

POTENTIAL ENERGY

HIDDEN ENERGY

TIME REQUIRED: 1 hour

MATERIALS: Small marble, large marble, Ping-Pong ball, golf ball, large pan, flour, yardstick

ACTIVITY AND RESOURCE SHEET: Potential Energy Activity Sheet



Central question:

What is potential energy?

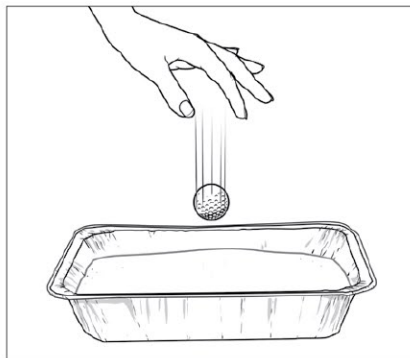
1. Introduce the concept of potential energy—energy that is stored due to an object's position or condition. Explain that the word "potential" means having the ability to do something. Therefore, potential energy is energy that has not yet been used.
2. To illustrate the concept of potential energy, ask students to imagine a racecar sitting on the top of a steep banking. (See the Build section of Lesson 2: Kinetic Energy for a description of racetrack bankings.) Tell students that in this position the car is loaded with a specific type of potential energy, called gravitational potential energy. Explain that when an object, like a racecar, is far above the ground, a force called gravity pulls it downward toward Earth's surface.



Central question:

What affects the amount of potential energy an object has?

1. Explain that the potential energy of an object is measured by its ability to exert a specific amount of force for a particular distance. There are three factors that determine how much gravitational potential energy an object has: gravity, height, and mass. Gravity is constant, but differences in an object's mass and height can increase or decrease the amount of potential energy the object has.
2. To demonstrate, set a small marble on the floor of your classroom. Ask students if the marble has potential energy in its current state. (No, because there's no distance for gravity to pull it toward Earth.) Raise the marble about one foot in the air. Ask whether the ball now has any potential energy. (Yes.)



3. Drop the marble into a large pan filled with a few inches of flour. Gently remove it from the pan, and have a volunteer measure the width of the impact crater left in the flour. Climb on a chair and drop the marble from a height of about seven feet. Measure the new impact crater. Repeat the experiment with the large marble, the Ping-Pong ball, and the golf ball. Have students take notes throughout the experiment. After the demonstration is complete, ask them to draw conclusions about how mass and height impact the amount of potential energy an object has.



Central question:

What types of potential energy exist?

1. Hand out Potential Energy Activity Sheet A. Tell students that gravitational potential energy is just one type of potential energy. Have them complete the activity to learn about three other forms.
2. Now that students understand potential energy's different forms, have them imagine a racecar sitting in position on the starting grid before the start of a race. Ask: What forms of potential energy might the car have before it starts moving?
3. Explain that cars use electric potential energy to operate. When a driver

starts the car, the battery releases a jolt of electricity to power parts inside the car. The fuel in the car's gas tank holds chemical potential energy. When the fuel burns, it undergoes a chemical reaction that unleashes energy to power the car's engine and propel the vehicle around the track. Batteries are unique because they hold energy in chemical form, but they release electric energy!

4. Describe how a racecar also has a suspension system between its wheels and its base. This system contains flexible springs that store elastic potential energy. This type of energy—also called mechanical energy—is energy stored in an object due to its tension. When the car hits a bump in the road, the springs absorb the impact by compressing. Then they stretch to release the stored energy, pushing the tire back against the road. This helps prevent the car's wheels from losing their grip on the track.



NAME _____

POTENTIAL ALL AROUND US

DIRECTIONS: Read about four types of potential energy in the chart below. Then write down as many examples of each that you can think of. One is already done for you.

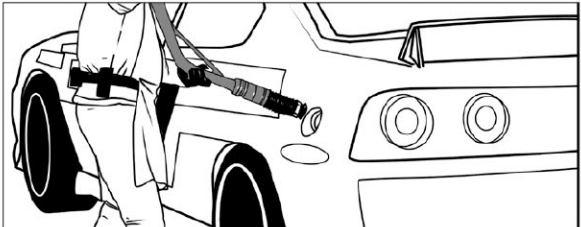
GRAVITATIONAL: energy stored in an object due to its height.



UNITS OF MEASURE: joules

Examples: a racecar coming off a bank,

CHEMICAL: energy stored in chemicals.



UNITS OF MEASURE: calories (food), joules, horsepower-hours (vehicles)

Examples: burning fuel inside a racecar's engine, _____

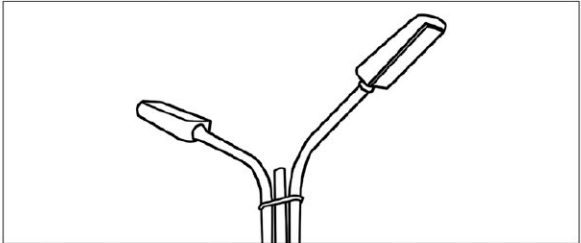
ELASTIC: energy stored in an object that can be stretched or squeezed.



UNITS OF MEASURE: joules

Examples: the springs that make up a racecar's suspension system,

ELECTRIC: energy stored as electricity.



UNITS OF MEASURE: volts

Examples: the wires in a lamppost,

