

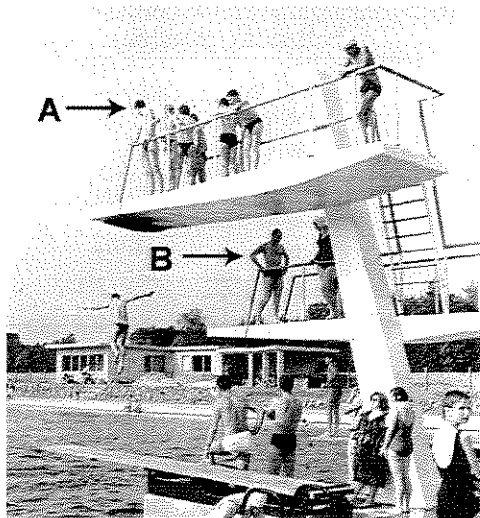


Name: _____ Date: _____

Student Exploration: Potential Energy on Shelves

Vocabulary: gravitational potential energy, kinetic energy, potential energy, weight, work

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



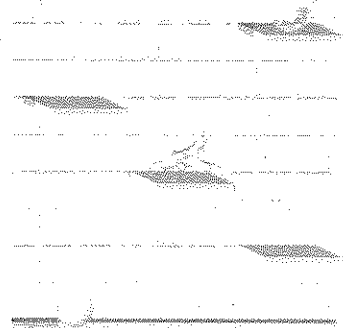
1. Look at divers A and B in the picture at left. Which diver had to put the most effort into climbing to the top of his board? Explain.

2. Which diver do you think will make the biggest splash? Explain.

Gizmo Warm-up

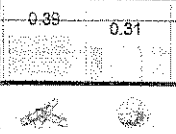
It takes energy to climb up to the top of a diving board, and of course a diver that leaps off the board and makes a big splash in the water also has a lot of energy. But how much energy does a diver have while he is standing at the top of the diving board?

Even at the top of the board, the diver has energy—a type of energy called **potential energy**. Potential energy is the energy an object has because of its position or shape. Using the *Potential Energy on Shelves* Gizmo, you will discover how gravity gives objects potential energy because of their position above the floor.



1. Which object on the SIMULATION pane most likely has the least potential energy? Why?

2. Click on the TABLE tab. The potential energy (*PE*) of each object is given in joules (J). List the objects in order from lowest to highest potential energies.

Activity A: Factors affecting GPE	Get the Gizmo ready: <ul style="list-style-type: none"> Select the BAR CHART tab and turn on Show numerical values. 	
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Introduction: Because gravity pulls objects down to Earth's surface, objects lifted above Earth's surface have a type of potential energy called **gravitational potential energy**, or *GPE*.

Question: What factors affect how much gravitational potential energy an object has?

1. **Identify:** Circle the factors below that you think affect an object's potential energy.

mass vertical position velocity horizontal position

2. **Observe:** Drag the ball to the 1-m shelf on the SIMULATION pane.

A. What is the ball's potential energy (*PE*)? _____

B. Move the ball to the 2-m shelf. What is its potential energy now? _____

C. What do you think the ball's potential energy will be on the 3-m shelf? The 4-m shelf?

PE on 3-m shelf: _____ *PE* on 4-m shelf: _____

Use the Gizmo to check your answers. (Click the \ominus control on the bar graph to zoom out.)

3. **Summarize:** What is the relationship between an object's height above the ground and its gravitational potential energy? _____

4. **Describe:** Move the ball from side to side (left to right) while trying to keep it at the same height. How does changing the horizontal position of the ball affect its potential energy?

5. **Infer:** Place the ball and the paper on the same shelf.

A. Which object has more potential energy? _____

B. Why do you think their potential energies are different? _____

6. **Identify:** What two factors affect how much gravitational potential energy an object has?
