

Grade 7 Science "Space Wagon": Space Exploration

Traveling to another planet...What planet will you choose? What will you take with you?



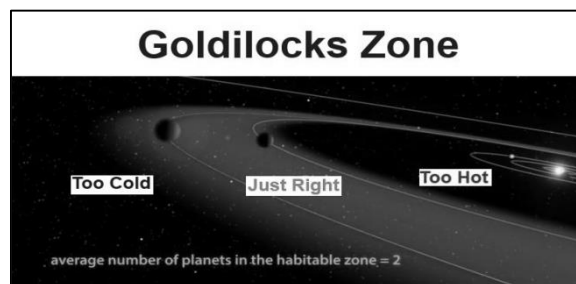
Day 1: Introduction

All organisms respond to stimuli, extract energy from food, eliminate waste, grow, and reproduce. In order for organisms to survive in their environment they require a few basic things. Living things on Earth are interconnected, meaning that many organisms rely on other organisms to survive. All organisms on Earth obtain the resources that they need from the environment. While not all organisms need exactly the same things there are some basics that we all need. They include:

W- Water cycles in our environment through the water cycle. All organisms require water to stay hydrated. Plants use water for photosynthesis, while humans need it to stay cool and hydrated. Both plants and animals need water in its liquid form. On a cold planet or moon there must be internal heat to melt ice, while on a hot planet water will need to be found trapped beneath the surface. Water has unique properties that make it important to life. Water's ability to transport substances within organisms makes it critical for life to exist. To be in all three phases of matter water must be in a small range of temperature and pressure which allows for a wide variety of habitats and microhabitats.

A- The **atmosphere** has essential elements such as carbon dioxide which plants use for photosynthesis and oxygen which animals breathe. Gases such as carbon dioxide in the atmosphere also insulate our planet by trapping heat, commonly known as the greenhouse effect. The ozone layer of the atmosphere protects us from harmful ultraviolet radiation by absorbing it. The atmosphere also acts like a shield by burning up things like meteors and space debris, keeping them from slamming into the ground. Without this protective layer Earth would be as barren as the moon.

G- Goldilocks Zone. Life on earth is limited to a temperature range between -15° to 115°C . Planet Earth is in just the right position in our solar system. Not too close to the sun, not too far away. The proximity to the sun determines how much liquid water exists on our planet and what the temperatures of the air and ground tends to be. It also determines how much energy is available to life on the planet Earth, as plants use the radiant energy of the sun in the process called Photosynthesis. This is the basis for all available energy in ecosystems.



O- Oxygen is a very important gas on Earth. About 21% of Earth's atmosphere is oxygen. Plants produce oxygen through photosynthesis and animals breathe in oxygen. Most living organisms require oxygen to live.

N- All organisms require **nutrients** to survive. The main elements that comprise the nutrients needed for survival are carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur. These elements are found within the food we eat. It is important that they are in constant supply. If people do not get the food they need to survive they will starve to death. This is true for other animals as well. Plants transform nutrients in the environment into a form that other organisms can use. A system for cycling nutrients in the environment and delivering them to organisms is important for life to survive.

The things people need to survive are becoming harder and harder to find on Earth. As the population grows the nutrients and water available stay the same. This means they are becoming more difficult to obtain. Our constant use of technology is pumping toxins into the atmosphere, limiting its ability to protect us, and deforestation (cutting down trees) is dropping the amount of oxygen available. Changes in the atmosphere are also causing changes to the global climate system which is increasing global temperatures. What are we going to do?

After you have read and annotated the passage complete the table below. Then discuss what you have written with your team.

| What did you learn? | What questions do you have? |
|---------------------|-----------------------------|
| | |

The Task.

You are a member of a group of scientists that are planning to start a colony on a new planet! Everyone has their own idea about which planet is best. Before you set off on your voyage, your group must come to a scientific conclusion about which planet is most likely to make a good home. The group realizes the fatal risk involved in moving to a planet that is not habitable. People could die if they walk on an unsafe planet. Your team must make a plan to determine where to go on your journey.

The guiding question of this investigation: ***Which planet will your team settle, and what will you need?***

| | |
|--|--|
| <p>Materials. You may use <u>any</u> of the following materials during your investigation:</p> <ul style="list-style-type: none"> • Planetary characteristic cards • Organism cards • Plant survival game (brainpop) • Conditions for survival on Earth • Exploring Extreme environments video • Life in Extremes • Space travel | <p>Equipment. This is how you will use the materials available to you!</p> <ul style="list-style-type: none"> • Computer with internet access • Headphones • Cards • Packet |
|--|--|

Safety Precautions: Only visit approved websites.

