

5E Integrated STEM Lesson Plan – Template

This template serves as a guide for developing a lesson that integrates across subject areas and includes the components of a quality STEM lesson. Please use it to support your work and engage in discussions with your instructors and peers when you have questions.

Lesson Title: *Habitat in Space*

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Topic: *The relationship between an animal/persons' needs and the places they live. After 4 weeks of learning about Earth's habitats, students will create a way for people to live in space based on their habitats on Earth.*

Targeted Grade Level: *Kindergarten*

Time Needed: *1 hour 15 minutes (Can be broken up into two days with the final habitat design being done on day 2 (45 minute/30 minute)).*

Subject Integration: *Science, Engineering, Mathematics, and Literacy.*

Justification: *Literacy and science integrate smoothly with each other. We will be using an informational text to generate background knowledge of persons/animals needed to survive in their habitat. Students' will use their knowledge of the concepts of print, as well as, context clues to help interpret new vocabulary and the books' message. However, the purpose for literacy is for them to understand the 'main idea' and details of a topic. Engineering is integrated when students' design their habitat in space. They will have to take into account the needs (food, water, and shelter) when creating a model of their habitat. Mathematics will be integrated by students' also identifying 2-D shapes and 3-D forms to help them create a habitat from different materials. Their model will be labeled of shapes used and what each item is.*

Standards:

Colorado State Standards link: <https://www.cde.state.co.us/apps/standards/7,2,17/4,2,11/6,2,19>

Kindergarten Science 3.2.a;

Standard 3 Earth and Space Science

2. Plants and animals meet their needs in their habitats and impact one another; people can prepare for severe weather.

a. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. (K-ESS3-1) *(Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.*

Kindergarten Mathematics Standard 4.1.a;

Standard 4 Geometry. K.G.A. Geometry: Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to. (CCSS: K.G.A.1)

Kindergarten Mathematics Standard 4.2.b;

Standard 4 Geometry. K.G.B. Geometry: Analyze, compare, create, and compose shapes. b. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. (CCSS: K.G.B.5)

Kindergarten Literacy Standard 2.2.a;

Standard 2 Reading For All Purposes. 2. Develop and apply the concepts of print and comprehension of informational texts.

a. Use Key Ideas and Details to:

- *With prompting and support, ask and answer questions about key details in a text. (CCSS: RI.K.1) **
- *With prompting and support, identify the main topic and retell key details of a text. (CCSS: RI.K.2)*

NGSS Performance Expectations

Students who demonstrate understanding can:

K-ESS3-1 Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.]

NGSS Standard:

K-ESS3-1 Earth and Human Activity

<https://www.nextgenscience.org/pe/k-ess3-1-earth-and-human-activity>

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts:
<p>Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, storyboard) that represent concrete events or design solutions.</p> <ul style="list-style-type: none"> Use a model to represent relationships in the natural world. 	<p>ESS3.A: Natural Resources</p> <ol style="list-style-type: none"> Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. 	<p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

<p>Common Core State Standards: <i>Use your state standards if Common Core is not applicable in your state. You are encouraged to list the CCSS and your state standards.</i></p> <p>Math: 1. <i>Cause and Effect: Events have causes that generate observable patterns.</i></p> <p>2. <i>Systems and System Models: Systems in the natural and designed world have parts that work together.</i></p> <p>3. <i>Connections to Engineering, Technology, and Applications of Science: People encounter questions about the natural world every day. People depend on various technologies in their lives; human life would be very different without technology.</i></p> <p>ELA: <i>If applicable</i></p>		
<p>ITEEA Standards <i>(If applicable)</i></p>		
<p>Other Standards <i>(as needed)</i></p>		

Measurable Student Learning Objectives:

We will design a 3-D habitat.

