

Phases of the Moon Shadow Puppet Show

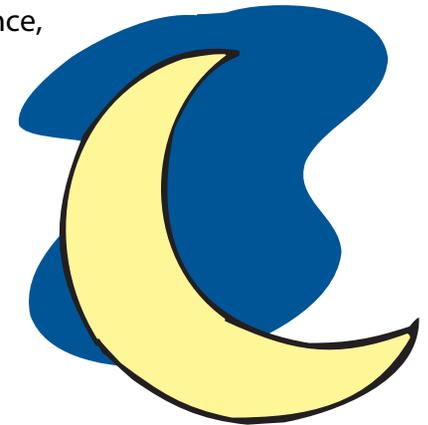
Background: You know that a shadow can be made by using a light and something that blocks the light. In science, we study phases of the moon—how the sun’s reflection and the moon’s position create the phases over a month.

Design Challenge: Design and create shadow puppets that will be used to illustrate the phases of the moon in a puppet show.

Criteria:

The puppets must

- be used to illustrate each of the phases of the moon
- cast shadows on the background
- each be between 4 and 4½ inches in height and width
- collectively show all phases over a month in the context of a puppet show
- include one puppet made using a transparent material.



Materials: Select from the list below.	Tools: Select from the list below.
<ul style="list-style-type: none">• construction paper• craft sticks• glue• paint stirring sticks• paper fasteners	<ul style="list-style-type: none">• pieces cut from clear, recycled cups• pieces cut from clean, used baggies• scraps of transparency film• scrap paper• tape (limit 12 inches)• hole punch• pencil• pushpin paper drill• scissors

Targeted Standard of Learning: Science 3.8
Supporting SOL: English 3.1, 3.2

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

Tips for Teachers

Targeted Standard of Learning:

- Science 3.8 The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include
- patterns of natural events such as day and night, seasonal changes, simple phases of the moon, and tides;
 - animal life cycles; and
 - plant life cycles.

Supporting SOL: English 3.1, 3.2

Targeted Standard for Technological Literacy:

- 11 Students will develop the abilities to apply the design process.

Supporting STL: 8, 9, 10

Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
<ul style="list-style-type: none"> Exposure to concepts and vocabulary related to phases of the moon Exposure to concepts related to shadows 	<ul style="list-style-type: none"> A puppet theater can be set up with an overhead projector and a white screen or other white background. Check Design Brief for recommended materials. Teacher may substitute materials. 	<ul style="list-style-type: none"> Discuss proper use of tools. Be aware of food allergies when using recycled containers. 	<ul style="list-style-type: none"> Groups or pairs 	<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.

Guided Portfolio, p2

Name _____



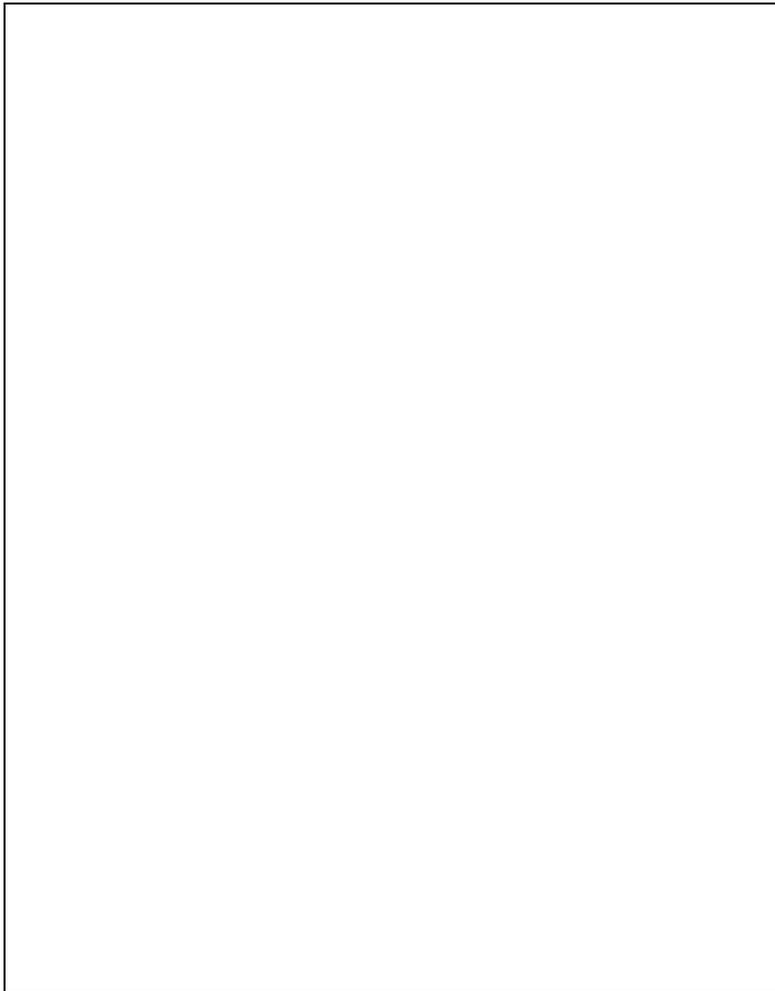
2. Brainstorm solutions. Sketch and/or describe some possible solutions.

