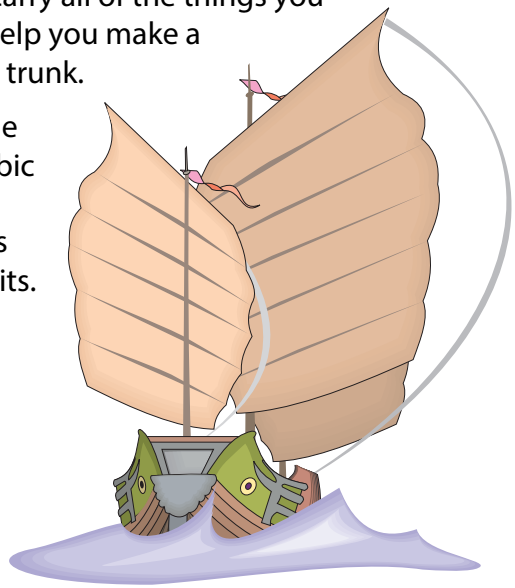
Pack Your Trunk

Background: You have decided to sail from England to Jamestown. You are allowed only one trunk to carry all of the things you will need to survive when you reach the settlement. You will use your knowledge of Virginia history to help you make a list of things you should take. Your teacher will tell you how to represent the items that will go into your trunk.



Design Challenge: Design and build a trunk to hold the items you must take with you on your trip to the Jamestown colony. Because of space restrictions, the trunk must be built to have between 36 and 60 cubic inches of space. To make loading the trunks onto the ship easier, all of the edges and sides of the trunk should be parallel and perpendicular to the other edges, and the height of your trunk must measure less than the width. You must draw a net of your trunk with the area and perimeter labeled, using proper units.

Criteria:

- ☐ Your trunk must have a volume between 36 and 60 cubic inches.
- ☐ Your trunk must have edges that are parallel and perpendicular to other edges.
- ☐ Your trunk must be wider than it is tall.
- ☐ The top of your trunk must stay closed if the trunk is turned on its side or upside down.
- ☐ Your trunk must have a means for being carried.
- ☐ You must draw a net and label the area and perimeter of each surface.

Materials: Select from the list below.			**Tools:** Select from the list below.
• cardboard • cardboard tubes • card stock • craft sticks	• egg cartons • glue or paste • pipe cleaners • poster board	• straws • string (12-inch pieces) • NO tape of any kind	• graph paper • protractor • ruler • scissors

Targeted Standard of Learning: Mathematics 5.8
Supporting SOL: Mathematics 5.11, 5.12; History and Social Science VS.3, VS.4; English 5.1, 5.2, 5.5, 5.6

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

Tips for Teachers

Targeted Standards of Learning:

Mathematics 5.8 The student will

a) find perimeter, area, and volume in standard units of measure;
b) differentiate among perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation;
c) identify equivalent measurements within the metric system;
d) estimate and then measure to solve problems, using U.S. Customary and metric units; and
e) choose an appropriate unit of measure for a given situation involving measurement, using U.S. Customary and metric units.

Supporting SOL: Mathematics 5.11, 5.12; History and Social Science VS.3, VS.4; English 5.1, 5.2, 5.5, 5.6

Targeted Standard for Technological Literacy:

9 Students will develop an understanding of engineering design.

Supporting STL: 8, 10, 11

Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
• Targeted Mathematics Standard of Learning 5.8 • Some understanding of the design process	• Students should follow directions to make a list of the items that need to be packed. • Students could draw pictures or make small models of items to be placed in the trunk.	• None	• Small groups or pairs • Each student keeps own Guided Portfolio. • Approve plans before students begin building.	• Design Brief • Guided Portfolio (adapt as appropriate/ optional) • Rubric Assessment	Follow the Design Process: • Restate the problem. • Brainstorm solutions. • Create the best solution. • Test the solution. • Evaluate the solution.

