Hubble	10 days	A deep image of a tiny, seemingly empty patch of sky that revealed roughly 3,000 distant galaxies .
Hubble Ultra Deep Field (2003–2004)	Hubble	11.3 days	An even deeper view showing nearly 10,000 galaxies ; NASA says it required 800 exposures over 400 Hubble orbits .
Webb first deep field (SMACS 0723)	James Webb Space Telescope	12.5 hours	Even in a much shorter time, Webb produced the deepest and sharpest infrared image of the distant universe to that point, revealing thousands of galaxies , including some extremely faint infrared objects.

Detective Prompt: Why would a longer observation help scientists detect faint objects?

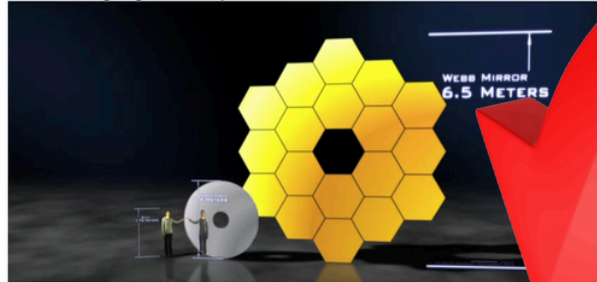
Part 4 – Suspect List

Students rank possible issues, defend their choices, and determine which suspect is most responsible for the problem.

EVIDENCE CARDS

- All Evidence Cards come in two versions - *With images and graphs and Without* and can be printed or projected as needed. Note: Both contain data tables.
- Students analyze each Evidence Card and record the following in their **Evidence Log**
 1. Summarize the evidence in their own words.
 2. Determine what this evidence suggests
 - ❑ What causes it
 - ❑ Pathway
 - ❑ Its impact
 3. Explain what question(s) this evidence raises for them?

Images & Graphs



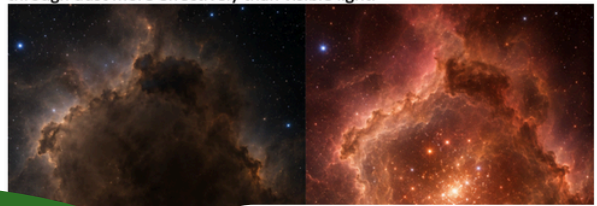
Evidence Card 3 – Faint Light Collection
Distant galaxies and stars can be so faint that telescopes need large mirrors and sensitive instruments to collect enough light to study them.

Note: The person is 1.75 m (5' 9") and the Hubble mirror is 2.4 m (7' 9"). The James Webb mirror is 6.5 m (21' 4").

Detective Prompt: Why does collecting more light help scientists study very distant objects?

Text Only

Evidence Card 4 – Infrared Through Dust
Infrared telescopes can often detect objects hidden inside dusty regions because infrared light can pass through dust more effectively than visible light.



Detective Prompt: Why

Part 3 – Evidence Log
For each Evidence Card, answer the questions below in 1–2 sentences in the chart.
1. Summarize the evidence in your own words.
2. Choose the one category that best fits each piece of evidence.
☐ Cause ☐ Pathway ☐ Impact

Evidence	Key Understanding
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10	

Part 4 – Suspect List
How Do Space Telescopes Help Scientists See Distant Objects?
Rank the suspects from 1 (most responsible) to 5 (least responsible).

Ranking	Suspect	Why You Ranked It This Way
	Different telescopes are built to study different wavelengths and features	
	Space telescopes see better only because they are much closer to the stars	
	Large mirrors and sensitive instruments help collect faint light from distant objects	
	Space telescopes can detect kinds of light that Earth's atmosphere blocks or weakens	
	Space telescopes avoid image blurring caused by Earth's atmosphere	

Evidence Card 7 – Long Observation Time
A space telescope can sometimes observe a faint object for a long time to collect more light and create a more detailed image.

Observation	Space telescope	Total exposure time	What the long observation produced
Hubble Deep Field (1995)	Hubble	10 days	A deep image of a tiny, seemingly empty patch of sky that revealed roughly 3,000 distant galaxies.
Hubble Ultra Deep Field (2003–2004)	Hubble	11.3 days	An even deeper view showing nearly 10,000 galaxies; NASA says it required 800 exposures over 400 Hubble orbits.
Webb first deep field	James Webb Space Telescope	12.5 hours	Even in a much shorter time, Webb produced the deepest and sharpest infrared image of the distant universe to that point, revealing thousands of galaxies, including some extremely faint infrared objects.

Prompt: Why would a longer observation help scientists detect faint objects?