Nature of STEM: *The lesson covers the Nature of STEM through several features. First, students are working with natural phenomena when they have to imagine the possibility of having to live on another planet. With the implementation of technology, students explore to build onto their background knowledge of habitats. Then, they elaborate from explanations given by scientists to help understand pros and cons of space to guide their design of a new habitat. Lastly, students then construct their design using materials to build a diorama showing how to establish a habitat that meets a person's needs for survival. Students' are able to explain through discussion of their diorama.*

Engaging Context/Phenomena: *(This lesson is intended to be given after 4 weeks of learning about different habitats on Earth) Students will be finding out that they will be leaving for Mars soon to live. But before they can live on Mars, they must design a suitable habitat for which they will live in.*

Data Integration: The data being used in this lesson will be from topographical maps, which will help observe and analyze the landscape for making a decision on what will be needed in a habitat to survive. Check-point data used from math curriculum and EL curriculum will be used to help guide the questions for helping know what shapes students need to focus more on, and which components of text should be spiraled in more if necessary.

Differentiation of Instruction: *I will provide lots of visuals and non-linguistics to help my ELL and SPED students. We will define vocabulary terms at the beginning of the lesson with a non-linguistic motion that will be used throughout the lesson for those vocabulary terms. I will sit in on each group to help support students' engagement and involvement.*

Real-life Connection: *Yes, there is a real-life connection because we all live in a habitat. Habitats are all around us no matter if it was our Earth's creation, or by human design. We see habitats out our front door, or man made habitats at zoos. Culturally responsive practices can be implemented into this lesson as habitats are found all across the world. It can be spiraled into how different cultures use their habitats (ie; the plants of that habitat will influence the food eaten by those people). Students will connect their background knowledge of animals and what they need to survive, as well as the possibility that in their future, they may have the chance to live on another planet.*

Possible Misconceptions: *That there are animals/aliens already living on some of our planets in the solar system, other than Earth.*

Lesson Procedure:

5E Model	5E Objectives
<p>Engage</p> <p><i>Introduce the lesson with an anchoring phenomenon. Facilitate student questions, discussion, etc. as appropriate. Learn about what students already know and want to know.</i></p>	<p>Procedure: We will discuss how other planets or planetary bodies are different habitats than Earth. (5 minutes)</p> <p>First the teacher will ask students' to describe what a habitat is. After thinking for 30 seconds, students will turn and discuss with their partner. Then, the teacher will get the class's attention and define what a habitat is; A place where people or animals make their home. The teacher will use a partner talk routine for the following questions: Are habitats for animals, humans or both? What is in a habitat? After each question, the teacher will share a few responses they heard being shared between partners.</p> <p>Modifications <i>non-linguistic hand motion is used for habitats that were taught during prior lessons.</i></p> <p>Standards Addressed Science 3.2.a, Literacy Standard 2.2.a</p> <p>Formative/Summative Assessments <i>through academic discourse (students responses to questions with partner talk)</i></p> <p>Resources</p>
<p>Explore</p> <p><i>Plan for students to engage in hands-on activities that are designed to facilitate conceptual change.</i></p>	<p>Procedure: We will examine various types of habitats on Earth, including the difference from location to location, and how these same principles apply once you leave Earth. (15 minutes)</p> <p>Students will then be exposed to pictures of habitats on Earth. After students are shown a picture of a habitat on Earth, they will then be asked what their reaction would be if they were told they were moving to this location. Students will engage in partner talk to answer questions, while the teacher walks around and listens. The teacher will get the class's attention and repeat back some of the responses heard. Students will then compare two different habitats on Earth from pictures and determine the supplies they may need to survive in these habitats. The teacher asks "what is the difference between these two habitats", then students' respond with "the difference is...". The teacher then passes out a blank piece of paper. The teacher instructs the students' to illustrate and label the supplies they may need to survive in one of the habitats shown. The teacher models drawing 2 supplies with a pencil (example; Antarctica habitat would illustrate a jacket and fishing rod). Provide 2-3 minutes for illustration. After illustrating, ask students "where do we see people trying to</p>

