

Splat that! (Physics)

Objective

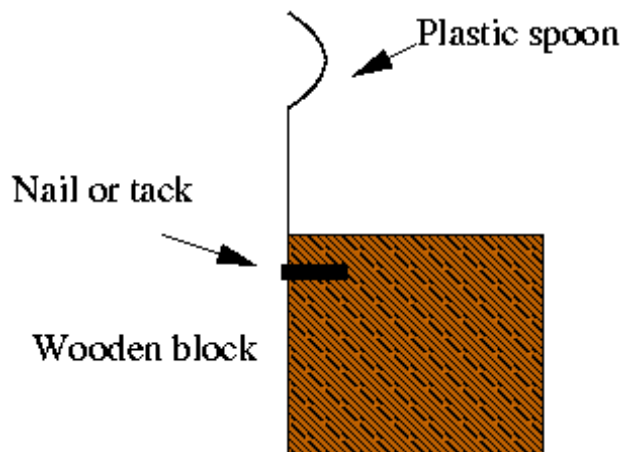
To describe the accuracy and reliability of a simple catapult.

Materials

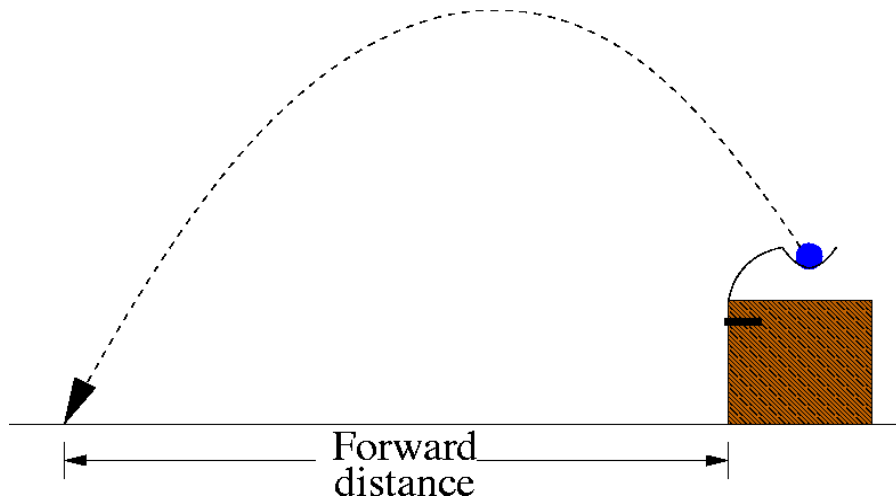
- A plastic spoon
- A small blue metal rock (or jellybeans, or Smarties, or some missile)
- A drawing pin, nail or screw
- A hammer or screw driver
- A flat wooden board or heavy wooden block
- Tape measure
- Pencil and paper for recording results
- Graph paper for plotting findings

Methods

- Securely attach the handle of the spoon to the wooden board so that scoop part is sticking up above the board. See the picture below.



- Place the mechanism on the ground.
- Draw a straight line on the ground directly out from the centre of the spoon.
- Load a rock (or whatever you use for a missile) into the scoop, pull back, release and mark where the rock lands. See the picture below.



- You need to make two measurements, forwards distance and sideways distance:
 - For sideways distance, measure from where the rock landed to the closest point on the centre line which you drew. Sidewise distance for rocks that landed on the left hand side of the centre line should be given a negative score and those which landed on the right should be given a positive score.
 - For forward distance, measure from the closest point on the centre line back to the spoon.
- Repeat the experiment at least 30 times, making sure that all methods are kept identical (eg try not to move the catapult between trials and try not to break the spoon).

Analysis

- Calculate the mean and standard deviation of the forward distance
- Calculate the mean and standard deviation of the sideways movement.
- Plot the forward distance and sideways distance on the graph paper (forward distance on the y axis, sideways distance on the x axis).

Discussion

- Is there any measurement bias in your study? (Did you follow identical methods for each shot? Did the catapult move at any stage? Was the measurement consistent?)
- Does there appear to be any connection between the amount of sideways movement and the amount of forward movement? If so, can you describe this connection simply?
- Does there appear to be any connection between the amount of sideways movement and the amount of forward movement? If so, can you describe this connection simply?
- What would you do to improve the study the next time you ran it?