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Date: 10/4/24

## Student Exploration: Gravitational Force

**Directions:** Follow the instructions to go through the simulation. Respond to the questions and prompts in the orange boxes.

**Vocabulary:** force, gravity, vector

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

On the night of a Full Moon, Mary decides to do an experiment with **gravity**. At midnight, she climbs into her backyard tree house, leans out the window, and holds an acorn as high as she can. She lets go and is disappointed to see the acorn plummet back down to Earth.

1. Why did the acorn fall to Earth instead of rising up to the Moon?

The earth has a greater magnitude of gravitational force than the moon, the moon itself is trapped in earth's gravity.

2. Give two reasons why we feel Earth's gravity more strongly than the Moon's gravity.

Since we are quite literally on the surface of the Earth, gravity on the surface would be much stronger than for example in space.

### Gizmo Warm-up

From acorns to apples, gravity causes nearly any object to fall to Earth's surface. Gravity also causes the Moon to orbit Earth and Earth and the other planets to orbit the Sun. The *Gravitational Force* Gizmo allows you to explore the factors that influence the strength of gravitational force.



To begin, turn on the **Show force vector** checkboxes for objects A and B. The arrows coming from each object are **vectors** that represent gravitational **force**. The length of each vector is proportional to the force on each object.

1. Move object **A** around. As object **A** is moved, what do you notice about the direction of the two force vectors?

They are parallel to each other and increase/decrease everytime you move the object A around. Object B's arrow moves and points towards Object A, as well as Object A always points to Object B.

2. How do the lengths of the two vectors compare?

They are equal, the two gravitational force vectors react the same way to each other.

3. Drag object **A** closer to object **B**. How does this change the gravitational force between the two objects?

# Gravitational Force Gizmo Answer Key

**RJ Shavelson**

A red circular graphic with a gradient, appearing as a stylized arrow or a partial circle, located to the right of the author's name.

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