

Adapted Aliens



Background: We have been studying adaptations that animals and plants make to live successfully in the environment. Organisms fit in a specific niche in their habitat and have a specific role in the food chain. Imagine a new planet has recently been discovered outside of our solar system. This planet supports alien life, but it is very strange life.

Design Challenge: Design and create a freestanding device that allows you to show three different aliens with interchangeable body sections. The device should have at least three moveable parts. The device should show three heads, three bodies, and three sets of legs. The aliens should show different adaptations they have to make to their environment. The body parts should be able to be switched among aliens and fit together correctly.

Criteria:

- Your device must be freestanding and remain standing.
- It should have three choices each for the head, torso, and sets of legs.
- Your device must include at least three movable parts.
- The dimensions of the device should be between 8 inches wide by 8 inches tall and 12 inches wide by 12 inches tall.

Materials: Select from the list below.		Tools: Select from the list below.	
<ul style="list-style-type: none"> • card stock • glue • paper fasteners • recycled materials 	<ul style="list-style-type: none"> • scrap fabric • straws • yarn or string 	<ul style="list-style-type: none"> • card stock figure pattern • hole punch • low-heat hot glue gun (optional) 	<ul style="list-style-type: none"> • markers/colored pencils/crayons • ruler • scissors

Targeted Standard of Learning: Science 4.5
Supporting SOL: English 4.1, 4.2, 4.3, 4.7

Targeted Standard for Technological Literacy: 7
Supporting STL: 2, 5, 6, 8, 9

Tips for Teachers

Targeted Standards of Learning:

- Science 4.5 The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include
- plant and animal adaptations;
 - organization of populations, communities, and ecosystems and how they interrelate;
 - flow of energy through food webs;
 - habitats and niches;
 - changes in an organism's niche at various stages in its life cycle; and
 - influences of human activity on ecosystems.

Supporting SOL: English 4.1, 4.2, 4.3, 4.7

Targeted Standards for Technological Literacy:

7 Students will develop an understanding of the influence of technology on history.

Supporting STL: 2, 5, 6, 8, 9

Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
<ul style="list-style-type: none"> Concepts related to adaptation, niche, and habitat 	<ul style="list-style-type: none"> Discuss ways to create moving parts (but waiting to see what the student can create may be preferred). 	<ul style="list-style-type: none"> Use of hot glue guns 	<ul style="list-style-type: none"> Individually or in pairs Each student keeps a portfolio. 	<ul style="list-style-type: none"> Design Brief Guided Portfolio (adapt as appropriate/optional) Rubric Assessments 	Follow the Design Process: <ul style="list-style-type: none"> Restate the problem. Brainstorm solutions. Create the best solution. Test the solution. Evaluate the solution.

Tips for Teachers, continued

Extension Ideas:

Switch the alien devices among groups, and have groups write about other groups' devices.

Organize a "museum tour" with student groups making oral presentations related to their alien devices.

Differentiation Option: For students with more advanced reading skills, the following page is provided as an alternative to page 1.

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Guided Portfolio, p2

Name _____



2. Brainstorm solutions. Sketch and/or describe some possible solutions.

Name _____

4. Test your solution.

Does your device allow you to match up three different heads, torsos, and sets of legs? YES NO

Does your device stand alone? YES NO

- How did you make it stand? _____

Do your aliens reflect different adaptations? YES NO

Tell how the adaptations would help each alien be successful in its environment. _____

Does your device have at least three moveable parts?

YES

NO

Describe how your moveable parts work. _____

Is your device between 8 inches by 8 inches and 12 inches by 12 inches?

YES

NO

What is the exact height of your device? _____

What is the exact width of your device? _____

What tool did you use to measure your device? _____

Guided Portfolio, p5

Name _____

5. Evaluate your solution.

Was it the best solution? Would one of your other ideas have been better? Why, or why not?

Describe one thing you could have done differently in the construction of your device.

Describe one thing you could add to your device to make it better.

Rubric for Adapted Aliens

Name _____ Date _____

0—no evidence; 1—limited understanding; 2—some understanding with room for improvement; 3—good understanding with room for improvement; 4—substantial understanding

Design Brief Rubric	0	1	2	3	4
The student restated the problem in his/her own words.					
The student brainstormed more than one idea.					
The student kept notes and/or made sketches while creating a solution, to include problems and how they were solved.					
The student tested the device to make sure					
• it is freestanding					
• the alien represents different adaptations					
• it has a moveable symbol					
• it measures between 8 inches by 8 inches and 12 inches by 12 inches.					
The student evaluated how he/she could make it better next time.					

Rubric for Adapted Aliens

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Oral Communication Rubric		0	1	2	3	4
4.1 The student will use effective communication skills in a variety of settings.	a) Present accurate directions to individuals and small groups.					
	b) Contribute to group discussions across content areas.					
	c) Seek ideas and opinions of others.					
	d) Use evidence to support opinions.					
	e) Use grammatically correct language and specific vocabulary to communicate ideas.					
	f) Communicate new ideas to others.					
	g) Demonstrate the ability to collaborate with diverse teams.					
	h) Demonstrate the ability to work independently.					
	4.2 The student will make and listen to oral presentations and reports.	a) Use subject-related information and vocabulary.				
b) Listen to and record information.						
c) Organize information for clarity.						
d) Use language and style appropriate to the audience, topic, and purpose.						