Card 8 – Spectrum Clue
Spectrographs can spread light into a spectrum, helping scientists study the composition, temperature, and motion of distant objects.
Prompt: Why is gathering information about light more useful than just taking pictures?

Card 9 – Not Much Closer
Even though a space telescope is in orbit, it is still tiny compared with the enormous distances to stars and galaxies.
Prompt: Why does this show that being slightly closer is not the main reason space telescopes work better?

Card 10 – Repeated Observation Pattern
Over many missions, scientists learned more about distant stars, galaxies, nebulae, and planets when telescopes combined clear viewing, faint-light collection, and different instruments.
Prompt: What does this pattern suggest about how space telescopes help scientists see distant objects?

Part 5-7

Part 5 – Pathway Tracking

How Does a Space Telescope Help Scientists See Farther?

Use arrows to trace the process.

Example:

Observation tool → changing viewing conditions → clearer or richer data

Your Turn:

Use a similar pathway to trace how a space telescope helps scientists study distant objects.

Part 6 – Impact Analysis

Impact of Earth's Atmosphere

How can Earth's atmosphere make some space observations harder?

Impact of Telescope Design and Wavelengths

How do mirror size, sensitive instruments, and different wavelengths help scientists study distant objects?

Impact on Scientific Discovery

Why are space telescopes important for learning about stars, galaxies, planets, and other distant objects?

Part 7 – The Big Question

How do space telescopes help scientists see distant objects?

Use evidence from the investigation to explain how location, light collection, and telescope instruments improve what scientists can observe.

Part 5 – Pathway Tracking

Students determine the scientific pathway *that explains how space telescopes help scientists see further.*

Part 6 – Impact Analysis

Students analyze *how Earth's atmosphere, telescope design and location impact observations* using evidence from the case to support their answers.

Part 7 – The Big Question

Students synthesize all their learning to explain the main cause of the problem or issue in this case.

Part 8-10

Part 8 – Claim–Evidence–Reasoning (CER)

Claim

What is the main reason space telescopes help scientists see distant objects more effectively?

Evidence

- 1.
- 2.

Reasoning

Explain how your evidence supports your claim.

Part 9 – Solutions & Action Plan

Personal

What could students do to learn more about telescopes and how scientists study space?

Classroom / Investigation

How could students model one part of how a space telescope works in class?

Scientific / Engineering

How can scientists and engineers improve future space telescopes?

Part 10 – Reflection

One thing that surprised me during this investigation was:

One change I would make is:

Part 8 – Claim-Evidence-Reasoning (CER)

Students write a structured scientific argument, making a claim, supporting it with evidence, and explaining their reasoning for ***space telescopes help scientists see distant objects more effectively.***

Part 9 and 10 – Solutions and Reflection

Students propose realistic actions at the personal, school/community, and scientific/environmental system levels, moving from awareness to problem-solving.

Full Teacher Answer Key

Teacher Answer Key

Part 2 – Background Questions

1. What is a space telescope?
A space telescope is a telescope placed above Earth's atmosphere.
2. Why can a space telescope often see some objects more clearly than a telescope on Earth?
A space telescope can often see some objects more clearly because it is above Earth's atmosphere, which causes blurring and can detect some kinds of light that do not reach the ground.
3. How do different telescope instruments help scientists study distant objects?
Different telescope instruments help scientists study distant objects by collecting different kinds of light and by measuring details such as brightness, spectra, temperature, composition, and motion.

Part 3 – Evidence Log – Key Points

Evidence #	Key Understanding
1	This evidence suggests a cause because the atmosphere causes blurring and reduces image sharpness.
2	This evidence suggests a cause because some wavelengths of light do not reach telescopes on Earth.
3	This evidence suggests a pathway because large mirrors and sensitive detectors help collect faint light from distant objects.
4	This evidence suggests an impact because infrared light is hidden by dust.
5	This evidence suggests a cause because different telescope instruments study different wavelengths of light.
6	This evidence suggests an impact because space telescopes avoid problems caused by clouds, weather, or changing air.
7	This evidence suggests a pathway because longer exposure times help collect more light and build better data.
8	This evidence suggests an impact because spectra provide more information than pictures alone can show.
9	This evidence suggests a cause because being above the atmosphere improves the results of space telescopes.
10	This evidence suggests a cause because clear viewing, faint-light collection, and specialized tools all work together to improve what scientists can observe.

