Energy

Key Concepts

- What factors affect an object's kinetic energy and potential energy?
- How can kinetic energy and potential energy be transformed?
- What is the law of conservation of energy?

Work is done when a force moves an object through a distance. The ability to do work or cause change is called **energy.** Energy is measured in joules.

Two basic kinds of energy are kinetic and potential energy. The energy of motion is called **kinetic energy. The kinetic energy of an object depends on both its mass and its speed.** The more mass a moving object has, the more kinetic energy it has. Kinetic energy also increases when velocity increases.

$$\text{Kinetic energy} = \frac{1}{2} \times \text{Mass} \times \text{Velocity}^2$$

Energy that is stored and held in readiness is called **potential energy.** When you raise a book or compress a spring, you give the object potential energy. Potential energy that depends on height is **gravitational potential energy. An object's gravitational potential energy depends on its weight and on its height relative to a reference point.**

$$\text{Gravitational potential energy} = \text{Weight} \times \text{Height}$$

An object's combined kinetic energy and potential energy is called **mechanical energy.** You can find an object's mechanical energy by adding the object's kinetic energy and potential energy.

Mechanical energy = Kinetic energy + Potential energy

One of the most common energy transformations is the transformation between potential and kinetic energy. **Any object that rises or falls experiences a change in its kinetic and gravitational potential energy.**

According to the law of conservation of energy, energy cannot be created or destroyed. So the total amount of energy is the same before and after any transformation. If you add up all the new forms of energy after a transformation, all of the original energy will be accounted for.

When you stretch an object, you give it a different kind of potential energy. The potential energy associated with objects that can be stretched or compressed is called **elastic potential energy.**

Energy (pp. 358–363)

This section explains how work, power, and energy are related. It also identifies the two basic kinds of energy.

Use Target Reading Skills

As you read about energy, complete the outline below. Use the red headings for main topics and the blue headings for subtopics. If no blue headings exist, create your own subtopics. Include supporting details or examples where indicated in the outline.

Energy
I. Kinetic Energy A. B. II. Potential Energy A. 1. 2. B. 1. 2. III. Energy Transformation and Conservation A. 1. 2. B. 1. 2.

Introduction (p. 358)

1. The ability to do work or cause change is called _____.

2. Why can work be thought of as the transfer of energy?

_____

_____

3. What are the two general kinds of energy?

a. _____ **b.** _____

Kinetic Energy (p. 359)

4. What is kinetic energy?

_____

5. The kinetic energy of an object depends on both its _____ and its _____.

6. Kinetic energy increases as velocity _____.

7. What formula do you use to calculate kinetic energy?

_____

8. Because velocity is squared in the kinetic energy equation, doubling an object's velocity will _____ its kinetic energy.

Potential Energy (p. 360)

9. What is potential energy?

_____

_____

10. What is the potential energy called that is associated with objects that can be stretched or compressed?

_____

11. What is potential energy called that depends on height?

_____

12. What is the formula you use to determine the gravitational potential energy of an object?

_____

13. Is the following sentence true or false? The greater the height of an object, the greater its gravitational potential energy.

_____

Energy Transformation and Conservation (pp. 361–363)

14. What two forms of energy are associated with mechanical energy?

_____

15. How would you calculate an object's mechanical energy?

_____

_____

16. What SI unit is used to measure mechanical energy?

_____

Energy *(continued)*

17. When you throw an orange up into the air, what kind of energy increases as its height increases? _____

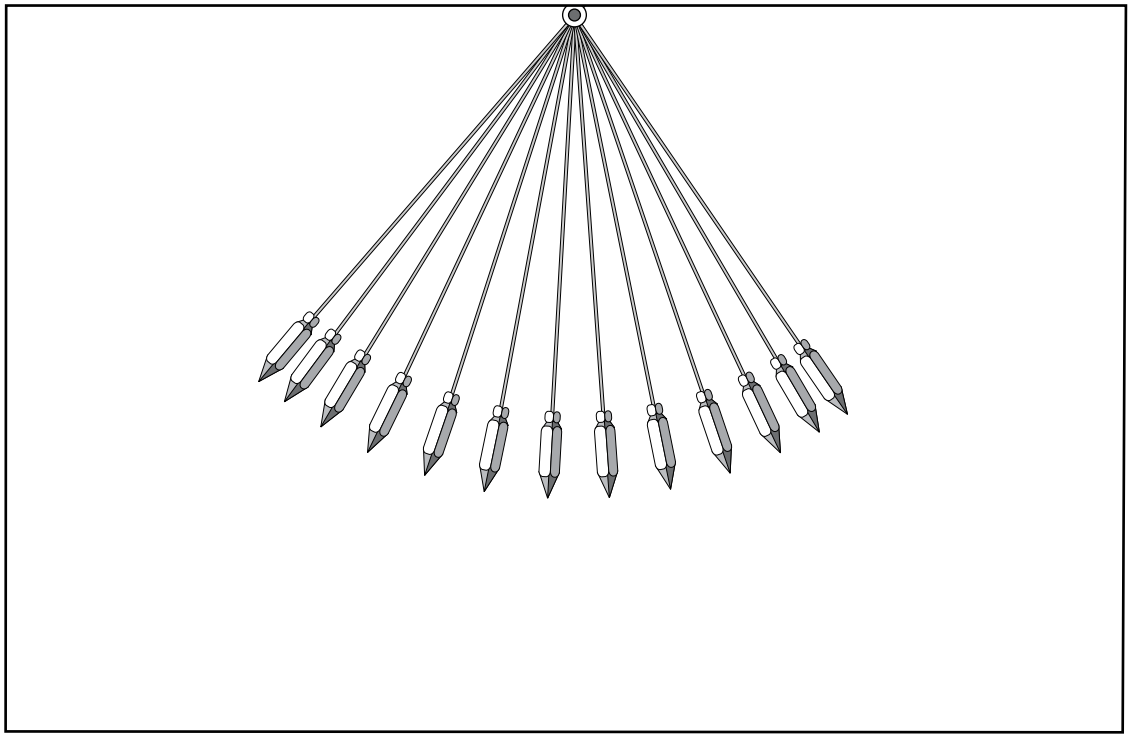
18. As an orange falls from its greatest height, what kind of energy increases and what kind of energy decreases?

_____

_____

_____

19. On the diagram of a moving pendulum, label the places where the pendulum has maximum potential energy and where it has maximum kinetic energy.



20. What does the law of conservation of energy state?

_____

_____

_____