Guided Portfolio, p3

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.

Do your puppets cast shadows on the background? YES NO

- Explain why.

Do your puppets each illustrate a different phase of the moon? YES NO

- Explain the phase of the moon that each puppet represents.
- Explain how your puppets work together to illustrate the phases of the moon.

Does one of your puppets include transparent material? YES NO

- What material did you use, and how did it help demonstrate the moon's phases?

Are each of your puppets between 4 and 4½ inches in height and in width? YES NO

- What is the height of each puppet? _____
- What is the width of each puppet? _____

Did you use your puppets to demonstrate phases of the moon in a puppet show? YES NO

Guided Portfolio, p5

Name _____

5. Evaluate your solution.

Was it the best solution? Why, or why not?

Look back at your brainstorming page. Would one of your other ideas have worked better? Why, or why not?

What did you learn by designing and making shadow puppets to show the phases of the moon?

Rubric for Phases of the Moon Shadow Puppet Show

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 shared problems that occurred and their solutions through written notes or oral communication per teacher's instructions.					
The student tested each of the puppets to make sure <ul style="list-style-type: none"> • it casts a shadow on the background • it shows a different phase of the moon • that collectively the puppets show all phases of the moon • one puppet includes a transparent material • each is between 4 and 4 ½ inches in height and width. 					
The student evaluated how he/she could make it better next time.					

Rubric for Phases of the Moon Shadow Puppet Show

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

Oral Communication Rubric	0	1	2	3	4
3.1 The student will use effective communication skills in group activities. <ul style="list-style-type: none"> a) Listen attentively by making eye contact, facing the speaker, asking questions, and summarizing what is said. b) Ask and respond to questions from teachers and other group members. c) Explain what has been learned. d) Use language appropriate for context. e) Increase listening and speaking vocabularies. 					
3.2 The student will present brief oral reports using visual media. <ul style="list-style-type: none"> a) Speak clearly. b) Use appropriate volume and pitch. c) Speak at an understandable rate. d) Organize ideas sequentially or around major points of information. e) Use contextually appropriate language and specific vocabulary to communicate ideas. 					

Standards of Learning

English (2010)

Oral Language

- 3.1 The student will use effective communication skills in group activities.
- a) Listen attentively by making eye contact, facing the speaker, asking questions, and summarizing what is said.
 - b) Ask and respond to questions from teachers and other group members.
 - c) Explain what has been learned.
 - d) Use language appropriate for context.
 - e) Increase listening and speaking vocabularies.
- 3.2 The student will present brief oral reports using visual media.
- a) Speak clearly.
 - b) Use appropriate volume and pitch.
 - c) Speak at an understandable rate.
 - d) Organize ideas sequentially or around major points of information.
 - e) Use contextually appropriate language and specific vocabulary to communicate ideas.

Science (2010)

Scientific Investigation, Reasoning, and Logic

- 3.8 The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include
- a) patterns of natural events such as day and night, seasonal changes, simple phases of the moon, and tides;
 - b) animal life cycles; and
 - c) plant life cycles.

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 the 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	<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>