Part 4 – Sample Suspect Ranking

Ranking	Suspect	Explanation
1	Space telescopes avoid image blurring caused by Earth's atmosphere	This is one of the biggest reasons space telescopes can produce clearer observations.
2	Space telescopes can detect kinds of light that Earth's atmosphere blocks or weakens	This lets scientists observe objects and details that may be hidden from ground telescopes.
3	Large mirrors and sensitive instruments help collect faint light from distant objects	This is essential for seeing very faint objects.
4	Different telescopes are built to study different wavelengths and features	Specialized detectors and instruments help scientists study distant objects by collecting different kinds of light and by measuring details such as brightness, spectra, temperature, composition, and motion.
5	Space telescopes see better only because they are much closer to the stars	Distance alone does not make a difference in what can be observed.

Part 5 – Pathway Tracking

A telescope is placed above Earth's atmosphere to avoid blurring and less atmospheric blocking → large mirrors and sensitive detectors collect faint light → specialized instruments study different wavelengths of light → scientists observe distant objects more clearly and learn more about them

Part 6 – Impact Analysis

Impact of Earth's Atmosphere

Earth's atmosphere can make some space observations harder because it blurs incoming light, blocks some wavelengths, and adds interference from weather and changing air. This means some objects appear less sharp or may be harder to study from the ground. Space telescopes avoid many of these problems by observing above the atmosphere.

Impact of Telescope Design and Wavelengths

Mirror size, sensitive detectors, and different instruments help scientists study distant objects more clearly because they collect faint light and measure details like brightness, spectra, temperature, and motion. Different telescope instruments help scientists study distant objects by collecting different kinds of light and by measuring details such as brightness, spectra, temperature, composition, and motion. Some telescopes are designed mainly for visible light, while others study infrared, ultraviolet, or X-rays. Infrared instruments can reveal objects hidden by dust, and spectrometers can spread light into a spectrum so scientists can learn what distant objects are made of and how they are moving.

Part 7 – The Big Picture

Space telescopes help scientists study distant objects more clearly by avoiding blurring, collecting faint light, and using specialized tools. The evidence from this investigation shows that clear viewing, faint-light collection, and specialized tools all work together to improve what scientists can observe.

Understanding How Space Telescopes Help Scientists See Distant Objects

Scientists use telescopes to study stars, galaxies, nebulae, planets, and many other objects in space. Some of these objects are extremely far away and very faint. Others are hidden behind clouds of dust or give off kinds of light that human eyes cannot see. Because of this, scientists need powerful tools to observe space clearly and collect good information.

A space telescope is a telescope placed above Earth's atmosphere to observe objects in space. Unlike a telescope on the ground, a space telescope does not have to look through Earth's air, clouds, or weather. This can make observations clearer, and scientists can study distant objects.

A space telescope can see more clearly than a telescope on Earth because it avoids problems caused by Earth's atmosphere. Earth's atmosphere causes blurring and reduces image sharpness. It also blocks some kinds of light that do not reach the ground well. Earth's atmosphere weakens some kinds of light, including much ultraviolet, X-ray, and infrared light. Space telescopes can avoid many of these problems and collect clearer information.

Different telescope instruments help scientists study distant objects by collecting different kinds of light and by measuring details such as brightness, spectra, temperature, composition, and motion. Some telescopes are designed mainly for visible light, while others study infrared, ultraviolet, or X-rays. Infrared instruments can reveal objects hidden by dust, and spectrometers can spread light into a spectrum so scientists can learn what distant objects are made of and how they are moving.

