Conservation of Energy Practice Multiple Choice Test

1. Which one of the following choices is an example of a non-conservative force?
   A) elastic spring force  C) kinetic frictional force
   B) electrical force  D) gravitational force

2. A skier leaves the top of a slope with an initial speed of 5.0 m/s. Her speed at the bottom of the slope is 13 m/s. What is the height of the slope?
   A) 7.3 m  B) 6.4 m  C) 11 m  D) 1.1 m  E) 4.6 m

3. A rock is thrown straight up from the surface of the Earth. Which one of the following statements describes the energy transformation of the rock as it rises? Neglect air resistance.
   A) The total energy of the rock increases.
   B) The kinetic energy increases and the potential energy decreases.
   C) Both the kinetic energy and the potential energy of the rock remain the same.
   D) The kinetic energy decreases and the potential energy increases.
   E) Both the potential energy and the total energy of the rock increase.

Use the following to answer question 4:

A block of mass $m$ is released from rest at a height $R$ above a horizontal surface. The acceleration due to gravity is $g$.

The block slides along the inside of a frictionless circular hoop of radius $R$.

4. Which one of the following expressions gives the speed of the mass at the bottom of the hoop?
   A) $v^2 = \frac{g^2}{R}$
   B) zero m/s²
   C) $v^2 = 2gR$
   D) $v = mgR$
   E) $v = \frac{mg}{2R}$
5. An engineer is asked to design a playground slide such that the speed a child reaches at the bottom does not exceed 6.0 m/s. Determine the maximum height that the slide can be.
   A) 2.9 m  B) 1.8 m  C) 14 m  D) 3.2 m  E) 4.5 m

6. Larry's gravitational potential energy is 1870 J as he sits 2.20 m above the ground in a sky diving airplane. What is Larry's gravitational potential energy when he begins to jump from the airplane at an altitude of 923 m?
   A) $7.85 \times 10^5$ J  D) $3.29 \times 10^4$ J
   B) $4.22 \times 10^6$ J  E) $1.87 \times 10^3$ J
   C) $9.36 \times 10^2$ J

7. What power is needed to lift a 49-kg person a vertical distance of 5.0 m in 20.0 s?
   A) 12.5 W  B) 210 W  C) 120 W  D) 25 W  E) 60 W

8. A 3.0-kg block falls from rest through a distance of 6.0 m in an evacuated tube near the surface of the earth. What is its speed after it has fallen the 6.0 m distance?
   A) 26 m/s  B) 8.0 m/s  C) 13 m/s  D) 120 m/s  E) 11 m/s

9. Which one of the following choices is an example of a conservative force?
   A) normal force  D) elastic spring force
   B) tension  E) motor propulsion force
   C) static frictional force

10. The force component acting on an object along the displacement varies with the displacement $s$ as shown in the graph. Determine the work done on the object as it travels from $s = 0.0$ to 12 m.

   A) 81 J  B) 48 J  C) 57 J  D) 66 J  E) 72 J
Answer Key

1. C
2. A
3. D
4. C
5. B
6. A
7. C
8. E
9. D
10. D