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

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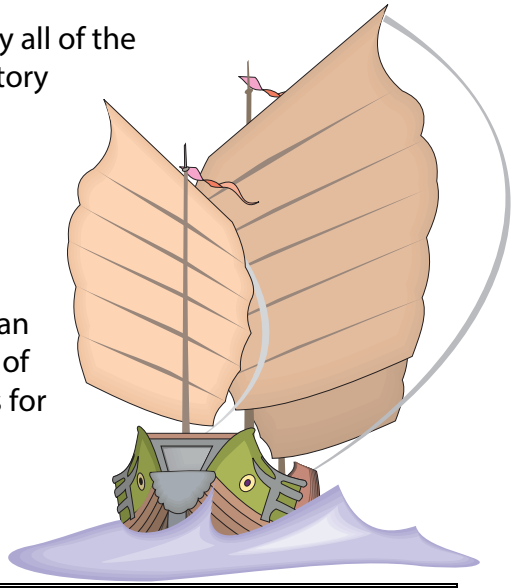

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Materials: Select from the list below.		**Tools:** Select from the list below.
• cardboard • cardboard tubes • card stock • craft sticks • egg cartons • glue or paste	• pipe cleaners • poster board • straws • string (12-inch pieces) • NO tape of any kind	• protractor • scissors • ruler

Targeted Standard of Learning: Mathematics 5.8
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Targeted Standard for Technological Literacy: 9
Supporting STL: 8, 10, 11

Guided Portfolio, p1

Name _____

Group Members _____

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

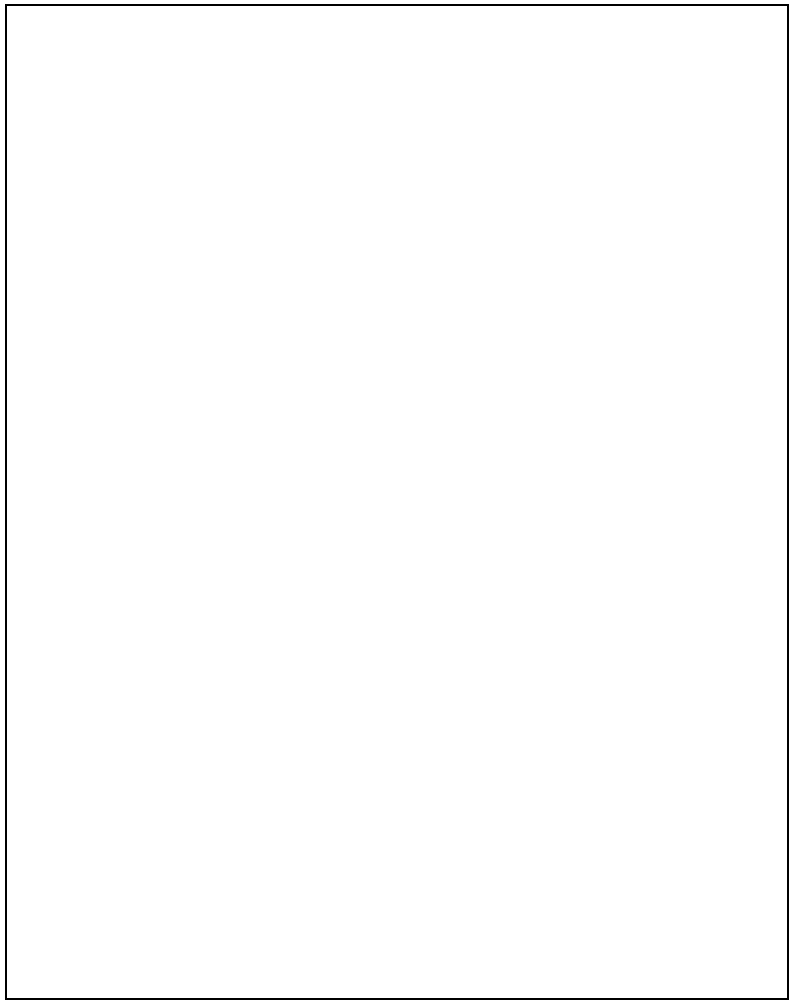
Name _____

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 trunk have a volume between 36 and 60 cubic inches?	YES	NO
Is your trunk wider than it is tall?	YES	NO
Are all the edges of your trunk parallel and perpendicular to other edges?	YES	NO
Does the top stay closed if the trunk is turned on its side or upside down?	YES	NO
Does your trunk have a means for being carried?	YES	NO
Did you draw a net and label the area and perimeter of each surface?	YES	NO

Name _____

5. Evaluate your solution.

Was your design 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 figure.

