

Name: _____

Section: _____

Engineering Design Process - Catapult Challenge



Problem:

There has been a plane crash over the Pacific Ocean. Luckily, everyone survived. You and half the passengers are now stranded on an island. The **good news** is that you have more than enough food and supplies on the island while you wait for help, which could be weeks or even months. However, the **bad news** is that the other half of passengers are on a neighboring island with no supplies. Shark infested waters surround the island, and the current is too strong to row a boat across. Help!

Goal:

Work as a team to construct a catapult prototype to launch a pom-pom to accurately hit a target 2 meters away. **Good Luck!**

Guidelines:

1. Each group is allotted \$30.00 and it will be necessary to purchase the listed materials prior to building the prototype. Each item from the list below has a cost of \$1.00.

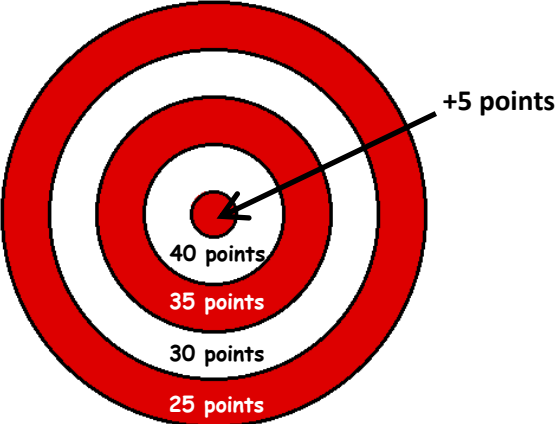
Masking tape (0.5 meter)	Popsicle sticks	Water bottle caps
Rubber bands	Paper clips	Glue sticks

2. Each member of the group must complete the catapult 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.	
Criteria	40 Points			Points
Execution (Best of 3 trials)				
	<ul style="list-style-type: none"> ➤ 20 points for a launch that does not hit the target ➤ 0 points for an unsuccessful launch ➤ Bonus points (5) for hitting the bull's eye 			

Total = ___ /85

Additional Comments:

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Engineering Design Process - Catapult Challenge - **Student Worksheet**

Problem

Define/describe the problem to be solved

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Research

Cite sources your group used to gather information

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Imagine Possible Solutions

Brainstorm for various solutions to help solve the problem

Choose a Solution (Preliminary)

- Complete the materials chart.
- Draw a detailed sketch of the prototype to be used.

Materials <i>(Unit Price - \$1 each)</i>	Quantity	Cost
Popsicle Sticks		
Paper Clips		
Masking Tape (0.5 meter)		
Rubber Bands		
Water Bottle Caps		
Glue Sticks		
Total Cost =		

Create and Test Prototype

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

Choose a Solution (Final)

- Complete the materials chart.
- Draw a detailed sketch of the final prototype to be used.
- Be sure to include **metric** measurements and label all materials used.

Materials <i>(Unit Price - \$1 each)</i>	Quantity	Cost
Popsicle Sticks		
Paper Clips		
Masking Tape (0.5 meter)		
Rubber Bands		
Water Bottle Caps		
Glue Sticks		
Total Cost =		

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 had to do this whole process again, what would you do differently? Why?
