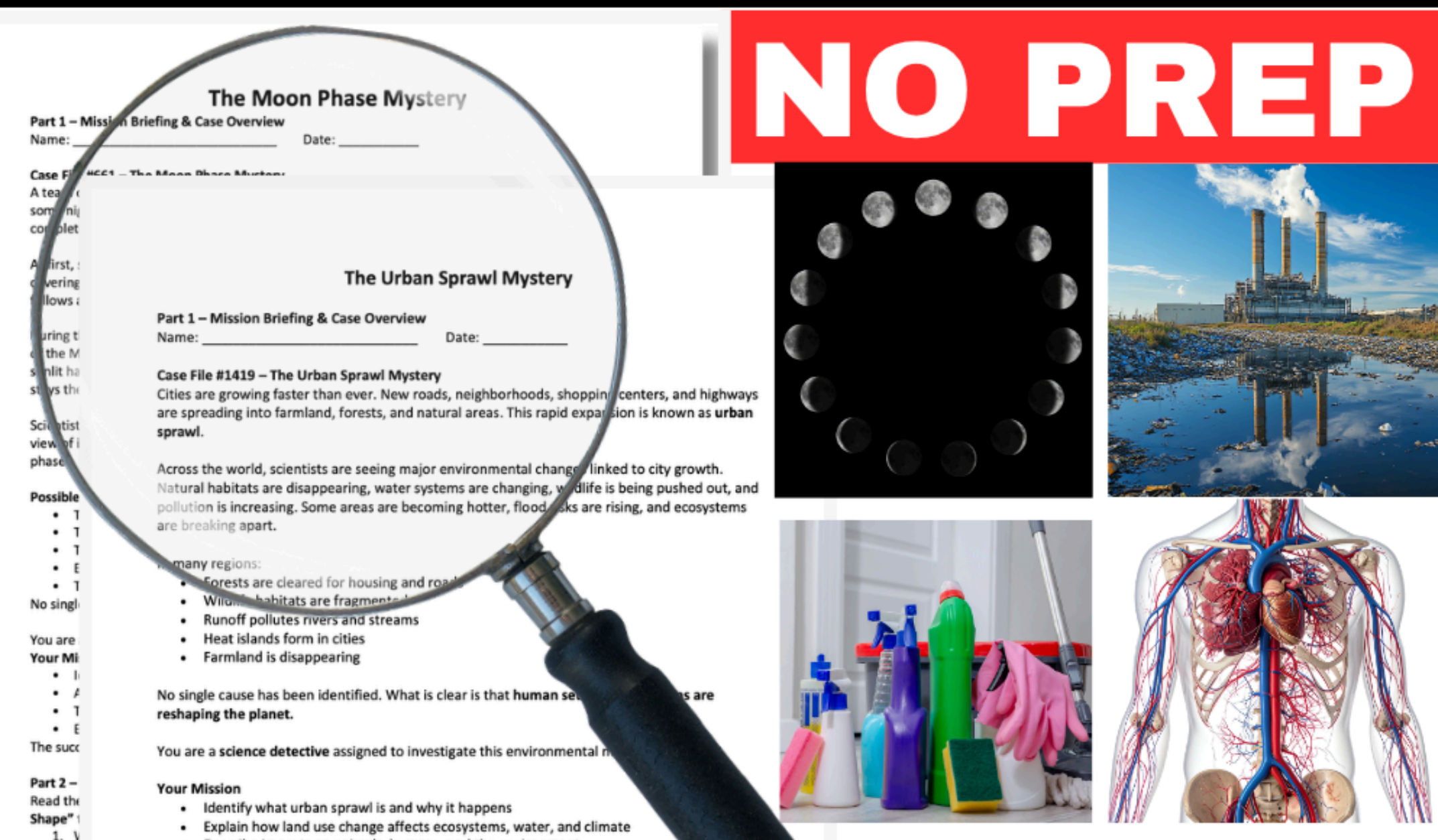


SCIENCE MYSTERY MEGA BUNDLE

PHYSICAL, LIFE, & ENVIRONMENTAL SCIENCE

NO PREP



The Moon Phase Mystery

Part 1 – Mission Briefing & Case Overview
Name: _____ Date: _____

Case File #1419 – The Moon Phase Mystery

A teacher has been assigned to investigate the mystery of the moon phases. The teacher has gathered some information and has completed a mission briefing. The mission briefing is as follows:

During the mission, the moon phases have been observed. The moon phases are as follows:

The Urban Sprawl Mystery

Part 1 – Mission Briefing & Case Overview
Name: _____ Date: _____

Case File #1419 – The Urban Sprawl Mystery

Cities are growing faster than ever. New roads, neighborhoods, shopping centers, and highways are spreading into farmland, forests, and natural areas. This rapid expansion is known as **urban sprawl**.

Across the world, scientists are seeing major environmental changes linked to city growth. Natural habitats are disappearing, water systems are changing, wildlife is being pushed out, and pollution is increasing. Some areas are becoming hotter, flood risks are rising, and ecosystems are breaking apart.

In many regions:

- Forests are cleared for housing and roads
- Wildlife habitats are fragmented
- Runoff pollutes rivers and streams
- Heat islands form in cities
- Farmland is disappearing

No single cause has been identified. What is clear is that **human settlement patterns are reshaping the planet**.

You are a **science detective** assigned to investigate this environmental mystery.

Your Mission

- Identify what urban sprawl is and why it happens
- Explain how land use change affects ecosystems, water, and climate

Part 2 – Read the Shape

1. V

★★★★★ Extremely satisfied -
“This product will make a great addition of Environmental Mystery Mondays for my Environmental Issues Curriculum, with no teacher prep needed.”

SCROLL

to take a look inside!

COMPREHENSIVE SCIENCE DETECTIVE MYSTERY COLLECTION

Classroom Fit Guarantee

I want you to feel confident when you purchase from Teach With Fergy. If a resource is not the right fit for your students, simply contact me and I'll provide double your purchase amount in store credit toward another resource in my store.



