Catapult Shooter

Adapted from: https://www.grc.nasa.gov/www/k-12/Summer_Training/KaeAvenueES/Catapult_Shooter.html

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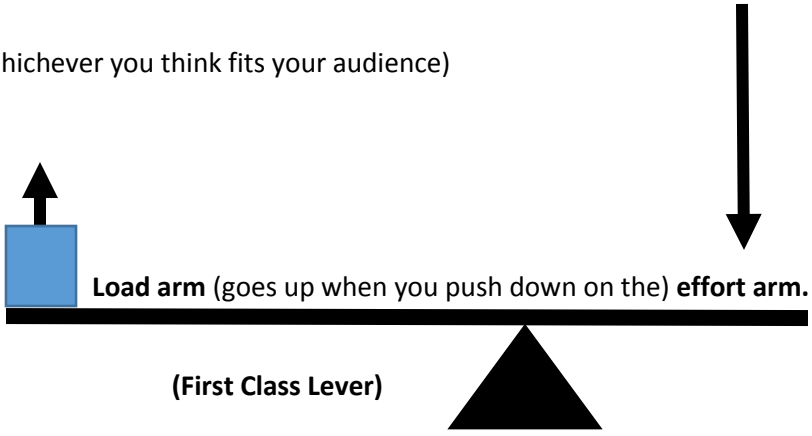
Materials per group:
Marshmallows/M&Ms/Cereal/Ping-Pong Balls (whichever you think fits your audience)
Flexible Plastic Ruler
Dixie Cup
Masking Tape
Meter Stick
Pencils x 12 (unsharpened wooden pencils)
Rubber bands x 12
Paper Clips x 12
Straws x 12
Plastic Spoon



Purpose:
Introduce the ideas of lever arms (effort/load) and fulcrums and related physics concepts (torque, projectile motion).

Procedure:
1.) Explorers spend 5 minutes brainstorming a design. They can LOOK but not touch the materials.
2.) Explorers spend 5 minutes constructing a catapult from materials listed.
3.) Launch your projectile and measure the distance.
4.) Move the fulcrum, increasing the length of the load arm; make three more launches and record the distance for each launch.
5.) Move the fulcrum, decreasing the length of the load arm; make three more launches and record the distance for each launch.
6.) Determine the average of each column and record the average

	Load Arm Length 1	Load Arm Length 2	Load Arm Length 3
Distance 1			
Distance 2			
Distance 3			
Average Distance			

Explore:
Looking at your data, how does placement of the fulcrum (length of load arm) change your results? What other variables do you think might make a difference?

Challenge:
Can you consistently hit a taped off, 5.0 cm square, located 1.0 m away, with your catapult?

Advanced Challenge:
Add a stopwatch and time your launches. Now determine the velocity of your projectile!