HOMESCHOOL SCIENCE LAB

BUILDING A TREBUCHET AND STUDYING PROJECTILE MOTION

Build a working trebuchet and use it to explore how angle and force affect the distance a projectile travels.

Name: _____ Date: _____

OBJECTIVE

Build a trebuchet and investigate how launch angle and release force affect the horizontal distance (range) of a projectile.

BACKGROUND

A trebuchet is a type of catapult that uses a long arm and a counterweight to launch a projectile. When the arm is released, the projectile follows a curved path called a trajectory. This path is affected by the launch angle and the initial speed of the projectile.

MATERIALS

- Wood or sturdy craft sticks (for frame)
- Dowel rod (arm)
- Small cup or spoon (sling)
- String or strong twine
- Counterweight (washer stack, small weight, or water bottle)
- Screws, bolts, or strong glue
- Measuring tape
- Protractor (or angle guide)
- Small foam balls or marshmallows (projectiles)
- Safety goggles (recommended)

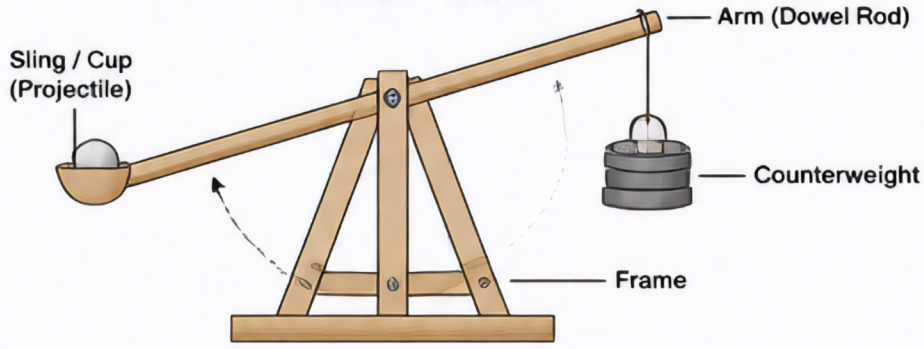
SAFETY FIRST

- Wear safety goggles.
2. Do not stand in front of the trebuchet when launching.
3. Keep hands away from the arm and counterweight when releasing.
- Use soft projectiles only.

PART 1: BUILD YOUR TREBUCHET

1. Build a stable base and vertical frame.
2. Mount the arm so it can swing freely.
3. Attach a cup or spoon to one end of the arm (for the projectile).
4. Attach the counterweight to the other end.
5. Test your trebuchet carefully to make sure it works smoothly.
6. Place your trebuchet on level ground for testing.

TREBUCHET DIAGRAM



PART 2: EXPERIMENT – PROJECTILE MOTION

1. Choose a launch angle. Measure and set the angle of the arm (example: 30°).
2. Use the same counterweight position for all trials.
3. Place a projectile in the cup and release.
4. Measure the horizontal distance from the base to where the projectile lands.
5. Repeat 3 trials for this angle. Record your results.
6. Test at different angles (suggested: 20°, 30°, 40°, 45°, 50°, 60°).
7. Keep all other variables the same.

DATA TABLE

Launch Angle (degrees)	Distance Traveled (meters)			Average (meters)	Notes
	Trial 1	Trial 2	Trial 3		
20°					
30°					
40°					
45°					
50°					
60°					

ANALYSIS QUESTIONS

1. Which launch angle gave you the greatest average distance? _____
2. How did changing the angle affect the distance? _____
3. If you increased the counterweight, what do you think would happen to the distance? Why? _____
4. What other factors might affect how far the projectile travels? _____

CONCLUSION

Write 2–3 sentences summarizing what you learned from your experiment.