

CATAPULTING PROJECTILES:

A cross-curricular math and science, inquiry based project in the fundamentals of linear equations and scientific investigations.

Outcome: Have students find the projectile that matches the linear path described in the graph.

Key Concepts:

MATH	SCIENCE
Linear equations	Variables
Graphing	Force (Newtons)
Outliers	Forensics (ballistics)
Averages	
Scatter Plots	
Measurement	

Materials: For each group of 3-4 the following is recommended:

- 1) 14 pencils
- 2) 30 rubber bands (varying sizes preferable)
- 3) Small paper cup
- 4) Tape
- 5) Projectiles (examples: coins, magnets, small rocks, chocolate, etc). For use today: Large magnet-16grams. Dime- 2.2grams. Reese's Miniature Cup- 9grams. Hershey miniature bar- 9grams. Rolo 6grams. Quarter 6 grams. Small magnet- 14 grams.
- 6) Meter stick
- 7) Scale (accurate in grams)
- 8) Newton spring scale
- 9) Premade graph with Force and Distance coordinates graphed (do NOT let students know what projectile was used)

Procedure:

- 1) Construct Catapults
- 2) Discuss Linear Functions (increase in input will increase output).
- 3) Have students predict which object is most likely to follow the linear function (previously investigated by the teacher).
- 4) Launch one object, same Force 10-20 times to achieve more usable data and reduce impact of outliers (discuss outliers if necessary)
- 5) Using different amounts of Force (vary number and size of rubber bands to achieve different Forces and use the Newton spring scale to calculate Force) repeat launches of the projectile.
- 6) Record data on a chart
- 7) Repeat steps 4-6 using different projectiles.
- 8) Graph data. Instruction on Scatter Plots will be necessary.
- 9) Compare student graphs to Teacher graph and determine which object was launched by the teacher.

Catapulting Projectiles

