Read to Understand

Potential Energy

Potential energy is stored energy. The energy of the water in the lake behind the dam in the figure below is potential energy.

The water has energy because of it position. Gravity can cause it to fall to the river below the dam. This kind of stored energy is called gravitational potential energy.

1. The water is not moving. How does it have energy and what type of energy does it have?

The gravitational potential energy stored in a sample of matter depends on two factors. These factors are weight and height. The more weight an object has the more potential energy it has. Potential energy also depends on height. The farther an object has to fall, the more potential energy it has.

2. Which would have greater gravitational potential energy – a ping-pong ball that is 2 m off the floor or one of the same mass that is 10 m off the floor? Why?

Kinetic Energy

Kinetic energy is energy of motion. Anything that is moving has kinetic energy. When you walk or run, you have kinetic energy. Like potential energy, kinetic energy also depends on two factors. With kinetic energy the factors are mass and velocity. The faster you move, the more kinetic energy you have. The more mass a moving object has, the more kinetic energy it has.

Think about a car and a truck moving at 30 mph. The truck has the greater mass. So, even though both vehicles are traveling at the same speed, the truck will have more kinetic energy than the car.

3. If we both weigh the same, but I'm running faster than you, who has more kinetic energy? Why?

Thinking about Energy:

1. Which of the following has the most kinetic energy?

   a. car traveling at 30 miles per hour

   b. car traveling at 60 miles per hour

   c. car parked on top of a 50 foot hill

   d. car parked on top of a 70 foot hill

2. The drawing shows an apple tree with one apple falling off a branch. What kind of energy change does the drawing to the right show?

   a. kinetic to potential c. potential to kinetic

   b. kinetic to chemical d. heat to kinetic

3. Which of the following best describes the energy change that occurs when a stretched rubber band is suddenly released?

   a. kinetic → potential c. mechanical → potential

   b. potential → kinetic d. kinetic → mechanical

Using formulas to understand Kinetic and Potential Energy

Formula for Kinetic Energy:

Formula for Potential Energy:

Examples:

1. A 50-kilogram boy and his 100-kilogram father went jogging. Both ran at a rate of 5 m/s. Who had more kinetic energy?

2. What is the potential energy of a 10-kg book that is placed on a shelf that is 2.5 meters high?

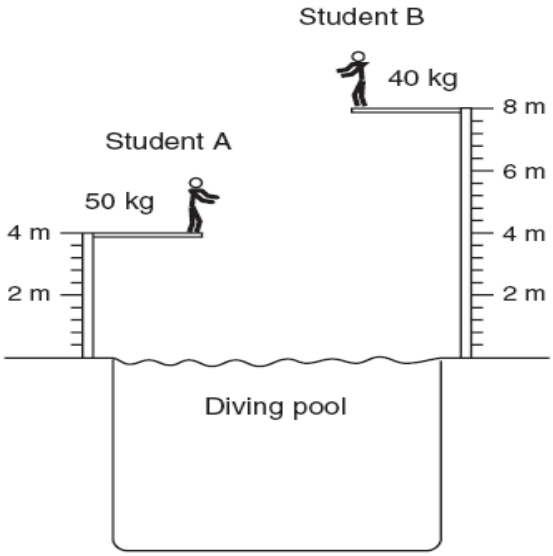
3. Which student has more potential energy?

a. Student A

b. Student B

c. Both Student A and Student have same amount

d. Cannot be determined



4. If both students jumped at the same time, which one would have more kinetic energy at the water?