★ Complete student case files with guided worksheets for every step of the investigation.

★ 10 detailed evidence cards based on *actual research* and *real-world examples* that include images, graphs, and text.

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

What You Get in Each Mystery

NO-PREP. JUST PRINT TO GO!

Full investigation breakdown

The Urban Sprawl Mystery
Part 1 – Mission Briefing & Case Overview
Name: _____ Date: _____
Case File #1419 – The Urban Sprawl Mystery
Cities are growing faster than ever. New roads, neighborhoods, shopping centers, and highways are spreading into farmland, forests, and natural areas. This rapid expansion is known as urban sprawl.
Across the world, scientists are seeing major environmental changes. Natural habitats are disappearing, water systems are being polluted, and some areas are becoming hotter than others.
In many regions:
• Forests are cleared for housing and roads
• Wildlife habitats are fragmented
• Runoff pollutes rivers and streams
• Heat islands form in cities
• Farmland is disappearing

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 positions in space can create a new pathway.
Evidence # _____ Key Understanding _____

Part 4 – Suspect Ranking
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 is unclear or inaccurate.

Evidence Card 2 – Lung Irritation
Non-Healthy Lungs Healthy Lungs
Non-healthy lungs show inflammation and irritation in lung tissue compared to healthy lungs which are clear.
Detective Prompt: Why would lung damage affect breathing and oxygen exchange?

Evidence Card 6 – Velcro and Trays
Food packages and utensils are often attached to trays with clips or Velcro so they do not drift away.
Detective Prompt: Why would floating utensils and food packages be a problem?

Evidence Card 7 – Labeled Storage
Food packages are carefully labeled and organized so astronauts can track what they have and when it should be used.
Detective Prompt: Why is careful storage and labeling important on a mission?

Evidence Card 8 – Nutrition Planning
Astronaut meals are planned to provide enough calories, vitamins, and minerals during long missions.
Nutrition Need Real-World Astronaut Meal Planning Data
Daily calories: About 1,900–3,200 calories per day
Meals per day: 3 meals + 1 snack
Vitamins and minerals: Meals are planned to provide 100% of daily vitamin and mineral needs
High-calorie astronaut plan: About 3,200 calories per day
Fruit target in 3,200-calorie plan: 2.5 cups per day
Vegetable target in 3,200-calorie plan: 4 cups per day
Grain target in 3,200-calorie plan: 10 ounces per day
Protein target in 3,200-calorie plan: 7 ounces per day
Dairy target in 3,200-calorie plan: 3 cups per day
Detective Prompt: Why is nutrition especially important in space?

Marking Rubric
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. 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 Log Use of Evidence from Reading 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. Modifies most evidence categories but explanations are incomplete. Minimal scientific vocabulary.
Part 4 – Suspect Ranking 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 is unclear or inaccurate.
Part 5 – Pathway Tracking Cause and Effect Connections Clearly traces accurate multi-step pathway showing how the problem spreads through the body. Shows correct pathway with minor gaps. Shows limited or partially accurate connections. Pathway is unclear or inaccurate.
Part 6 – Impact Analysis Organ-Level Understanding Thorough explanation of system-level effects. Explains most effects correctly. Partial understanding. Limited understanding or missing explanation.
Cellular Understanding Clearly explains cellular impact. Mostly accurate explanation. Basic or incomplete explanation. Inaccurate or missing explanation.
Whole-Body Impact Strong connection to overall health impact. Clear explanation using some evidence. Clear explanation with limited evidence. Minimal or unsupported explanation.
Part 7 – The Big Question Explanation Using Evidence Thorough, logical explanation using multiple pieces of evidence. Clear explanation using some evidence. Basic explanation with limited evidence. Minimal or unsupported explanation.
Part 8 – Claim Claim Clear, specific, scientifically accurate claim. Clear but somewhat general claim. Claim present but vague. Claim unclear or missing.
Evidence Multiple relevant pieces of case evidence used. Some relevant evidence used. Limited or weak evidence used. Evidence missing or irrelevant.
Reasoning Clearly explains how evidence supports claim using science concepts. Reasoning mostly clear with minor gaps. Limited reasoning connection. No clear reasoning.
Part 9 – Realistic Solutions Thoughtful personal, community, and medical/system solutions. Practical solutions in most categories. Basic or incomplete solutions. Solutions missing or unrealistic.
Part 10 – Reflection Thoughtful reflection on investigation with personal connection. Clear reflection. Basic response. Minimal effort.

Interpretation & Recording Data
10 Evidence Cards to Determine Culprit

HOW THESE ACTIVITIES WILL HELP YOU

- Saves prep time with a fully structured, print-and-go investigations.
- 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 students analyze real evidence, make connections, and use CER to explain scientific phenomena and solve each mystery.

10-PART INVESTIGATIONS

For Each Investigations - Students:

1. Step into the role of a Science Detective.
2. Examine real scientific evidence using images, graphs, diagrams, and text.
3. Track the hidden causes, pathways, and impacts behind each mystery.
4. Interrogate possible explanations and identify the most likely scientific cause of the case.
5. Build a scientific case using Claim–Evidence–Reasoning.
6. Propose real solutions, explanations, or action plans that connect science to the real world.