_____

_____

_____

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

_____

_____

_____

Rubric for Pack Your Trunk

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 trunk to make sure					
• it has a volume between 36 and 60 cubic inches					
• it is wider than it is tall					
• all its edges are parallel and perpendicular to one another					
• its top stays closed with the trunk is turned on its side or upside down					
• it has a means for being carried.					
The student drew a net and labeled the area and perimeter of each surface.					
The student evaluated how he/she could make it better next time.					

Rubric for Pack Your Trunk

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

English (2010)

Communication: Speaking, Listening, Media Literacy

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i) Use language and style appropriate to the audience, topic, and purpose.

Reading

5.6 The student will read and demonstrate comprehension of nonfiction texts.

a) Use text organizers, such as type, headings, and graphics, to predict and categorize information in both print and digital texts.
b) Use prior knowledge and build additional background knowledge as context for new learning.
c) Skim materials to develop a general overview of content and to locate specific information.
d) Identify the main idea of nonfiction texts.
e) Summarize supporting details in nonfiction texts.
f) Identify structural patterns found in nonfiction.
g) Locate information to support opinions, predictions, and conclusions.
h) Identify cause and effect relationships following transition words signaling the pattern.

i) Differentiate between fact and opinion.
j) Identify, compare, and contrast relationships.
k) Identify new information gained from reading. l) Use reading strategies throughout the reading process to monitor comprehension.
m) Read with fluency and accuracy.

History and Social Science (2008)

Colonization and Conflict: 1607 through the American Revolution

VS.3 The student will demonstrate knowledge of the first permanent English settlement in America by
- a) explaining the reasons for English colonization;
- b) describing how geography influenced the decision to settle at Jamestown;
- c) identifying the importance of the charters of the Virginia Company of London in establishing the Jamestown settlement;
- d) identifying the importance of the General Assembly (1619) as the first representative legislative body in English America;
- e) identifying the importance of the arrival of Africans and English women to the Jamestown settlement;
- f) describing the hardships faced by settlers at Jamestown and the changes that took place to ensure survival;
- g) describing the interactions between the English settlers and the native peoples, including the contributions of Powhatan to the survival of the settlers.

VS.4 The student will demonstrate knowledge of life in the Virginia colony by
- a) explaining the importance of agriculture and its influence on the institution of slavery;
- b) describing how the culture of colonial Virginia reflected the origins of European (English, Scots-Irish, German) immigrants, Africans, and American Indians;
- c) explaining the reasons for the relocation of Virginia's capital from Jamestown to Williamsburg to Richmond;
- d) describing how money, barter, and credit were used;
- e) describing everyday life in colonial Virginia..

Mathematics (2009)

Measurement

5.8 The student will
- a) find perimeter, area, and volume in standard units of measure;
- b) differentiate among perimeter, area, and volume and identify whether the application of the concept of perimeter, area, or volume is appropriate for a given situation;
- c) identify equivalent measurements within the metric system;
- d) estimate and then measure to solve problems, using U.S. Customary and metric units; and
- e) choose an appropriate unit of measure for a given situation involving measurement, using U.S. Customary and metric units.

5.11 The student will measure right, acute, obtuse, and straight angles.

Geometry

5.12 The student will classify
- a) angles as right, acute, obtuse, or straight; and
- b) triangles as right, acute, obtuse, equilateral, scalene, or isosceles.

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 *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.