

Catapult Challenge

The problem: You need to move some materials from one place to another with the help of a simple machine. Keeping what you know about force and motion in mind, your challenge is to design the catapult that will move your materials the furthest.

Your Goal: Using supplies available to you in the classroom, build the catapult that will launch your chosen projectile the furthest.

First, find the answers to these question using the reference tools available to you—iPads and laptops. You have 15 minutes.

1. What does a catapult do?

2. What is a projectile?

3. How does a catapult work?

4. What type of simple machine is it? (incline plane, lever, pulley, screw, wedge, or wheel and axle) How do you know? <http://www.mikids.com/Smachines.htm>



Research: Research different ways to build simple catapults.

- You might try online research and/or trial and error. (Google *how to make a catapult for kids*)
- Decide what materials your team wants to use to build their catapult
- You have 20 minutes.

The materials you will have to choose from to create your catapult are listed in the table below.

Material	Limits
Large and small craft sticks	10 altogether
Rubber bands	6 or less
Plastic spoon	1
Binder clip	1
Plastic cup	1
Clothespin	1
Materials you have on your desk right now	Up to 3
Your projectile will be taken from a bag of assorted valentine candy.	

Materials we chose:

Material	Quantity Selected
Large craft sticks	
Small craft sticks	
Rubber bands	
Plastic spoon	
Binder clip	
Plastic cup	
Clothespin	
Materials you have on your desk right now. 1. 2. 3.	

Sketch:



Design: You have 30 minutes to build, test and modify your catapult.

Keep in mind:

- What is your design goal?
- How much force will your design require for a successful launch?
- What angle launches the object the furthest?
- Which projectile launches the furthest?
- Have you tested a different way?
- What improvements can you make?
- You may test every projectile, but you may only use one in the final launch.
- NEVER aim your projectile toward a person.

Test Data:

Test Number	Projectile used (small candy heart, large candy heart, sweet tart, gummi heart or marshmallow.)	Change you made and why.	Distance in inches
1.			
2			
3			
4			
5			
6			
7			
8.			

Team Final Results

Team Number	Projectile used (small candy heart, large candy heart, sweet tart, gummi heart or marshmallow.)	Trial One Distance in inches	Trial Two Distance in inches	Rank
1				
2				
3				
4				
5				
6				
7				
8				
9				



Observations Based on Data Evidence

1. Overall, which projectile seemed to launch the furthest? What do you think made that one go further?

2. What one material do you think made the biggest difference in creating a successful catapult? Explain why you chose that one.

3. What forces were used to move the projectile—pushes or pulls? Explain your answer by giving examples using your catapult design.

4. What happens to the projectile if no force is applied? Why?

5. What would you do differently next time and why?

Catapult Challenge 2

Your Goal: Using supplies available to you in the classroom, build the catapult that can launch a projectile to hit a six-inch target that is 36 inches away.

You have 15 minutes to build, test and modify your catapult!

1. How is this catapult different from your last one?

2. Explain why your team made the changes you did. What were you thinking?

Test Data:

Test Number	Projectile used (small candy heart, large candy heart, sweet tart, gummi heart or marshmallow.)	Changes you made and why.	Did it hit the bull's eye? Yes/no	How many inches away from the target?
1.				
2				
3				
4				

Questions to Discuss

- What type of energy did your catapult use?
- What makes the projectile go the furthest?
- What projectile goes the furthest?
- What makes the catapult more accurate?
- Does mass affect the results?
- How do objects move?
- How did the catapult set the candy in motion?
- Which challenge did your catapult meet best, accuracy or distance?
- What happens when the arm of a lever is shortened or the load is moved?
- What happens to the force needed to make the load move?
- What happens when you move the fulcrum?
- What is the relationship between force and distance?
- What happens when you adjust the angle?