	<p>design and build man-made habitats like we see?” Students will respond with “I think we see man-made habitats……” Once you listen to the students’ share, then get their attention. Teacher will share some thoughts they heard (zoo, aquarium), and share that another place where people are trying to build a habitat for humans is in space. And that today they are going to design a habitat for space.</p> <p>Pull a blank sheet of paper on the board for the whole class to see. Discuss the following questions with a partner talk routine.</p> <p>Participants will describe how they manage their personal habitats. (i.e. do you have your own bedroom? How do you manage your bedroom? What supplies do you have in your room and why?)</p> <p>As students respond to questions, take notes on white sheet and have students guide you to draw a layout of a house and what rooms/supplies they have in it (Lots of things will differ, so stick to the ones that everyone has in common).</p> <p>Modifications <i>Allow SPED student to copy the teacher's paper.</i></p> <p>Standards Addressed Science 3.2.a, <i>Literacy Standard 2.2.a</i></p> <p>Formative/Summative Assessments <i>Through academic discourse and illustrations</i></p> <p>Resources</p> <p>Blank white sheet of paper for the whole class to see.</p> <p>Pictures of four habitats; ocean, desert, jungle, Antarctica.</p> <p><i>https://solarsystem.nasa.gov/planets/overview/</i></p>
<p><u>Explain</u></p> <p><i>Facilitate opportunities for students to explain their understanding of concepts and processes</i></p>	<p>Procedure: We will identify some of the challenges that may be encountered in trying to make space a habitat and express why they are challenges. (15 minutes)</p> <p>The environment of space will then be analyzed. The teacher will pull up the website to explore the solar system and planets (idle, this is best if the website can be shared to students’ and they can explore on their own 1:1 device). The teacher will select one planet and ask the following question, “What are the differences of this environment?” Have students think about the question for 30 seconds, then turn towards their partner. They will use the sentence frame “The differences are……”. Have the premade T-chart on the board for the whole class to see. Introduce the t-chart and how we will be using it today. Write down some of the thoughts you heard between partners. Do the same process for the following questions, “Are these challenges only applied to humans? Does this environment have any effect on the spacecraft? How does it compare to their home environment? How about the other environments that have been discussed on Earth?”</p>

<p><i>and make sense of new concepts.</i></p>	<p>Modifications <i>The teacher will be partnered with their SPED student to help facilitate the conversation, or desired outcome of question, before walking around to hear the rest.</i></p> <p>Standards Addressed Science 3.2.a, Literacy Standard 2.2.a</p> <p>Formative/Summative Assessments <i>Through academic discourse (partner talk)</i></p> <p>Resources https://solarsystem.nasa.gov/planets/overview/</p> <p><i>T-Chart: make a t-chart with the left side saying ‘problems’ and the right side saying ‘solutions’.</i></p>
<p>Elaborate</p> <p><i>Provide applications of concepts and opportunities to challenge and deep ideas; build on or extend understanding and skills.</i></p>	<p>Procedure: We will analyze some of the ways these problems might be solved and possible uses of chosen location resources. (10 minutes)</p> <p>Explain to the class that we will be watching videos to help us understand how some of these problems can be solved by scientists today. As the videos play, stop the videos to define the following terms with a non-linguistic;</p> <p>Atmosphere: an envelope of gas surrounding a planet or moon.</p> <p>Countermeasure: a measure or action taken to counter or offset another one. Astronauts exercise as a countermeasure against bone loss.</p> <p>Demineralization: the loss, deprivation, or removal of minerals or mineral salts from the body, especially through disease, as the loss of calcium from bones or teeth.</p> <p>Distill: to heat a liquid to make it a gas and then to cool the gas back to a liquid so that it is pure. One way to minimize the amount of water that has to be carried on a space mission is to distill waste water and fluids back into drinking water.</p> <p>Fluid: a substance, as a liquid or gas, that is capable of flowing. Ordinary methods of dealing with fluids, such as pouring, will not work in space.</p> <p>Nutrition: the science or study that deals with food and nourishment, especially in humans. Good nutrition is important in an astronaut’s food choice to maintain health and prevent bone loss in space.</p> <p>Orbit: to move or travel around a central object in an orbital or elliptical path. Earth orbits the Sun once every 365.25 days.</p>

