

Name:  
Core:  
Due Date:

### PAPER BRIDGE STEAM CHALLENGE

I can develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. - [MS-ETS1-4 Engineering Design](#)

Rubric Categories	<b>Great 10</b>	<b>Good 8-9</b>	<b>Honorable Attempt 6-7</b>	<b>Incomplete 5</b>
<b>Paper Bridge Design</b>	Bridge is constructed according to directions and holds at least 200 pennies.	Bridge is constructed according to directions and holds at least 100 pennies.	Bridge is constructed according to directions and holds some pennies.	Bridge is incomplete and holds no pennies.
<b>Check for Success</b>	No Errors: spelling, grammar, punctuation, caps & paragraph	Very Few Errors: spelling, grammar, punctuation, caps & paragraph	Some Errors: spelling, grammar, punctuation, caps & paragraph	Too Many Errors
<b>Written Work Accuracy</b>	All assigned components are complete and accurate	Almost all of the assigned components are complete and accurate	Some of the required components are complete and accurate	Incomplete
<b>Craftsmanship</b>	All work is done in a professional manner	Most work is done in a professional manner	Some aspects of professionalism exist	Improvements needed
<b>Timeliness</b>	All work is complete and checked in at least two weeks early	All work is complete and turned in at least one week early	All work is complete and turned in by the deadline	Work is turned in late or not at all

<b>Grade</b>	Teacher Rubric Settings: f01660tffn.jeremy.jorgensen _
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**PAPER BRIDGE**

**CHALLENGE: HOW CAN YOU BUILD A BRIDGE FROM A SINGLE PIECE OF PAPER THAT HOLDS 200 PENNIES.**

**OVERVIEW AND PURPOSE**

The gravitational force on an object is it’s weight. Some materials are better at supporting weight than other materials. The strength of a material depends both on its shpae and what it is made of. Some shapes help spread out the force due to the weight of a load more than other shapes.

A bridge is designed to support both itself and an added load. Engineers designing a bridge must take into account such factors as the load the bridge must carry and the cost of building materials. Some shapes increase the load that a bridge made of a certain material can carry. In this lab you will

- Design and build a bridge from a single piece of paper that is capable of supporting at least 100 pennies
- Test your design to see if it can support twice the load that it was designed for

**MATERIALS**

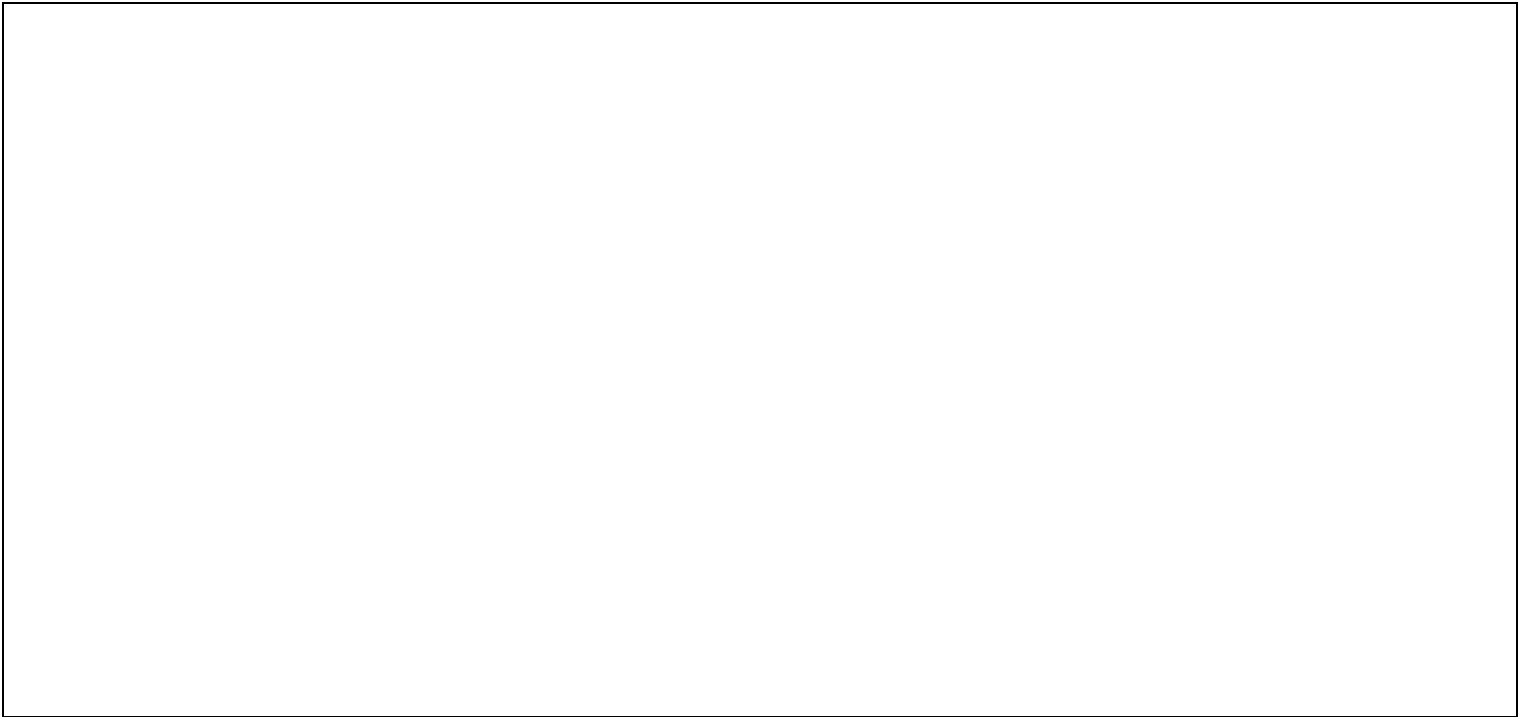
<ul style="list-style-type: none"><li>• Paper (8.5 x 11)</li><li>• Tape</li><li>• 4 books</li></ul>	<ul style="list-style-type: none"><li>• 200 pennies</li><li>• Metric ruler</li></ul>
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**PROCEDURE**

Begin developing your design for a bridge made from a single piece of plain paper. Your bridge should be built with the following specifications:

- The bridge should span a 20cm gap between two stacks of books of the same height.
- No materials may be used to attach the bridge to the books.
- You may use tape if it is needed to help the paper in a particular shape. You may not use any other materials.
- The bridge must be able to support the weight of 100 pennies.
- You may add and place pennies in any manner as long as they are over the gap, not over the books.
- The lowest penny must be at least 3 centimeters above the ground.
- After you test your bridge, try to improve your design with a second bridge.
- Make sure you test your bridge while Mr. Jorgensen and at least three other students are watching.

**BRIDGE 1 PHOTO**



**BRIDGE TWO PHOTO**



**Research: How can changing the shape of paper make it stronger?**

**Evaluate: Compare your design with that of other students. How similar were the successful design?**

**Analyze: Compare the maximum number of pennies your bridge could hold with the maximum number that other students' bridges could hold. Why types of designs were the most effective for supporting weight?**

**Modify: What changes did you make between your first and second bridge? Explain why you made the changes you did. How many pennies did each bridge hold?**

How might your design have been different if a material other than paper had been available for the bridge?

Many road bridges are rated to carry only a certain amount of weight. Why must bridges be designed to support a weight that is higher than the rated weight?