“

★★★★★ Extremely satisfied - These "mysteries" were well written and complete...just print and go with very little set-up. It is student led and could be left for a substitute. I love that there is scaffolding for the CER process as well which allowed me to use in my study skills class. Definitely worth the money! - Mystery Buyer Comment”

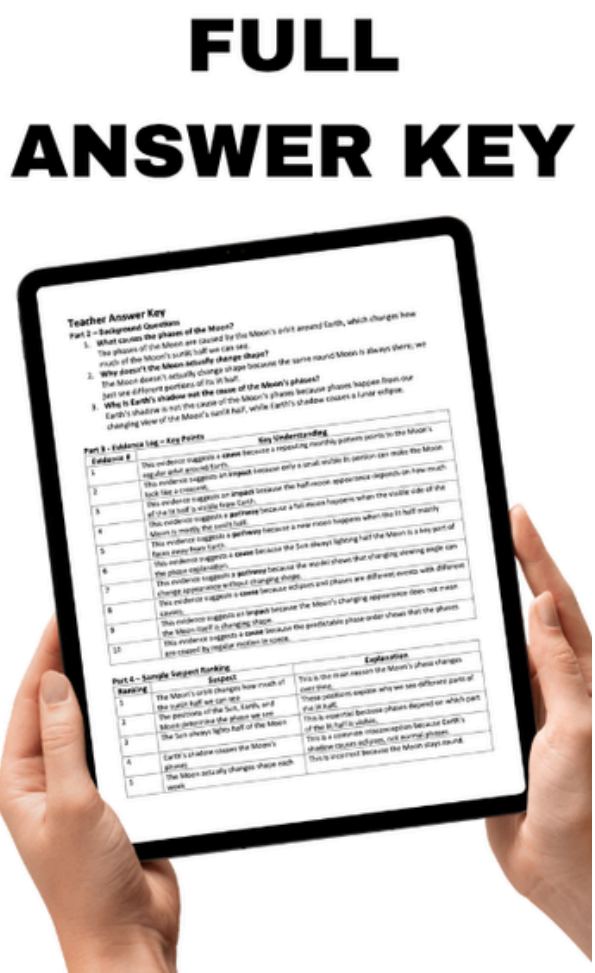
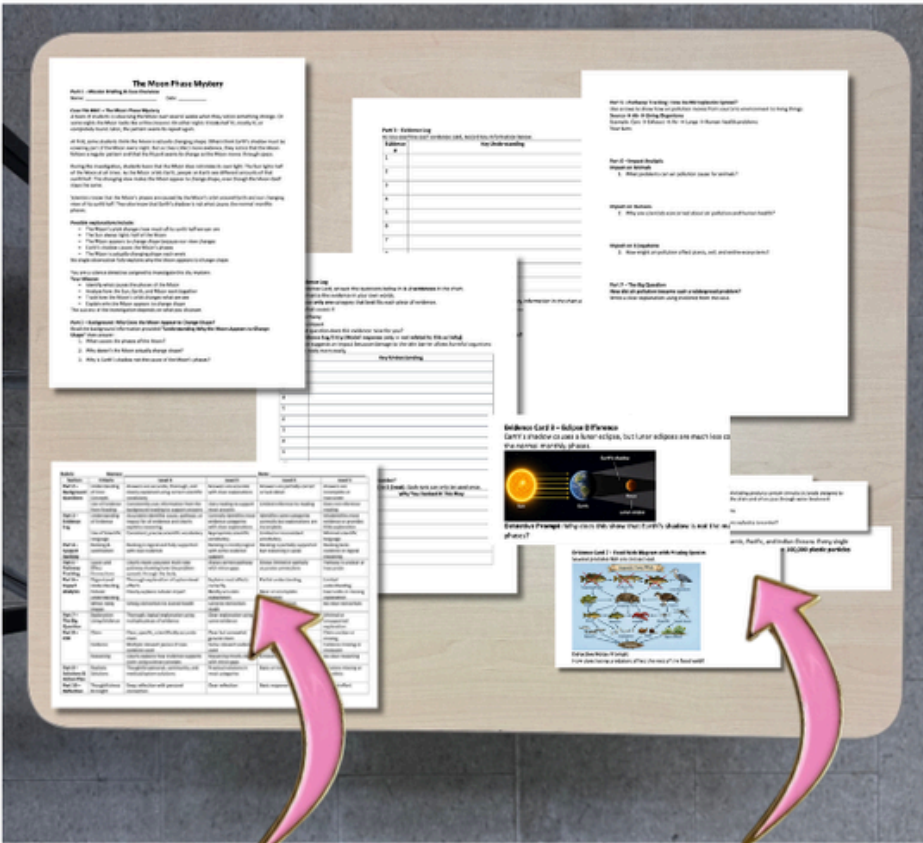
HOW THESE MYSTERIES WILL HELP YOU



- Prep-FREE and fully editable Mystery Investigations - just print/upload and assign with no materials.
- Engages every learner through hands-on, high-interest mystery investigations that boost motivation and participation.
- Strengthens instruction by aligning directly with NGSS.
- 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



- ✓ How science explains real-world phenomena in everyday life, the human body, the environment, and space
- ✓ How patterns, systems, and interactions help explain observable changes and events
- ✓ How matter, energy, forces, living systems, and environmental conditions affect outcomes
- ✓ How scientists use evidence to investigate problems and identify likely causes
- ✓ How changes develop through cause-and-effect pathways in scientific systems
- ✓ How scientific ideas connect across chemistry, life science, Earth science, and space science
- ✓ How to analyze scientific evidence including graphs, diagrams, images, and data
- ✓ How to compare explanations and justify conclusions using evidence
- ✓ How to construct scientific explanations using Claim–Evidence–Reasoning (CER)
- ✓ How scientific thinking helps solve real-world problems and deepen understanding of the world and universe

★★★★★ 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

THE SPACE COLONY MYSTERY PAGE-BY-PAGE EXAMPLE



THE SPACE COLONY MYSTERY

NO PREP

The Space Colony Mystery

Part 1 – Mission Briefing & Case Overview

Name: _____ Date: _____

Case File #662 – The Space Colony Mystery

A team of students is helping plan a future human settlement beyond Earth, but they quickly discover a major problem. Living on another world would be very different from living on Earth. People would not automatically have breathable air, liquid water, safe temperatures, or protection from radiation and harsh surface conditions.

During the investigation, students notice that survival on another world would depend on more than just building houses. A successful space colony would need reliable systems for air, water, food, waste management, power, and protection. If even one major system failed, the colony could be in danger.

