



Curiosity Guide #202

Levers

Accompanies Curious Crew, Season 2, Episode 2 (#202)

Marshmallow Launcher

Investigation #7

Description

Send marshmallows flying into the air! Can you hit a target every time?

Materials

- 5 large marshmallows per team
- 7 wooden skewers per team
- Tape
- Plastic spoon
- Rubber band
- Measuring tape

Procedure

- 1) Lay out three marshmallows on the table so that the marshmallows look like the points of a large triangle.
- 2) Carefully insert the ends of three wooden skewers into the marshmallows so that the skewers make the sides of the triangle. This is the base of the launch pad.
- 3) Insert the next three skewers into the base marshmallows to form a pyramid.
- 4) Complete the pyramid with the fourth marshmallow. Carefully pierce the marshmallow with the standing skewers so that it remains in place.
- 5) Drape the rubber band over the top marshmallow so that the rubber band touches each of the vertical skewers.

- 6) Securely tape the plastic spoon to the blunt end of the seventh skewer. Overlap the entire spoon handle with the end of the skewer. This will serve as the launch arm.
- 7) Slide the pointed end of the launch arm between the peak marshmallow and one side of the draped rubber band.
- 8) Thread the skewer to the opposite base marshmallow. Secure the skewer in place by piercing the base marshmallow.
- 9) Gently push down on the spoon to stretch the rubber band. When released, the spoon will spring back into place.
- 10) Place the fifth marshmallow on the spoon. Pull back the spoon arm and launch the marshmallow.
- 11) Improve your aim! Pick a target and practice. How long does it take before you can hit the target almost every time? Did you make any adjustments to improve your accuracy?
- 12) Measure the distance that your marshmallow travels. What can you adjust to make the marshmallow fly farther?

My Results

Explanation

In ancient battles, armies used catapults to hurl heavy objects at an enemy. The marshmallow catapult works on the principle of a third-class lever. In this example, the fulcrum is the point at which the spoon skewer pierces the base marshmallow. The spoon holds the marshmallow load. The stretched rubber band results in an upward force on the center of the load arm. When released, the lever is drawn up. When the lever suddenly hits the peak marshmallow, the load marshmallow continues to fly. This illustrates Newton's first law of motion: **An object in motion will stay in motion.**

Have you ever paddled a canoe? If you have, you were using a third-class lever. In a Class 3 lever, the fulcrum is on one end, the load is on the other, and the effort is in the middle. When you paddle, you place one hand on the top of the paddle and hold it stiffly in place. That hand is the fulcrum. Your second hand pulls the center of the paddle back to move the paddle blade against the water. Levers sure are useful!

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