

Modeling Gravity and Orbital Motion

Name: _____ Date: _____

LEARNING OBJECTIVE

Students will build a simple model demonstrating how gravity curves an object's path into an orbit.

MATERIALS NEEDED

- large piece of stretchy fabric or an old bedsheet (or a large mixing bowl)
- a heavy ball (e.g., a bowling ball or large marble) to represent a star
- a small marble or bead to represent a planet
- 4 people or chairs to hold fabric corners (or use the bowl instead)
- notebook paper
- pencil

HANDS-ON ACTIVITY

1. If using fabric: have 4 people (or tie corners to chair legs) hold the fabric taut like a trampoline. Place the heavy ball in the center to create a deep curve/well. If using a bowl, this step is already done by the bowl's shape.
2. Roll the small marble across the edge of the fabric or bowl with a moderate, steady push so it travels roughly parallel to the edge, not straight at the center ball.
3. Observe and record what path the small marble takes as it nears the heavy ball's 'gravity well' -- does it go straight, curve around, spiral in, or fly off?
4. Try the experiment 3 times with different amounts of push (slow, medium, fast) and record what happens to the marble's path each time.
5. Draw a diagram showing the curved 'gravity well' shape and the marble's curved path, and label the heavy ball as the star's gravity and the marble's curved path as an orbit.

QUESTIONS

1. What happened to the marble's path when it rolled near the heavy ball with a moderate push?

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2. How did the marble's speed affect its path in your three trials?
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3. How does this model represent how gravity keeps planets in orbit around the Sun?

4. In real space, planets don't lose energy to friction like the marble on fabric does. What keeps a real planet's orbit stable over billions of years?