In one example, engineers showed that habitats would need to be sealed and pressurized because many other worlds do not have breathable atmospheres. In another, scientists explained that water and air would likely need to be recycled because resupply from Earth would be limited and expensive. Students also found that food might need to be grown in controlled systems and that energy would likely be needed to power life-support equipment, heating, lighting, and communication.

Scientists know that a space colony must function like a carefully managed survival system. It must provide the basic needs humans require while also protecting people from dangerous conditions outside the habitat.

Possible explanations include:

- Humans need breathable air, water, food, shelter, and power
- A colony would need systems that recycle and manage resources
- Habitats would need protection from radiation and extreme temperatures
- Other worlds may not provide safe air pressure or liquid water
- Humans could survive on another world with careful planning

No single observation fully explains what humans would need to survive on another world.

You are a science detective assigned to investigate this survival mystery.

Your Mission:

- 1. What basic needs would humans need on another world?
- 2. How would you design a habitat to provide air, water, food, shelter, and power?
- 3. How would you manage resources to survive on another world?
- 4. What challenges would you discover?

Teach With A Fergy

Need to Survive on Another World?
Understanding What Humans Would Need to Survive on Another World

How to Survive on Another World?
How to meet the basic needs to survive on another world?

What Systems Would You Need?
What systems would you need to manage resources?

What Environment is Important on another world?



DETECTIVE FILE ON SPACE AND SPACE EXPLORATION

Part 1 & 2

The Space Colony Mystery

Part 1 – Mission Briefing & Case Overview

Name: _____ Date: _____

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- Humans need breathable air, water, food, shelter, and power
- A colony would need systems that recycle and manage resources
- Habitats would need protection from radiation and extreme temperatures
- Other worlds may not provide safe air pressure or liquid water
- Humans could survive on another world with very little planning

No single observation fully explains what humans would need to survive on another world.

You are a science detective assigned to investigate this survival mystery.

Your Mission

- Identify the basic systems humans would need on another world
- Analyze how a colony would provide air, water, food, shelter, and power
- Track how environmental dangers affect survival planning
- Explain what humans would need to survive on another world

The success of the colony depends on what you discover.

Part 2 – Background: What Would Humans Need to Survive on Another World?

Read the background information provided “Understanding What Humans Would Need to Survive on Another World” then answer:

1. What basic needs would humans have to meet to survive on another world?
2. Why would a space colony need closed or carefully managed systems?

Part 1 – Mission Briefing & Case Overview

Students take on the role of science detectives and are introduced to *how a Space Colony could be created.*

Part 2 – Understanding What Humans Would Need to Survive on Another World

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

Part 3 & 4

Part 3 – Evidence Log

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

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 a survival system must respond to changing environmental conditions in order to keep people alive.

Evidence #	Key Understanding
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Part 4 – Suspect List

What Would Humans Need to Survive on Another World?

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

Ranking	Suspect	Why You Ranked It This Way
	A colony would need systems that recycle and manage resources	
	Humans could survive on another world with very little planning	
	Habitats would need protection from radiation and extreme temperatures	
	Humans need breathable air, water, food, shelter, and power	
	Other worlds may not provide safe air pressure or liquid water	

Evidence Card 10 – System Reliability Pattern

Across many habitat designs, colonies were safest when air, water, food, power, wa: and protection systems all worked together.



Detective Prompt: What does this pattern suggest about surviving on another world?

Evidence Card 3 – Food Production

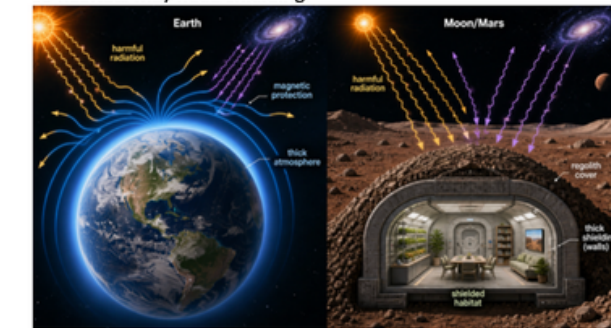
Astronaut-style stored food can help at first, but a lasting colony would also need reliable ways to grow or produce food over time.



Detective Prompt: Why would long-term food production matter on another world?

Evidence Card 5 – Radiation Protection

Other worlds may provide much less protection from harmful radiation than Earth does, so habitats may need shielding.



Detective Prompt: Why is radiation protection important for long-term survival?

Part 4 – Suspect List

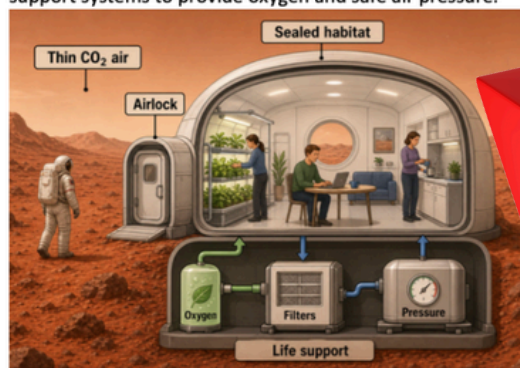
Students rank possible issues, defend their choices, and determine which suspect is most responsible for the problem.

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?

Evidence Cards

Evidence Card 1 – No Breathable Atmosphere
Many other worlds do not have breathable air for humans, so a colony support systems to provide oxygen and safe air pressure.



Detective Prompt: Why would a habitat need to replace what the outside environment cannot provide?

Evidence Card 2 – Water Recycling
A long-term colony would likely need to recycle water because bringing all water from Earth would be difficult and limited.



Detective Prompt: Why would reusing water be important for survival?

Evidence Card 3 – Food Production
-style stored food can help at first, but a lasting colony would also need ways to grow or produce food over time.
Prompt: Why would long-term food production matter on another world?

Evidence Card 4 – Power Systems
would need dependable energy to run lights, pumps, heaters, computers, communication systems, and life-support equipment.
Prompt: Why is power connected to almost every other survival system?

