

Shipping Across the Centuries

Background: We have studied the ancient cultures of Greece and Rome and their use of ships in trading. You will now use your knowledge of the ancient cultures of Greece and Rome to complete this challenge. Follow your teacher's directions for researching the ships and boats used by the people living in ancient Greece and ancient Rome.

Design Challenge: Design and build a model of a ship from either ancient Greece or ancient Rome. The design of your ship should include the details that made it unique to its own culture and have at least one simple machine. Your ship should be no shorter than 6 inches and no longer than 14 inches from bow to stern. It should be able to float in water for at least 5 minutes and hold cargo for 2 minutes. Make a list of goods the ship might carry.

Criteria: Your ship should

- be designed and decorated with details from the culture it represents
- include at least one simple machine in the design
- have a hull longer than 6 inches but shorter than 14 inches
- float for a period of at least 5 minutes
- hold cargo weighing 100 grams for a period of at least 2 minutes.



Materials: Select from the list below.	Tools: Select from the list below.
<ul style="list-style-type: none"> • aluminum foil • cardboard milk cartons • card stock or poster board • construction paper • corks • craft sticks • fabric scraps • glue • metal washers • paper clips • paper fasteners • pipe cleaners • plastic cut from recycled containers • spools • straws • Styrofoam trays • twist ties • yarn or string 	<ul style="list-style-type: none"> • computer • crayons/markers • hole punch • pencils • pushpin paper drill • ruler • scissors • weight (100 grams)

Targeted Standards of Learning: History and Social Science 3.4

Supporting SOL: English 3.1, 3.2, 3.4, 3.6, 3.7; History and Social Science 3.4; Science 3.1, 3.2

Targeted Standards for Technological Literacy: 9, 18

Supporting STL: 1, 6, 7, 8, 10, 11

Tips for Teachers

Targeted Standards of Learning:

- History and Social Science 3.4 The student will develop map skills by
- a) locating Greece, Rome, and West Africa;
 - b) describing the physical and human characteristics of Greece, Rome, and West Africa;
 - c) explaining how the people of Greece, Rome, and West Africa adapted to and/or changed their environment
- History and Social Science 3.8 The student will recognize that because people and regions cannot produce everything they want, they specialize in what they do best and trade for the rest.

Supporting SOL: English 3.1, 3.2, 3.4, 3.6, 3.7; History and Social Science 3.4; Science 3.1, 3.

Targeted Standards for Technological Literacy:

- 9 Students will develop an understanding of engineering design.
- 18 Students will develop an understanding of and be able to select and use transportation technologies.

Supporting STL: 1, 6, 7, 8, 10, 11

Tips for Teachers, continued

Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
<ul style="list-style-type: none"> Exposure to targeted and supporting History and Social Science SOL and supporting Science SOL Exposure to the design process Internet research strategies 	<ul style="list-style-type: none"> Check Design Brief for recommended materials. Teacher may substitute materials. Provide a plastic or metal tub for testing the completed ships. For Web searches, use key words "Ancient Roman Technology," "Ancient Ship Building," "Ancient Greek Technology," and "Ancient Ships." Consider cutting plastic from recycled materials prior to beginning the activity. Use gram weights or have students use paper clips. Students can research the weight of one paper clip and do the math needed to determine how many equal 100 grams. 	<ul style="list-style-type: none"> Discuss proper use of tools. Supervise cutting of recycled plastic. Use only clean recycled plastic. 	<ul style="list-style-type: none"> Groups of no more than four students Consider using one guided portfolio per group. Consider approving plans before students begin building. 	<ul style="list-style-type: none"> Design Brief Guided Portfolio (adapt as appropriate/ optional) Rubric Assessments 	<p>Follow the Design Process:</p> <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.

Name _____

4. Test your solution.

Is your ship designed and decorated with details from the culture it represents? YES NO

- Explain the details and why you chose them.

Does your ship have at least one simple machine in the design? YES NO

- Identify it and explain how it works.

