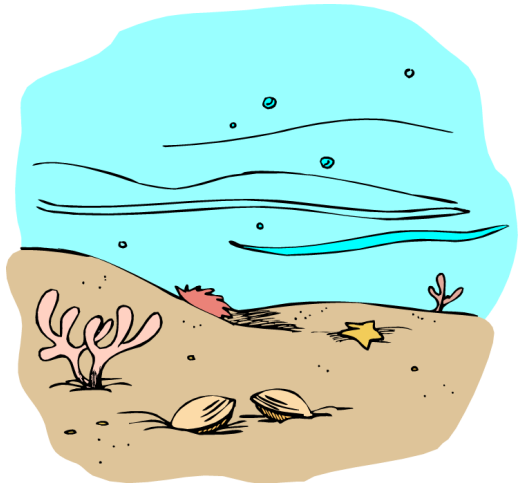
Ocean Floor Pop-Up Card

Background: The ocean floor is made up of a great variety of formations, from underwater mountains to trenches big enough to hold them. Scientists studying the depths of our oceans have been going deeper and deeper as new technologies are developed that open up this amazing part of our world.



Design Challenge: Design and create a pop-up card that shows the different ocean floor formations using a variety of 3-D and pop-up interactive parts. You should include all of the ocean floor formations you have studied in class.

Criteria: Your pop-up must

- ☐ have at least three different types of interactive parts
- ☐ be freestanding
- ☐ include all ocean floor formations studied in class
- ☐ include labels or a key for all formations
- ☐ must be no larger than a standard letter-sized sheet of paper.

Materials: Select from the list below.		**Tools:** Select from the list below.
• card stock • Cellophane • construction paper • craft sticks • glue	• index cards • paper fasteners • tape • yarn	• crayons/colored pencils/markers • hole punch • pens/pencils • ruler • scissors

Targeted Standard of Learning: Science 5.6
Supporting SOL:

Targeted Standard for Technological Literacy: 10
Supporting STL: 8, 9, 11

Tips for Teachers

Targeted Standard of Learning:

Science 5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include
a) geological characteristics;
b) physical characteristics; and
c) ecological characteristics.

Supporting SOL:

Targeted Standard for Technological Literacy:

10 Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Supporting STL: 8, 9, 11

Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
• Ocean floor formations	• See Design Brief for recommended materials.	• Safe use of tools	• Individual or pairs • Each student keeps own Guided Portfolio.	• Design Brief • Guided Portfolio (adapt as appropriate/ optional) • Rubric Assessments	Follow the Design Process: • Restate the problem. • Brainstorm solutions. • Create the best solution. • Test the solution. • Evaluate the solution.

Extension Ideas:

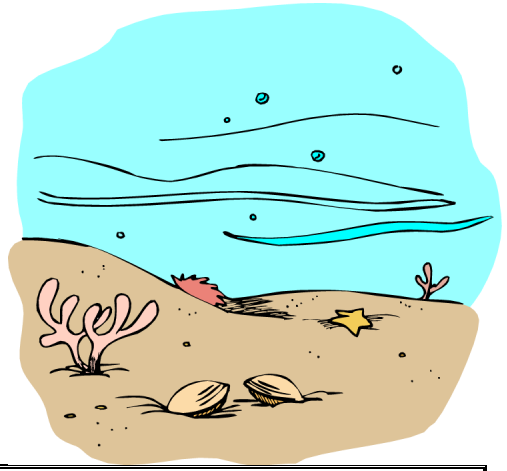
- Have students create pop-up cards to show the layers of the Earth.
- Have students create pop-up cards to demonstrate plate tectonics.

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

Ocean Floor Pop-Up Card Extension

Background: The ocean floor is made up of a great variety of formations, from underwater mountains to trenches big enough to hold them. Scientists studying the depths of our oceans have been going deeper and deeper as new technologies are developed that open up this amazing part of our world.

Design Challenge: Design and create a pop-up card that shows the different ocean floor formations using a variety of 3-D and pop-up interactive parts. Your card must have at least three different types of interactive parts. You should include all of the ocean floor formations you have studied in class and include labels or a key for all formations. Your card must be no larger than a standard letter-sized sheet of paper.



Materials: Select from the list below.		**Tools:** Select from the list below.
• card stock • Cellophane • construction paper • craft sticks • glue	• index cards • paper fasteners • tape • yarn	• crayons/colored pencils/markers • hole punch • pens/pencils • ruler • scissors

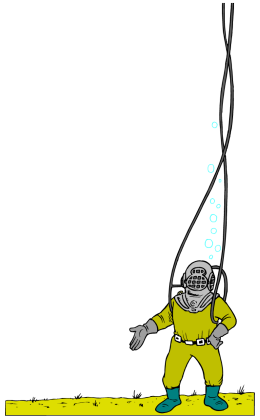
Targeted Standard of Learning: Science 5.6

Supporting SOL:

Targeted Standard for Technological Literacy: 10

Supporting STL: 8, 9, 11

Guided Portfolio



Name _____

Group Members_____

1. What is the problem? State the problem in your own words.

_____

_____

_____

_____

_____

_____

_____

_____

_____

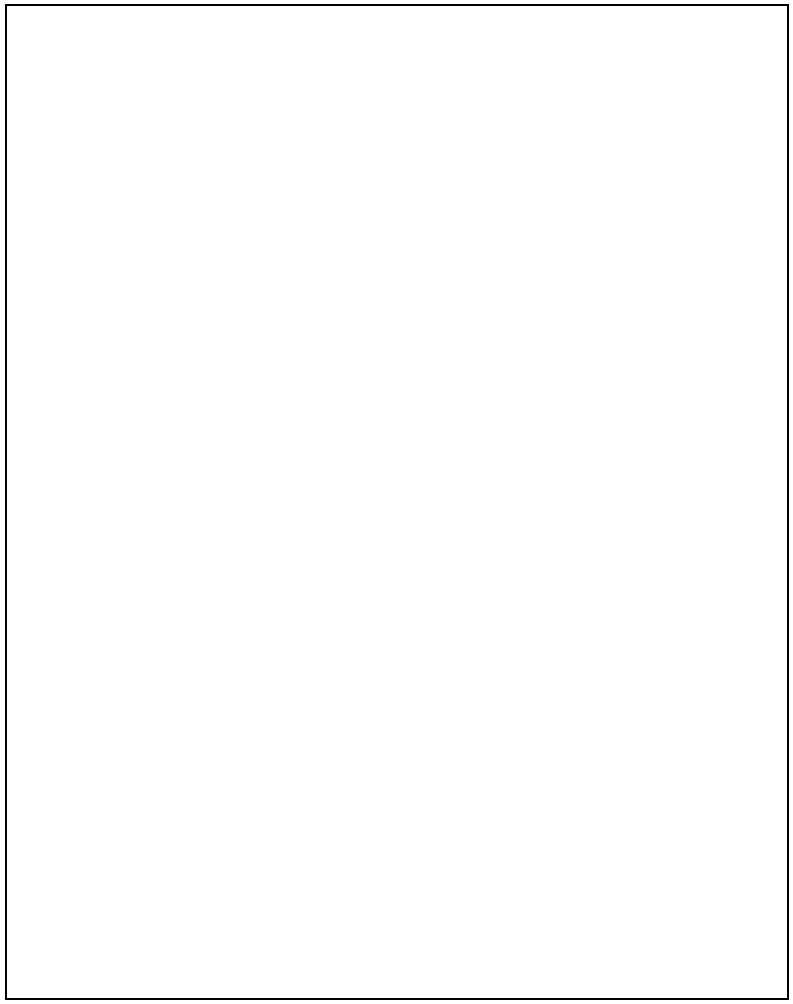
Name _____

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

Name _____

3. Create the solution you think is best.

Keep notes about your problems and how you solve them. Make sketches if they help.



Name _____

4. Test your solution.

Does your pop-up card have at least three different types of interactive parts? YES NO

- Describe the parts:_____

_____

_____

Is your pop-up card freestanding? YES NO

Did you include all the ocean floor formations studied in class? YES NO

- Which formations did you include? _____

_____

_____

Does your pop-up card include labels or a key for the ocean floor formations? YES NO

Is your pop-up card the correct size? YES NO

Name _____

5. Evaluate your solution.

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

_____

_____

_____

What would you have done differently?

_____

_____

_____

Could you add to it to make it better? What would you add to it?

_____

_____

_____

Rubric for Ocean Floor Pop-Up Card

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 pop-up card to make sure					
• it has at least three different types of interactive parts					
• it is freestanding					
• it includes all the ocean floor formations studied in class					
• it includes labels or a key for the ocean floor formations					
• it is the correct size.					
The student evaluated how he/she could make it better next time.					

Rubric for Ocean Floor Pop-Up Card

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

Communication: Speaking, Listening, Media Literacy Rubric	**0**	**1**	**2**	**3**	**4**
5.1 The student will listen, draw conclusions, and share responses in subject-related group learning activities.					
a) Participate in and contribute to discussions across content areas.					
b) Organize information to present reports of group activities.					
c) Summarize information gathered in group activities.					
d) Communicate new ideas to others.					
e) Demonstrate the ability to collaborate with diverse teams.					
f) Demonstrate the ability to work independently.					
5.2 The student will use effective verbal and nonverbal communication skills to deliver planned oral presentations.					
a) Maintain eye contact with listeners.					
b) Use gestures to support, accentuate, and dramatize verbal message.					
c) Use facial expressions to support and dramatize verbal message.					
d) Use posture appropriate for communication setting.					
e) Determine appropriate content for audience.					
f) Organize content sequentially around major ideas.					
g) Summarize main points as they relate to main idea or supporting details.					
h) Incorporate visual media to support the presentation.					
i) Use language and style appropriate to the audience, topic, and purpose.					

Standards of Learning

Science (2010)

Interrelationships in Earth/Space Systems

5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include
- a) geological characteristics;
- b) physical characteristics; and
- c) ecological characteristics.

Standards for Technological Literacy

Standard 8: Students will develop an understanding of the attributes of design.

Standard 9: Students will develop an understanding of engineering design.

Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Standard 11: Students will develop abilities to apply the design process.

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 *Put an X in the appropriate column:*	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. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

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. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

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. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*				

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. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*				

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. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

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. *If any of the questions above are marked other than "ready for classroom use," please provide suggestions here.*			

Additional Comments Please use this area to provide general suggestions for improving this design brief.