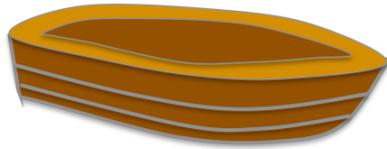


Name: _____

Section: _____

Engineering Design Process - Sink or Float Challenge



Problem:

A team of treasure hunters close to the score of a lifetime are forced to anchor their large boat about one kilometer off the coast of Treasure Island because of the enormous coral reef. They lower the dingy into the water and row row row the boat toward their destination until a sharp piece of coral punctures a hole in the bottom. As the dingy quickly takes on water, all occupants are forced to swim to shore. The **good news** is that all members safely make it to shore and are able to quickly locate the treasure. However, the **bad news** is that they no longer have a dingy to help transport their riches to the main boat. Help!

Goal:

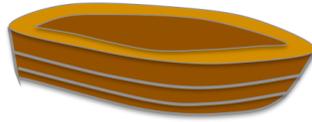
Work as a team to construct a boat prototype capable of holding and transporting the maximum amount of "treasure," without sinking.

Good Luck!

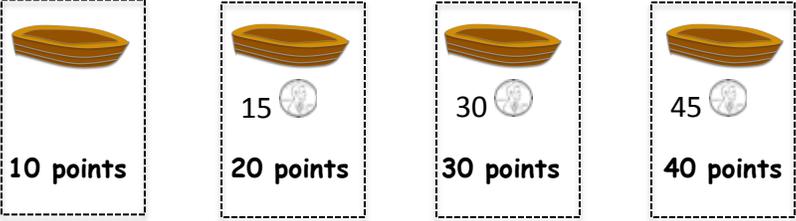
Guidelines:

1. Each group will be provided with a piece of clay ($\approx 70\text{g}$) to be used for constructing the boat prototype.
2. Pennies will represent the "treasure" to be placed into the prototype.
3. Each member of the group must complete the Sink or Float Challenge **Student Worksheet**.

Assessment: The total score earned for this activity will be based on the grading rubric below.



Grading Rubric				
Criteria	Exceptional (5 - 4 Points)	Acceptable (3 - 2 Points)	Marginal (1 - 0 Points)	Points
Define Problem	Clearly and precisely defines the problem.	Defines the problem.	Defines a problem that cannot be tested or does not define the problem at all.	
Research	Accurate information taken from a minimum of three sources in a systematic manner; sources appropriately cited.	Accurate information taken from a few sources; sources cited.	Incorrect or no information; no sources cited.	
Brainstorm	Extensive list of possible solutions to the problem accompanied by labeled diagrams.	List of possible solutions to the problem with sketches.	Limited list of possible solutions to the problem or no possible solutions listed.	
Design Proposal	Plan/blueprint has neat diagrams with clearly labeled measurements and components/materials.	Plan/blueprint has diagrams with most of the necessary measurements and components/materials.	Plan/blueprint has rough diagrams that do not adequately provide the necessary measurements and components/materials.	
Prototype/Model	Meticulously constructed according to the blueprints and functional.	Constructed according to the blueprints and functional.	Carelessly constructed; does not function properly.	
Test, Evaluate, & Redesign.	Clear evidence of troubleshooting, testing, and refinements based on data.	Some evidence of troubleshooting, testing and refinements.	Little evidence of troubleshooting, testing or refinement.	
Total Group Effort	All students worked as a cohesive unit and equally participated.	Most students participated, but some members appeared to be non-existent.	Few students effectively participated.	

Criteria	Exceptional (5 - 4 Points)	Acceptable (3 - 2 Points)	Marginal (1 - 0 Points)	Points
Question #1	Answer is thoughtful, detailed, and reflects a clear understanding of all aspects associated with the engineering design process.	Answer reflects a general understanding of the aspects associated with the engineering design process.	Answer does not reflect an understanding of the engineering design process.	
Question #2	Answer is thoughtful, detailed, and reflects a clear understanding of all aspects associated with the engineering design process.	Answer reflects a general understanding of the aspects associated with the engineering design process.	Answer does not reflect an understanding of the engineering design process.	
Question #3	Answer is thoughtful, detailed, and reflects a clear understanding of all aspects associated with the engineering design process.	Answer reflects a general understanding of the aspects associated with the engineering design process.	Answer does not reflect an understanding of the engineering design process.	
Criteria	40 Points			Points
Execution				
➤ Bonus points (5) for a boat that can hold over 45 pennies				

Total = ____ /90

Additional Comments:

Imagine Possible Solutions

Brainstorm for various solutions to help solve the problem

Choose a Solution (Preliminary)

- *Draw a detailed sketch of the prototype to be used.*

Create and Test Prototype

Record observations related to the testing, evaluation, and redesign of the prototype

Choose a Solution (Final)

- *Draw a detailed sketch of the final prototype to be used.*
 - *Be sure to include **metric** measurements.*

Improve

Reflect on your design solutions

- 1) As you were building and testing, what were 3 specific changes your group made in efforts to improve the design? Explain the reasoning behind each of the changes.

- 2) If you could have built your prototype out of one other material of your choice to increase the amount of treasure, what would it be and why would you use it?