Evidence Card 5 – Radiation Protection
Other worlds may provide much less protection from harmful radiation than Earth does, so humans may need shielding.
Prompt: Why is radiation protection important for long-term survival?

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.
Choose the one category that best fits each piece of evidence.
☐ Pathway ☐ Impact

Example: This evidence suggests a survival system must respond to changing environmental conditions because a colony must be able to adapt to new conditions.

Evidence #	Key Understanding
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Part 4 – Suspect List
What Would Humans Need to Survive on Another World?
Rank the suspects from 1 (most responsible) to 5 (least responsible).

Ranking	Suspect	Why You Ranked It This Way
	A colony would need systems that recycle and manage resources	
	Humans could survive on another world with very little planning	
	Habitats would need protection from radiation and extreme temperatures	
	Humans need breathable air, water, food, shelter, and power	
	Other worlds may not provide safe air pressure or liquid water	

Images & Graphs

Text Only

Part 5-7

Part 5 – Pathway Tracking

How Would a Space Colony Support Human Survival?

Use arrows to trace the process.

Example:

Environmental challenge → changing conditions → survival response

Your Turn:

Use a similar pathway to trace how humans could survive on another world.

Part 6 – Impact Analysis

Impact of Basic Survival Needs

Why would a colony need systems for air, water, food, shelter, and power?

Impact of Closed or Managed Systems

Why would recycling and resource management be important in a space colony?

Impact of the Environment

Why would radiation, temperature, pressure, and surface conditions affect colony design?

Part 7 – The Big Question

What would humans need to survive on another world?

Use evidence from the investigation to explain how basic needs, life-support systems, and environmental protection would work together in a space colony.

Part 5 – Pathway Tracking

Students determine the scientific pathway responsible for *a space colony can support human survival.*

Part 6 – Impact Analysis

Students analyze *how humans can survive on a different planet* 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 humans would need carefully designed systems to survive on another world?

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 space colonies and human survival beyond Earth?

Classroom / Investigation

How could students model one challenge of living on another world in class?

Scientific / Engineering

How can scientists and engineers improve future space colony systems?

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 *the systems humans would need to survive on another world.*

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

- What basic needs would humans have to meet to survive on another world?**
Humans would have to meet their needs for breathable air, water, food, shelter, and power to survive on another world.
- Why would a space colony need closed or carefully managed systems?**
A space colony would need closed or carefully managed systems because supplies may be limited and air, water, and waste must be reused or controlled.
- Why is protection from the environment important on another world?**
Protection from the environment is important because other worlds may have extreme temperatures, radiation, low pressure, dust, and no breathable atmosphere.

Part 3 - Evidence Log – Key Points

Evidence #	Key Understanding
1	This evidence suggests a cause because many other worlds do not provide these conditions safely for humans.
2	This evidence suggests a pathway because water recycling is essential for functioning with limited supplies.
3	This evidence suggests an impact because long-term survival depends on production, not just stored supplies.
4	This evidence suggests a cause because power is needed for a survival system.
5	This evidence suggests an impact because radiation can be deadly on another world.
6	This evidence suggests an impact because extreme temperatures directly threaten human survival and safety.
7	This evidence suggests a pathway because a sealed, pressurized environment is needed for humans.
8	This evidence suggests a pathway because waste management is essential for resource reuse.
9	This evidence suggests an impact because local surface conditions affect equipment reliability.
10	This evidence suggests a cause because survival depends on many connected systems working together, not just one.

Part 4 – Sample Suspect Ranking

Ranking	Suspect	Reasoning
1	Humans need breathable air, water, food, shelter, and power	These are the most basic needs for survival.
2	A colony would need systems that recycle and manage resources	Recycling and resource management are essential for long-term survival.
3	Habitats would need protection from radiation and extreme temperatures	Environmental protection is crucial for human health and safety.
4	Other worlds may not provide safe air pressure or liquid water	This helps explain why Earth is the only known habitable planet.
5	Humans could survive on another world with very little planning	This does not fit the evidence that survival requires careful planning.

Part 5 – Pathway Tracking

A dangerous outside environment exists → the colony replaces missing air, pressure, water, food, and protection with managed systems → resources are controlled and recycled → humans live safely inside habitats → the colony can survive over time

Part 6 – Impact Analysis

Impact of Basic Survival Needs

A colony would need systems for air, water, food, shelter, and power because humans cannot survive without those basic needs. On another world, these resources may not exist in usable quantities. Without those basic needs, the colony cannot function. This means the colony must create or manage them artificially in order to survive.

Impact of Closed or Managed Systems

Recycling and resource management would be important for a colony to survive because resources would be limited and expensive to replace. Air, water, and food would need to be carefully managed and recycled so the colony could continue operating. Waste management is also crucial to reduce waste and make the most of limited resources.

Impact of the Environment

Radiation, temperature, pressure, and other environmental factors could directly threaten human survival and safety. Shielding, strong temperature control, safe pressure, and protection from the environment are essential. The harsher the environment, the more carefully the colony must be designed and engineered.

Part 7 – The Big Question

Humans would need breathable air, water, food, shelter, power, and protection to survive on another world. Because many other worlds do not provide these conditions safely, a space colony would need carefully designed habitats and managed systems to replace or control them. Recycling, waste management, food production, and environmental protection would all be important. The evidence from this investigation shows that survival on another world would depend on many connected systems working together.

Part 8 – CER Evidence

Claim

Humans would need carefully designed systems to survive on another world because of the evidence.

Evidence

- Many other worlds do not provide safe air pressure or liquid water.
- A long-term colony would need systems to recycle and manage resources.

Reasoning

The first piece of evidence shows that survival on another world would require careful planning. The second piece of evidence shows that survival would depend on many connected systems working together. Because a colony would need to replace missing conditions and control limited resources, the evidence supports the claim that survival would depend on carefully designed systems.