	<p>Recycle: to treat or process used or waste materials so as to make them suitable for reuse.</p> <p>Terraforming: To transform (a landscape) on another planet into one having the characteristics of landscapes on Earth. Latin terra, <i>earth</i>;</p> <p>Weightless: the condition of being in a continual freefall during orbit so that all sense of gravitational attraction is lost. Astronauts need some time to get used to being weightless in space. (Have students move around the room as if they were weightless)</p> <p>After each video, on the T-chart write down some of the solutions students heard on the videos that would help with the problems.</p> <p>Modifications <i>None-but if needed, check frequently on SPED student as needed.</i></p> <p>Standards Addressed Science 3.2.a, Mathematics Standard 4.1.a, Mathematics Standard 4.2.b, Literacy Standard 2.2.a</p> <p>Formative/Summative Assessments Q&A gathered from students that was written on T-chart to assess their understanding of a problem, and the solution scientists have found.</p> <p>Resources https://www.nasa.gov/exploration/technology/deep_space_habitat/ https://www.nasa.gov/mission_pages/station/main/index.html https://www.nasa.gov/offices/education/programs/national/dln/events/Humans_To_Mars.html</p>
<p>Evaluate</p> <p><i>Assess students knowledge, skills and abilities.</i></p>	<p>Procedure: We will design a 3-D habitat for space.</p> <p>The teacher will let students know they will be working in a group of 4 to design a habitat on Mars that they could live in. Before they begin, use the partner talk routine previously used throughout this lesson to have partners talk about the following questions; What things would you need to consider about your new environment compared to Earth? What would be different? What would change? How will you survive?</p> <p>After discussion, provide a big table paper for each table to illustrate their plan. Before students begin work on their plan, show them the materials they will have available, as well as, letting them know it must be labeled, so they can include labels in their plan. Remind students that they are in outer space with no oxygen, and that needs to be accounted for in their design. (5 minutes to design). Once approved by the teacher (look for a source of food, water, and shelter in plan), allow</p>

students to start getting materials and building their design(25 minutes). After all designs are done, the class will take a 'gallery' walk so each group can show what they designed and how it provides the needs of humans on Mars.

Modifications *Sit next to SPED student to help support engagement and involvement with the group project. Provide a task they can do independently, so that the teacher can do a quick walk around and help others. Make sure students are grouped heterogeneous.*

Standards Addressed *Science 3.2.a, Mathematics Standard 4.1.a, Mathematics Standard 4.2.b, Literacy Standard 2.2.a*

Formative/Summative Assessments *If they have all three needed resources in their habitat (food, water, shelter)*

Resources

iPad or computer with a picture of Mars up.

Materials:

Box (shoe box or smaller)

Construction paper (varies colors)

glue

crayons

pipe cleaners

clay

sticky notes

tape

pencil

Teacher Background: *The teacher needs to have the background knowledge of their students' understanding of a habitat. This activity should only be done after teaching 4 habitats on Earth (1 habitat per 4 day week). That includes any vocabulary, hands-on activity for that habitat, or writing piece about a habitat.*

Habitat Design Rubric

	4	3	2	1	Notes/Comments
<i>Space Habitat Design</i>	<i>Shelter with three living areas, and two needed resources. Labels are made to identify what items are and what shapes are used.</i>	<i>Shelter with two living areas, and two needed resources. Labels are made to identify what items are and what shapes are used.</i>	<i>Shelter with one living area, and one needed resources.</i>	<i>Shelter made, but no other detail added.</i>	

Students' names: _____ Total: _____

_____ Date: _____

Habitat Pictures



