

Centripetal Force Simulator

Classroom worksheet · Interactive simulation: <https://lkforge.com/tools/physics/centripetal-force/>

Name: _____ Date: _____

Learning objectives

- Relate centripetal force to speed, mass, and radius.
- Identify the direction of centripetal acceleration.
- Explain what supplies the centripetal force in real situations.

Variables to change

- Speed
- Radius
- Mass

Procedure

1. Set an object in uniform circular motion and note the required force.
2. Double the speed at fixed radius and observe the force.
3. Increase the radius at fixed speed and observe the force.

Observations

Record the centripetal force as you vary speed and radius, keeping the others fixed.

Questions

1. Write the centripetal force equation.
2. What happened to the force when you doubled the speed?
3. Which way does centripetal acceleration point?

4. What happens to the object if the centripetal force suddenly disappears?
5. Give a real example of what provides centripetal force.

Answer key (instructors)

- **1.** $F = m \cdot v^2 / r$.
- **2.** It quadrupled — force depends on the square of the speed.
- **3.** Toward the center of the circle.
- **4.** It flies off in a straight line tangent to the circle (Newton's first law).
- **5.** Tension in a string, friction on tires, or gravity for an orbiting satellite.

Uniform circular motion needs a net inward (centripetal) force $F = mv^2/r$ pointing to the center. It grows with the square of speed and shrinks with radius. Remove it and the object continues straight along the tangent.