DAY 2 & 3: Getting Started. Before you can design and carry out your investigation, you must determine what type of data you will need to collect, how you will collect it, and how will you analyze it.

Investigation Proposal Required: Yes No

On the next page there is a Proposal form. You need to record the resource you think will best answer that question in the space provided. By listing a resource on the Proposal you are telling your teacher “My team plans to use this resource to get the information we need to be able to answer the guiding question.” To be clear: You are NOT answering the question on the proposal, you are JUST TELLING YOUR TEACHER WHAT RESOURCES YOU NEED.

On the back of the proposal page there is room to make notes. THIS is where you will write what you find in the resources that will help you to answer the question: ***Which planet will your team settle, and what will you need?*** There is more than one way to get to the correct answer(s).

If you want to add additional resources later you may, but this will let your teacher know where you want to start!

Name: _____

Period: _____

ADI Laboratory Investigation Proposal A: Descriptive Studies

The Guiding Question...

Which planet will your crew inhabit and what will you bring to ensure your survival?



What data will you collect?

1. What characteristics of our solar system make Earth habitable?

2. What are the characteristics of the other planets?

3. What are the conditions like in space?

4. What are the requirements for manned space travel?



Your Procedure

1. What tools will you use to find out about what makes Earth habitable?

2. How will you find out about the characteristics of other planets?

3. How can you find out about conditions in space?

How will you collect your data?

4. What can you use to determine what organisms would survive in space conditions?

5. How can you find information about requirements for manned space exploration?

6. How do you plan to organize your findings?



How will you analyze your data?

1. How will your data help you determine which planet is the best to inhabit?

2. How will your data help you determine which items you will need to take to survive?

I approve of this investigation.

Instructor's Signature

Date

Notes from information gained.



Inferences from the data you collected. Focus on the question you are trying to answer.



Claim: Answer to the question and support.

DAY 4: Close the research and Board Plan.

It is time to present your findings to the other teams around the world who are also trying to solve this problem. You are going to present using a white board, organized in such a way that other teams can understand your claim in just a few moments.

Before you start you are going to make a Board Plan. Plan the layout of the board you will be constructing tomorrow on the diagram below. This is your last chance to gather any final information you need.

If you would like to use a **blank sheet of paper** so that you have more room to write you may but you **MUST** use these rectangles, and you must keep the correct labels, though you can make them much smaller.

| | |
|-----------------------|------------------------------------|
| The Guiding Question: | |
| Our Claim: | |
| Our Evidence: | Our Justification of the Evidence: |

A few tips:

- The guiding question was given to you.
- Your claim is your answer to that question.
- Your evidence is the information you found in your resources.
- Your Justification of the Evidence is an explanation of why you think that evidence is important and connects your evidence to the scientific ideas from the introduction.

I approve this Board Plan _____ Date: _____

DAY 5: A Gallery of Boards

It is finally here! Today you are going to explain your board and the planet you are suggesting that humanity settle next! You are also going to listen to other groups present their information. You will do this by standing beside your board, as well as walking around and see the boards of other groups. Space is provided below for you to make notes about what you hear from other groups.

Remember: This is your big chance to get more information, and a different perspective. You have not yet written your final report and it is OKAY to change your mind, or to add details found by other teams! This is the time to get those details!

Information I need to add to our board:

Information I may want to change on my board:

Information I found interesting:

I feel the most prepared group was group _____ because.....

What can I do to be more prepared next time we have a Gallery of Boards?

DAY 6: Report your Findings

You have your research, and the notes you made yesterday. It is time to write your report. The report is independent work, meaning for this step you are NOT going to be working with your team. The job of the report is to show what you, as an individual have learned about Life on Earth, and what is needed for it to continue.

Humanity needs a new home. When I set out to do my research I focused on the guiding question _____
(Guiding question)

I, Dr. _____, *feel that we should choose to settle the planet*
(Your name)

_____. *To answer the guiding question I used many valuable resources*
(Planet number you chose)

including _____
(List the resource you used)

Here is what I found.

For life to exist on a planet that world has to have five things to support life, including _____
(Look at the reading, what five things support life?)

The planet I chose supports life by, _____
(Describe your evidence. What characteristics of the planet make it a good choice.)

I feel this evidence is important because, _____
(Look at your Justification!)

As I did my research, and reviewed the research of my peers, I learned many fascinating things, including _____
(At least one thing you found interesting)

Be prepared to have your writing reviewed by other students and to give feedback on other students' writing.