Understanding What Humans Would Need to Survive on Another World

Living on another world would be very different from living on Earth. On Earth, people are surrounded by breathable air, liquid water, and temperatures that can support life in many places. Earth also has an atmosphere that helps protect people from harmful radiation and dangerous pressure differences. On another world, many of these conditions might not exist. Because of this, humans would need carefully planned systems to survive.

Humans would have to meet their needs for breathable air, water, food, shelter, and power to survive on another world. These are the most basic needs for life. Breathable air would be needed for oxygen. Water would be needed for drinking, and other life-support systems. Food would provide the energy needed to stay healthy. Shelter would protect people from outside dangers like radiation, extreme temperatures, and other hazards. Life-support systems, communication equipment, and other technologies would also be needed.

Survival on another world would depend on using resources efficiently and keeping them under control. Resources like air, water, food, and power would need to be reused or controlled. It would be difficult and expensive to keep sending supplies from Earth. For this reason, a colony would need systems that recycle water, food, and other resources. The colony would also need to carefully monitor air and other important resources. If too much of one resource was used, the colony could quickly face a survival problem. A successful colony would depend on using resources efficiently and keeping them under control.

Protection from the environment is important because other worlds may have extreme temperatures, radiation, low pressure, dust, and no breathable atmosphere. Some worlds may be extremely hot or cold. Others may expose people to more radiation than Earth does because they do not have the same kind of atmosphere or magnetic protection. In many places, the outside air pressure would not be safe for humans, and some worlds may have dust or rough surface conditions that could damage equipment or make travel difficult. This means habitats would need to be sealed, pressurized, and built to protect people from the environment.

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 & 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	
	Clearly traces accurate multi-step pathway showing how the problem is solved through the body	Shows correct pathway with minor gaps	Shows limited or partially accurate connections	Pathway is unclear or inaccurate	
Part 5 – Pathway Tracking	Explains most effects correctly	Explains most effects correctly	Partial understanding	Limited understanding	
	Mostly accurate explanation	Mostly accurate explanation	Basic or incomplete explanation	Inaccurate or missing explanation	
Part 6 – Impact Analysis	General connection made	General connection made	Limited connection	No clear connection	
	Clear explanation using some evidence	Clear explanation using some evidence	Basic explanation with limited evidence	Minimal or unsupported explanation	
Part 7 – The Big Question	Clear but somewhat general claim	Clear but somewhat general claim	Claim present but vague	Claim unclear or missing	
	Some relevant evidence used	Some relevant evidence used	Limited or weak evidence	Evidence missing or irrelevant	
Part 8 – CER Evidence	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	Basic or incomplete solutions	Solutions missing or unrealistic	
Part 9 – Reflection	Deep reflection with personal connection	Clear reflection	Basic response	Minimal effort	

Background Reading

Optional Marking Rubric

THE STRESS RESPONSE & HEALTH PAGE-BY-PAGE EXAMPLE



THE STRESS RESPONSE & HEALTH BREAKDOWN MYSTERY

NO PREP

The Stress Response & Health Breakdown Mystery

Part 1 – Mission Briefing & Case Overview
Name: _____ Date: _____

Case File #623 – The Stress Response & Health Breakdown Mystery
Doctors and school health professionals are reporting an increase in patients experiencing frequent headaches, stomach pain, rapid heartbeat, difficulty sleeping, fatigue, irritability, and trouble concentrating. Some patients report feeling “on edge” most of the time, while others experience crashes in energy after stressful situations. Medical records show elevated stress hormone levels, increased heart rate and blood pressure during routine activities, and signs that the body is remaining in a prolonged state of alert.

Health officials suspect a breakdown in the **stress response system**—the body’s natural reaction to challenges or threats. While short-term stress responses help protect the body, long-term or repeated stress can disrupt normal body functions and lead to health problems affecting multiple systems.

Stress response breakdown has been linked to:

- Prolonged release of stress hormones
- Increased heart rate and blood pressure
- Disrupted sleep and digestion
- Reduced immune system function
- Difficulty focusing and regulating emotions

No single symptom explains the full problem. What is clear is that when the stress response remains active for too long, the body struggles to return to balance.

You are a science detective assigned to investigate this stress-related health mystery. Your Mission:

- How does the stress response normally work?
- How does the stress response remain activated?
- How does the stress response affect body systems?
- How does the stress response disrupt healthy stress regulation?
- How does the stress response protect long-term health?

Teach With Fergy

What is the stress response?
How is it activated, then answer:
What is its purpose?
How is it different from long-term stress?
Why are health problems difficult to detect early?

**DETECTIVE FILE ON HOW ISSUES
AFFECT THE HUMAN BODY**

Part 1 & 2

The Stress Response & Health Breakdown Mystery

Part 1 – Mission Briefing & Case Overview

Name: _____ Date: _____

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No single symptom explains the full problem. What is clear is that when the stress response remains active for too long, the body struggles to return to balance.

You are a science detective assigned to investigate this stress-related health mystery.

Your Mission

- Explain how the stress response normally works
- Identify what causes the stress response to remain activated
- Describe how chronic stress affects body systems
- Propose solutions that support healthy stress regulation

Understanding this system is key to protecting long-term health.

Part 2 – Background: What Is the Stress Response?

Read the background information provided, then answer:

1. What is the stress response, and what is its purpose?
2. How is short-term stress different from long-term stress?
3. Why can stress-related health problems be difficult to detect early?

Part 1 – Mission Briefing & Case Overview

Students are introduced to the stress response and how it impacts health and take on the role of science detectives.

Part 2 – Background: What is the Stress Response?

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

Part 3 & 4

Part 3 – Evidence Log

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

Part 3 – Evidence Log

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

- Summarize the evidence in your own words.
- Choose **only one** category that best fits each piece of evidence.
 - ☐ What causes it
 - ☐ Pathway
 - ☐ Its impact
- What question does this evidence raise for you?

Example Evidence Log Entry (Model response only — not related to this activity):

This evidence suggests an impact because it shows how long-term hormone release can disrupt normal body balance.

