

Algorithmic Bridges		Grade 7: Structures and Mechanisms	
Lesson Plan	Coding Tool	Offline coding	
	Cross-curricular	<ul style="list-style-type: none"> Coding Forces 	
Big Ideas <ul style="list-style-type: none"> Structures have a purpose. (Overall expectation 1) The form of a structure is dependent on its function. (Overall expectations 1, 2, and 3) 	Specific Expectations <p>2.3 investigate the factors that determine the ability of a structure to support a load</p> <p>2.4 use technological problem-solving skills to determine the most efficient way for a structure to support a given load Sample problem: Using the least amount of material (by mass), construct a bridge to support a specific load</p>		
Description This lesson has students creating algorithms to use as building plans to have other students create a bridge using as little material as possible that can support a load.			
Materials <ul style="list-style-type: none"> Building materials (Examples: <ul style="list-style-type: none"> Sheets of paper Sheets of aluminum foil Sheets of cardstock Stack of books, or small boxes Washers or bolts Tape Ruler Thread spools Craft sticks “Jenga” blocks) Pen and paper for algorithms 	Computational Thinking Skills <ul style="list-style-type: none"> Algorithm Pseudo code 		
Introduction The key coding concept in this lesson are algorithms and pseudo code, students will write out step by step instructions on how they would build a bridge using the least amount of materials provided. The main idea of this exercise is that precise instructions are important; it’s also a good mental exercise in planning out your build knowing someone else is going to have to build it. Success should be weighted on successfully leading their partners with their algorithms to build a bridge as designed in their algorithm that can successfully hold a load.			

Action

- Have a brief discussion about algorithmic thinking and the importance of accuracy in your instructions.
- Explain that students will create an algorithm for their partner to build a bridge following their instructions.
- Explain that they must use as little of materials provided as possible.
- Explain that the bridge must be able to support a load.
- Once the algorithms are completed have students trade algorithms with their partners and attempt to build the bridge following their instructions exactly as presented.
- Once the bridges are completed compare the final product to the algorithms and have students discuss their experience.

Consolidation/Extension

You can limit construction materials even further by applying a cost/budget system where the students' code must take into consideration the "cost" of materials. (Example: Paper \$3, Tape \$1/cm, Jenga block \$6) and giving them a strict budget. This forces them to create the bridge with as little materials as possible and use critical thinking when creating their pseudo code.