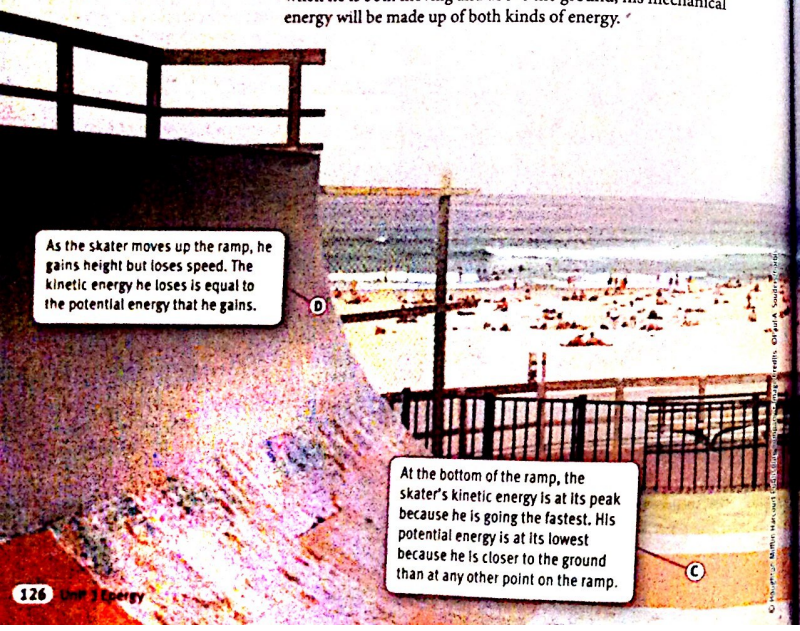
Add It Up!

What is mechanical energy?

The skater in the picture has both kinetic energy and potential energy. There are many times when these two types of energy are found together. **Mechanical energy** (meh•KAN•ih•kuhl) is the combination of kinetic and potential energy.

Remember that kinetic energy is the energy of motion. Potential energy is the energy of position. The mechanical energy of an object is the total of that object's kinetic energy and its potential energy. Mechanical energy is energy due to motion and position.

At any point on the half-pipe shown in the photograph, the mechanical energy of the skater will be equal to the sum of his kinetic energy and his potential energy. If there is any point where his kinetic energy is zero, then his mechanical energy will only be made up of potential energy. However, for all of the many times when he is both moving and above the ground, his mechanical energy will be made up of both kinds of energy.



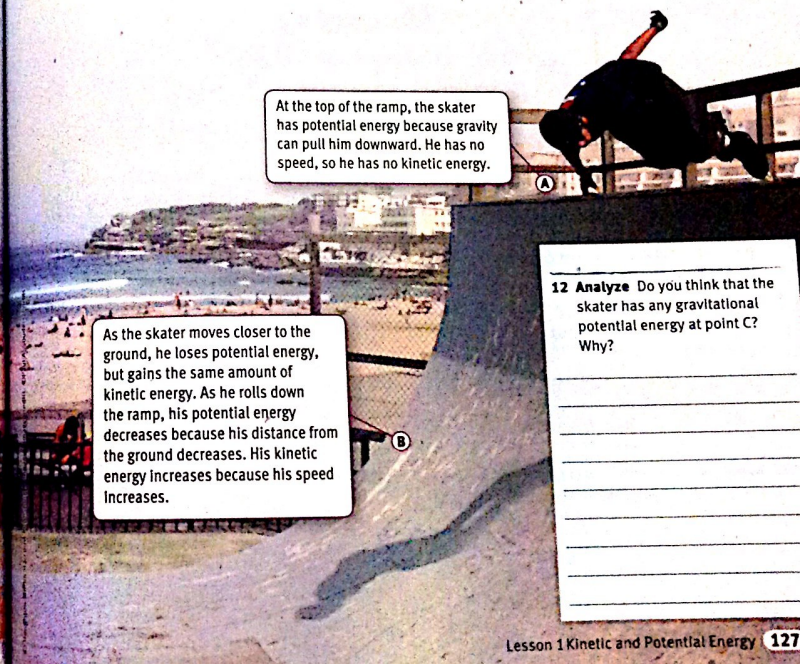
What is the law of conservation of energy?

The **law of conservation of energy** states that energy can be neither created nor destroyed. It can only be transformed. The mechanical energy of an object always remains the same unless some of it is transformed into other forms of energy, such as heat through friction. If no energy is transformed, the mechanical energy of an object stays the same.

As a skater rolls down the ramp, the amounts of kinetic and potential energy change. However, the law of conservation of energy requires that the total—or mechanical energy—stays the same, assuming no energy is converted into other forms. In order for the mechanical energy to stay the same, some potential energy changes into kinetic energy. At other times, some kinetic energy changes into potential energy. The picture below shows the skater's mechanical energy at four key places: the top of the ramp, between the top and the bottom of the ramp, the bottom of the ramp, and between the bottom and top of the ramp.

Active Reading

11 Identify As you read, underline examples in the text where kinetic energy changes into potential energy or where potential energy changes into kinetic energy.



12 Analyze Do you think that the skater has any gravitational potential energy at point C? Why?