Is the hull of your ship longer than six inches but shorter than 14 inches? YES NO

- How long is the hull of your ship? _____

Can your ship float for a period of five minutes or longer? YES NO

- How long did your ship float? _____

Can your ship hold 100 grams of cargo for two minutes or longer? YES NO

- What did you use for the weight? _____

- How long did your ship hold the cargo? _____

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 been better? Explain your reasoning.

What did you learn by designing and creating this model?

Rubric for Shipping Across the Centuries

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 the ship to make sure					
• the ship has at least one simple machine in the design					
• the hull is longer than 6 inches but shorter than 14 inches					
• the ship floats for at least 5 minutes					
• the ship holds cargo (100 grams) for at least 2 minutes.					
The student designed and decorated the ship with details from its culture.					
The student evaluated how he/she could make it better next time.					

Rubric for Shipping Across the Centuries

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
<p>3.1 The student will use effective communication skills in group activities.</p> <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. 					
<p>3.2 The student will present brief oral reports using visual media.</p> <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.

Reading

- 3.4 The student will expand vocabulary when reading.
- a) Use knowledge of homophones.
 - b) Use knowledge of roots, affixes, synonyms, and antonyms.
 - c) Apply meaning clues, language structure, and phonetic strategies.
 - d) Use context to clarify meaning of unfamiliar words.
 - e) Discuss meanings of words and develop vocabulary by listening and reading a variety of texts.
 - f) Use vocabulary from other content areas.
 - g) Use word reference resources including the glossary, dictionary, and thesaurus.
- 3.6 The student will continue to read and demonstrate comprehension of nonfiction texts.
- a) Identify the author's purpose.
 - b) Use prior and background knowledge as context for new learning.
 - c) Preview and use text features.
 - d) Ask and answer questions about what is read.
 - e) Draw conclusions based on text.
 - f) Summarize major points found in nonfiction texts.

- g) Identify the main idea.
 - h) Identify supporting details.
 - i) Compare and contrast the characteristics of biographies and autobiographies.
 - j) Use reading strategies to monitor comprehension throughout the reading process.
 - k) Identify new information gained from reading.
 - l) Read with fluency and accuracy.
- 3.7 The student will demonstrate comprehension of information from a variety of print and electronic resources.
- a) Use encyclopedias and other reference books, including online reference materials.
 - b) Use table of contents, indices, and charts.

History and Social Science (2008)

Geography

- 3.4 The student will develop map skills by
- a) locating Greece, Rome, and West Africa;
 - b) describing the physical and human characteristics of Greece, Rome, and West Africa;
 - c) explaining how the people of Greece, Rome, and West Africa adapted to and/or changed their environment to meet their needs.

Science (2010)

Scientific Investigation, Reasoning, and Logic

- 3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- a) observations are made and are repeated to ensure accuracy;
 - b) predictions are formulated using a variety of sources of information;
 - c) objects with similar characteristics or properties are classified into at least two sets and two subsets;
 - d) natural events are sequenced chronologically;
 - e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;
 - f) time is measured to the nearest minute using proper tools and techniques;
 - g) questions are developed to formulate hypotheses;
 - h) data are gathered, charted, graphed, and analyzed;
 - i) unexpected or unusual quantitative data are recognized;
 - j) inferences are made and conclusions are drawn;
 - k) data are communicated;
 - l) models are designed and built; and
 - m) current applications are used to reinforce science concepts.

Force, Motion, and Energy

- 3.2 The student will investigate and understand simple machines and their uses. Key concepts include
- a) purpose and function of simple machines;
 - b) types of simple machines;
 - c) compound machines; and
 - d) examples of simple and compound machines found in the school, home, and work environments.

Standards for Technological Literacy

- Standard 1: Students will develop an understanding of the characteristics and scope of technology.
- 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.
- 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.
- Standard 18: Students will develop an understanding of and be able to select and use transportation technologies.

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>