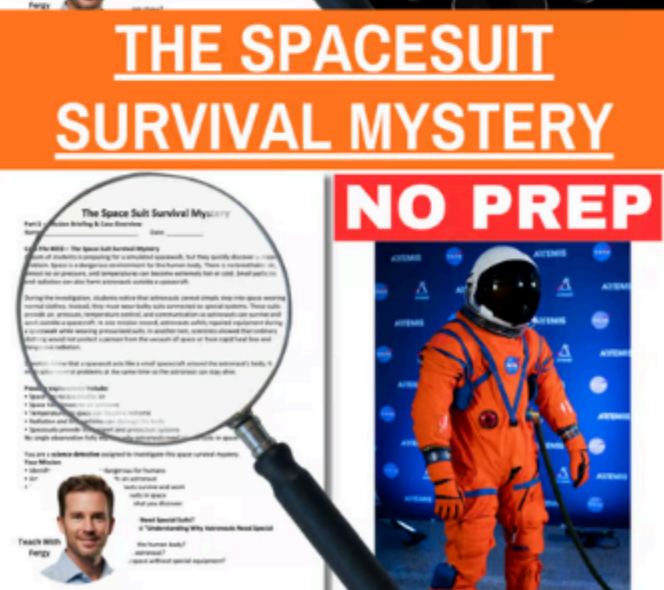
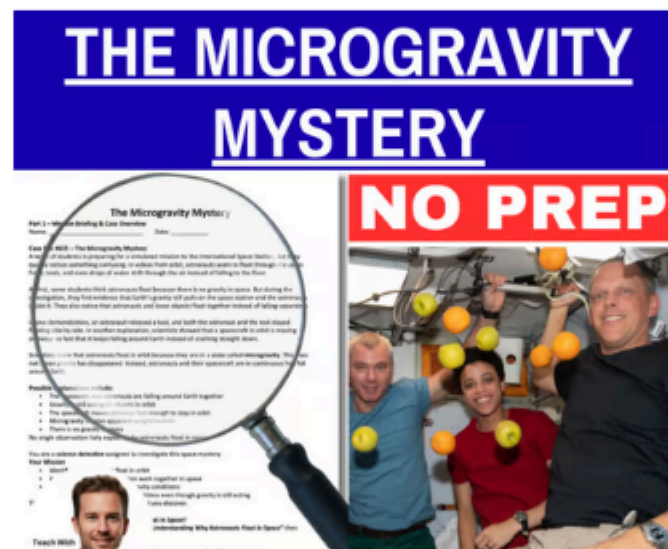
Large mirrors and sensitive detectors also help scientists collect faint light from distant objects. The more light a telescope can gather, the better it can detect faint galaxies, dim stars, and other hard-to-see targets. Some space telescopes also observe an object for a long time so they can collect even more information.

Rubric		Names:		Date:	
Section	Criteria	Level 4	Level 3	Level 2	Level 1
Part 2 – Background Questions	Understanding of Core Concepts	Answers are accurate, thorough, and clearly explained using correct scientific vocabulary	Answers are accurate with clear explanations	Answers are partially correct or lack detail	Answers are incomplete or inaccurate
	Use of Evidence from Reading	Consistently uses information from the background reading to support answers	Uses reading to support most answers	Limited reference to reading	Does not reference reading
Part 3 – Evidence	Understanding of Evidence	Accurately identifies cause, pathway, or impact for all evidence and clearly explains reasoning	Correctly identifies most evidence categories with clear explanations	Identifies some categories correctly but explanations are incomplete	Misidentifies most evidence or provides little explanation
	Use of Scientific Language	Consistent, precise scientific vocabulary	Appropriate scientific vocabulary	Limited or inconsistent vocabulary	Minimal scientific language
Part 4 – Sample Suspect Ranking	Ranking & Explanation	Ranking is logical and fully supported with case evidence	Ranking is mostly logical with some evidence support	Ranking is partially supported but reasoning is weak	Ranking lacks evidence or logical reasoning
	Pathway Tracking	Clearly traces accurate multi-step pathway showing how the problem leads through the body	Shows correct pathway with minor gaps	Shows limited or partially accurate connections	Pathway is unclear or inaccurate
Part 5 – Pathway Tracking	Explanation of System-Level Impact	Explains most effects correctly	Explains most effects correctly	Partial understanding	Limited understanding
	Cellular Impact	Mostly accurate explanation	Mostly accurate explanation	Basic or incomplete explanation	Inaccurate or missing explanation
Part 6 – Impact Analysis	Overall Health	General connection made	General connection made	Limited connection	No clear connection
	Reasoning	Clear explanation using some evidence	Clear explanation using some evidence	Basic explanation with limited evidence	Minimal or unsupported explanation
Part 7 – The Big Picture	Scientifically Accurate	Clear but somewhat general claim	Clear but somewhat general claim	Claim present but vague	Claim unclear or missing
	Relevant pieces of case evidence used	Some relevant evidence used	Some relevant evidence used	Limited or weak evidence	Evidence missing or irrelevant
Part 8 – Conclusion	Reasoning mostly clear with minor gaps	Reasoning mostly clear with minor gaps	Reasoning mostly clear with minor gaps	Limited reasoning connection	No clear reasoning
	Thoughtful personal, community, and medical/system solutions	Practical solutions in most categories	Practical solutions in most categories	Basic or incomplete solutions	Solutions missing or unrealistic
Part 9 – Reflection	Thoughtfulness & Insight	Deep reflection with personal connection	Clear reflection	Basic response	Minimal effort

Optional Marking Rubric

Space Exploration Mystery Bundle

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Thanks
**for your interest
in this resource!**

I am a real person and if
you have any questions,
suggestions, or concerns,
please reach out.



devon@teachwithfergy.com

TWF

Teach With Fergy

*Let's
Connect!*