Evidence	Key Understanding
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

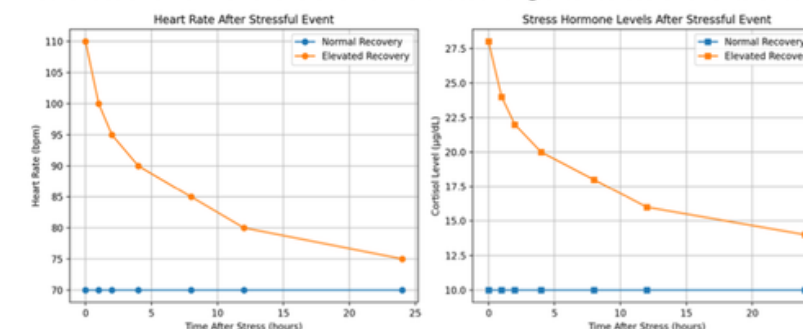
Part 4 – Suspect List: What Is Causing the Breakdown?

Rank the suspects from **1 (most responsible)** to **5 (least)**. Each rank can only be used once.

Suspect	Rank	Why You Ranked It This Way
Chronic stress exposure		
Prolonged cortisol release		
Lack of recovery time (sleep/rest)		
Environmental stressors (school, work, noise)		
Poor coping strategies		

Evidence Card 9 – Delayed Recovery

Heart rate and hormone levels remain elevated long after stressful events end.



Detective Prompt:

Why is returning to baseline important for health?

Evidence Card 1 – Elevated Cortisol Levels

Blood tests show consistently elevated cortisol levels, even during non-stressful situations.

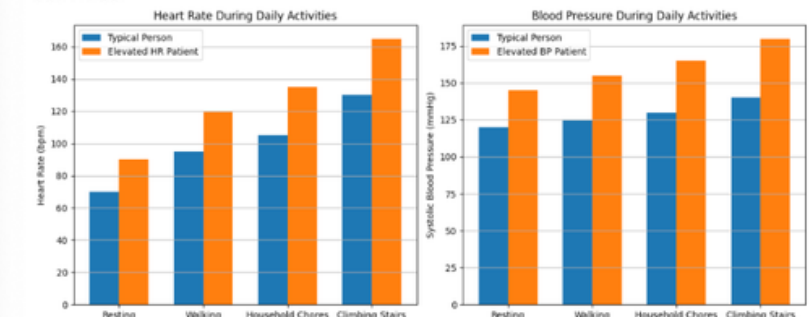
Blood Cortisol Test Results

Group Tested	Blood Cortisol Level (µg/dL)	When Measured	Interpretation
Healthy Individual (Normal)	6–18 µg/dL	Morning (8 a.m.)	Normal stress hormone regulation
Healthy Individual (Normal)	< 5 µg/dL	Evening	Cortisol properly decreases during rest
Patient with Elevated Cortisol	20–30 µg/dL	Morning (8 a.m.)	Abnormally high baseline

What role does cortisol

Evidence Card 2 – Increased Heart Rate and Blood Pressure

Patients show increased heart rate and blood pressure during routine daily activities.



Detective Prompt:

How does the stress response affect the cardiovascular system?

Part 4 – Evidence Analysis

Students summarize each piece of evidence, identify what it reveals about the stress response, and generate questions, building critical thinking and reasoning skills.

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 on the human body
3. Explain what question(s) this evidence raises for them?

**Images
&
Graphs**

Evidence Cards

Evidence Card 1 – Elevated Cortisol Levels

Blood tests show consistently elevated cortisol levels, even during non-stressful situations.

Blood Cortisol Test Results

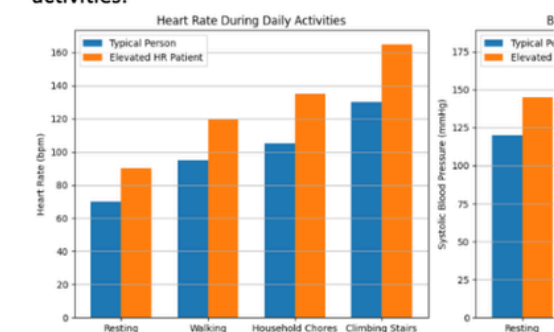
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Patient with Elevated Cortisol	10–20 µg/dL	Evening (non-stressful)	Cortisol remains high when it should be low

Detective Prompt:

What role does cortisol play in the stress response?

Evidence Card 2 – Increased Heart Rate and Blood Pressure

Patients show increased heart rate and blood pressure during routine daily activities.



Detective Prompt:

How does the stress response affect the cardiovascular system?

Evidence Cards – No Images

Evidence Card 1 – Elevated Cortisol Levels

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Detective Prompt:

What role does cortisol play in the stress response?

Evidence Card 2 – Increased Heart Rate and Blood Pressure

Patients show increased heart rate and blood pressure during routine daily activities.

Detective Prompt:

How does the stress response affect the cardiovascular system?

Evidence Card 3 – Sleep Problems

Patients report difficulty falling asleep or staying asleep.

Detective Prompt:

Why is it difficult to fall asleep after a stress response?

Evidence Card 4 – Digestive Problems

Patients experience frequent stomach pain, nausea, or changes in appetite during stressful periods.

Detective Prompt:

How does stress affect digestion?

**Text
Only**

Part 5-7

Part 5 – Pathway Tracking: How Does Stress Affect the Body?

Use arrows to show how stress spreads through the body.

Stress Trigger → Hormone Release → Body System Response → Health Impact

Example:

Deadline → Cortisol release → Increased heart rate → Fatigue

Your Turn:

Choose one stress-related issue from the case and trace its pathway.

Part 6 – Impact Analysis

Impact on Organs

How can long-term stress affect organs such as the heart, stomach, or brain?

Impact on Cells

Why can prolonged exposure to stress hormones affect normal cell function?

Impact on the Whole Body

How can chronic stress affect daily health, behavior, and performance?

Part 7 – The Big Question

How did the stress response shift from being helpful to becoming harmful in this case?

Use evidence from the investigation to explain.