Standards of Learning

English (2010)

Communication: Speaking, Listening, Media Literacy

- 4.1 The student will use effective oral communication skills in a variety of settings.
- a) Present accurate directions to individuals and small groups.
 - b) Contribute to group discussions across content areas.
 - c) Seek ideas and opinions of others.
 - d) Use evidence to support opinions.
 - e) Use grammatically correct language and specific vocabulary to communicate ideas.
 - f) Communicate new ideas to others.
 - g) Demonstrate the ability to collaborate with diverse teams.
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- 4.2 The student will make and listen to oral presentations and reports.
- a) Use subject-related information and vocabulary.
 - b) Listen to and record information.
 - c) Organize information for clarity.
 - d) Use language and style appropriate to the audience, topic, and purpose.
- 4.3 The student will learn how media messages are constructed and for what purposes.
- a) Differentiate among auditory, visual, and written media messages.
 - b) Identify the characteristics of various media messages.

Writing

- 4.7 The student will write cohesively for a variety of purposes.
- a) Identify intended audience.
 - b) Focus on one aspect of a topic.
 - c) Use a variety of pre-writing strategies.
 - d) Organize writing to convey a central idea.
 - e) Recognize that different modes of writing have different patterns of organization.
 - f) Write a clear topic sentence focusing on the main idea.
 - g) Write two or more related paragraphs on the same topic.
 - h) Use transition words for sentence variety.

- i) Utilize elements of style, including word choice and sentence variation.
- j) Revise writing for clarity of content using specific vocabulary and information.
- k) Include supporting details that elaborate the main idea.

Science (2010)

Life Processes

- 4.5 The student will investigate and understand basic plant anatomy and life processes. Key concepts include
- a) plant and animal adaptations;
 - b) organization of populations, communities, and ecosystems and how they interrelate;
 - c) flow of energy through food webs;
 - d) habitats and niches;
 - e) changes in an organism's niche at various stages in its life cycle; and
 - f) influences of human activity on ecosystems.

Standards for Technological Literacy

- Standard 2: Students will develop an understanding of the core concepts of technology.
- Standard 5: Students will develop an understanding of the effects of technology on the environment.
- Standard 6: Students will develop an understanding of the role of society in the development and use of technology.
- Standard 7: Students will develop an understanding of the influence of technology on history.
- Standard 8: Students will develop an understanding of the attributes of design.
- Standard 9: Students will develop an understanding of engineering design.

Please give us some feedback.

Complete the form below to let us know how this design brief worked for you and your students. Please be specific so that we might use your suggestions to improve the activity. *You can fill this out on your computer, or you can print it, fill it out manually, and scan it.*

Teacher: _____

School: _____

School division: _____

Design brief title: _____

Background	<i>Put an X in the appropriate column:</i>	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Does it set the context for the activity?				
Is it age-appropriate in language, length, and complexity?				
Does it reference prior learning and/or research that the students did that will facilitate designing a solution to a problem?				
Is it detailed enough that an adult will understand the purpose for the design brief?				
COMMENTS. <i>If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.</i>				

Design Challenge	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Does the challenge support your curriculum?			
Is it age-appropriate in language, length, and complexity?			
Is it detailed enough that an adult will understand the purpose for the design brief?			
COMMENTS. <i>If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.</i>			

Criteria Criteria are part of the challenge. They set the limitations for the design. They are not directions.	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use	N/A
Are the limitations age-appropriate?				
Do the limitations encourage critical thinking?				
Is the application of mathematic knowledge/skills integrated into the criteria? If not, should the skill area be addressed?				
Is the application of science knowledge/skills integrated into the criteria? If not, should the skill area be addressed?				
Is the application of social studies knowledge/skills integrated into the criteria? If not, should the skill area be addressed?				
Are language skills integrated into the criteria? If not, should the skill area be addressed?				
COMMENTS. <i>If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.</i>				

Materials Materials help set the limitations for the design. The list should include materials that might work.	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use	N/A
Does the materials list encourage a variety of design solutions?				
Does the materials list include a variety of choices for joining items?				
Does the materials list include materials that force students to make decisions?				
COMMENTS. <i>If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.</i>				

Tools Tools can be used in the construction of the designed product. They are used to manipulate materials. They cannot become part of the product.	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Are the tools listed age appropriate?			
Are all tools needed for the activity included?			
COMMENTS. <i>If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.</i>			

Standards of Learning	Yes	No
Does the design brief reinforce the targeted Standard of Learning(s)?		
Are the supporting Standards of Learning appropriate?		
What Standards of Learning would you add or remove?		

Standards for Technological Literacy	Yes	No
Does the design brief reinforce the targeted Standard(s) for Technological Literacy?		
Are the supporting Standards for Technological Literacy appropriate?		
What Standards for Technological Literacy would you add or remove?		

Tips for Teachers	Yes	No
Are the tips listed in the chart helpful for a first-time teacher?		
What tips would you add?		

Guided Portfolio	Needs to be rewritten	Needs minor adjustment	Is ready for classroom use
Are the instructions and questions age appropriate and clear?			
In the "Test your solution" section, do the questions force students to thoroughly test their solutions?			
In the "Evaluate your solution" section, do the questions force students to honestly evaluate their solutions			
COMMENTS. <i>If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.</i>			

<p>Additional Comments Please use this area to provide general suggestions for improving this design brief.</p>