

FLY HIGH WITH CATAPULTS

Send your objects soaring while learning the laws of physics.

A projectile is propelled with an initial velocity, and then gravity acts on the projectile to bring it back down to earth (e.g., tossing a baseball, rocket launch). By applying a force (press or stomp) to a catapult lever arm, students can launch a projectile into the air at varying velocities and observe how gravity acts on the projectile to create a parabolic trajectory.

MATERIALS

- Several wooden boards in varying lengths (suggest 1x4 or 2x4 boards cut 3 to 4 feet long)
- Wooden blocks (suggest 4x4 boards cut 4 inches long or multiple 1x4 or 2x4 boards screwed together to form cubic shape)
- Assorted projectiles: marshmallows, bean bags, plush toys, plastic containers

METHOD

1. Assemble several catapults by screwing a length of board (lever arm) to a wooden block (fulcrum). Vary the location of the fulcrum between the end of the board length and the middle of the board length.
2. Place catapults on ground and assign students to each catapult.
3. Place projectile on one end of each board.
4. Use hands and or feet to press down on the opposite end of each board.
5. Determine how fast and how far the projectiles fly depending on the force applied (how hard the student presses or stamps down on the board).
6. After students have had time to test their catapults, rotate students to another catapult to see how changes to the lever arm and fulcrum affect the projectile's trajectory.

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How does this activity demonstrate Newton's First Law of Motion?

How does the mass of each projectile affect its trajectory?

Does the fulcrum placement affect the trajectory for an object of the same mass?

What launch angle makes the same projectile travel the farthest or the highest?

How does varying the force applied to one end of the lever arm affect the projectile's trajectory?

What careers rely on an understanding of Newton's First Law of Motion? (e.g., roller coaster designer, rocket engineer, baseball pitcher or soccer forward)

NOTES

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