Part 5 – Suspect List

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

Part 6 – Pathway Tracking

Students trace how the stress response leads to other health problems that affects the body.

Part 7 – Impact Analysis

Students analyze how the stress response affects organs, cells, and the whole body, using evidence from the case to support their answers.

Part 8-10

Part 8 – The Big Question

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

Part 9 – Claim-Evidence-Reasoning (CER)

Students write a structured scientific argument, making a claim, supporting it with evidence, and explaining their reasoning.

Part 10 – Reflection and Solutions

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

Part 8 – Claim–Evidence–Reasoning (CER)

Claim

What is the main cause of the stress-related health breakdown?

Evidence

List two pieces of evidence from the case.

- 1.
- 2.

Reasoning

Explain how your evidence supports your claim.

Part 9 – Solutions & Action Plan

Personal Actions (Things Individuals Can Do)

Community / School Actions

Medical or Health System Actions

Part 10 – Reflection

One thing that surprised me in this case was:

One change I would make after learning this information is:

Full Teacher Answer Key

Teacher Answer Key

Part 2 – Background Questions

1. What is the stress response, and what is its purpose?
The stress response prepares the body to respond quickly to challenges by releasing hormones that increase alertness and energy.
2. How is short-term stress different from long-term stress?
Short-term stress helps the body respond to challenges, while long-term stress keeps systems activated and causes damage.
3. Why are stress-related health problems difficult to detect early?
Symptoms often develop gradually and may be mistaken for normal tiredness or emotional changes.

Part 3 - Evidence Log – Key Points

Evidence #	Key Understanding
1	This evidence shows a cause , because cortisol controls stress response intensity.
2	This evidence shows an impact , as heart rate and blood pressure increase.
3	This evidence shows an impact , because lack of sleep prevents recovery.
4	This evidence shows an impact , as digestion slows during stress.
5	This evidence shows an impact , because immune function is reduced.
6	This evidence shows an impact , as stress affects brain processing.
7	This evidence shows a pathway , linking stress to muscle tension.
8	This evidence shows an impact , as energy is rapidly depleted.
9	This evidence shows a pathway , because delayed recovery explains how stress continues to affect the body.
10	This evidence shows a cause , due to constant stress exposure.

Part 4 – Suspect Ranking

High Responsibility:

- Chronic stress exposure
- Prolonged cortisol release

Moderate Responsibility:

- Lack of recovery time

Lower Responsibility:

- Environmental stressors
- Poor coping strategies

Part 5 – Sample Pathway

Stress trigger → Cortisol release → Increased heart rate → Fatigue and health disruption

Part 6 – Impact Analysis

- **Organs:** Long-term stress strains the heart, brain, and digestive organs.
- **Cells:** Stress hormones disrupt normal cell signaling and energy balance.
- **Whole Body:** Chronic stress affects health, mood, focus, and immunity.

Part 7 – The Big Question

The stress response became harmful because it remained activated for too long, preventing the body from returning to balance and causing system-wide effects.

Part 8 – CER (Sample)

Claim:

The main cause of the health breakdown is prolonged activation of the stress response.

Evidence:

Elevated cortisol levels and delayed recovery after stress.

Reasoning:

Constant hormone release keeps body systems activated, leading to fatigue and damage.

Part 9 – Solutions

- **Personal:** Practice stress management, sleep, and recovery.
- **Community:** Create supportive, lower-stress environments.
- **Medical:** Monitor and treat chronic stress effects.

Part 10 – Reflection (Sample)

One thing that surprised me in this case was:

How stress affects many body systems at the same time.

One change I would make after learning this information is:

I would prioritize recovery time and stress management.

Background Reading: The Stress Response and Health

Stress is a normal part of everyday life. People experience stress when facing challenges such as tests, deadlines, loud environments, or unexpected events. The body is designed to respond to these situations quickly in order to stay safe and focused. This automatic reaction is known as the **stress response**, and it plays an important role in helping the body handle short-term demands.

The stress response prepares the body to respond quickly to challenges by releasing hormones that increase alertness and energy. When a stressful situation is detected, the brain signals the adrenal glands to release hormones such as adrenaline and cortisol. These hormones increase heart rate, raise blood pressure, sharpen focus, and provide extra energy to muscles and the brain. This response allows the body to react rapidly to potential threats or demanding situations.

In healthy conditions, the stress response is temporary. Once the challenge passes, hormone levels decrease, and the body returns to a balanced state. This short-term stress response can be helpful and even protective. It allows people to concentrate, solve problems, and respond effectively during brief periods of pressure. Afterward, rest and recovery help the body reset.

Long-term stress is very different. When stressors are constant or repeated, the stress response can remain activated for long periods of time. Instead of returning to balance, the body continues releasing stress hormones. This ongoing activation places strain on body systems, including the heart, digestive system, immune system, and brain. Over time, this can lead to fatigue, sleep problems, weakened immunity, and difficulty concentrating.

Long-term stress can also affect how the body uses energy and maintains internal balance. Prolonged hormone release keeps muscles tense, increases heart workload, and interferes with digestion and recovery. Cells exposed to stress hormones for extended periods may struggle to function normally, which can contribute to system-wide health problems.

Stress-related health problems are often difficult to detect early because symptoms develop gradually. Early signs such as headaches, tiredness, irritability, or trouble sleeping may seem normal or temporary. If ignored, these symptoms can become more serious. Even if they are not always severe at first, they may be overlooked or blamed on other factors.

It is important to recognize that emotional and physical symptoms often appear together. Changes in mood, energy, or focus may be mistaken for emotional stress alone, rather than signs of physical strain on the body. As time passes and these symptoms become more noticeable, the stress response may have already affected multiple body systems.

Understanding how the stress response works helps explain why managing stress and allowing time for recovery are essential for long-term health. While short-term stress can be useful, prolonged stress can disrupt normal body function. Recognizing this difference is important for preventing stress-related health breakdowns and supporting overall well-being.

Background Reading