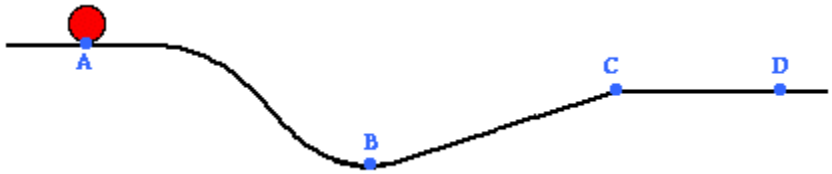
8th Grade Science – Week 12

If using the acceleration of gravity on Earth, you can round g = 10 m/s^2. Friction and air resistance are negligible on the following problems.

$$W = Fd \qquad PE = mgh \qquad KE = \frac{1}{2}mv^2 \qquad ME = PE + KE$$

Questions 1-3 refer to the following diagram of a 2.0 kg ball starting from rest at point A, which is a height of 5 m above the ground.

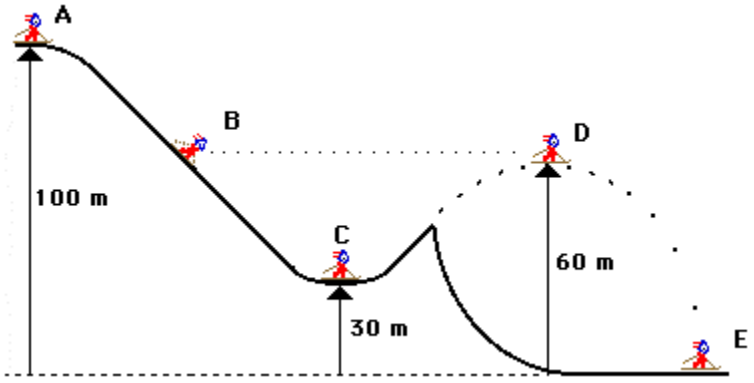


1. At what point on the track will the ball be traveling the fastest speed?
   (A) Point A
   (B) Point B
   (C) Point C
   (D) Point D

2. Rank the potential energies of the ball from greatest to least.
   (A) Point B, Point C = Point D, Point A
   (B) Point B, Point C, Point D, Point A
   (C) Point A, Point C = Point D, Point B
   (D) Point A, Point C, Point D, Point B

3. Rank the mechanical energies of the ball from greatest to least.
   (A) Point B, Point C = Point D, Point A
   (B) Point B, Point C, Point D, Point A
   (C) Point A, Point C = Point D, Point B
   (D) Point A = Point B = Point C = Point D

Questions 4-6 refer to the following 50 kg skier starting from rest at point A.

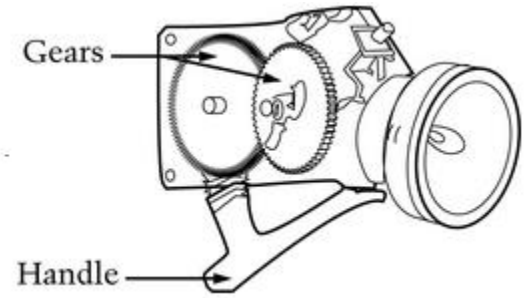


4. How much potential energy will the skier have at point A?
   (A) 25 000 J
   (B) 50 000 J
   (C) 75 000 J
   (D) 100 000 J

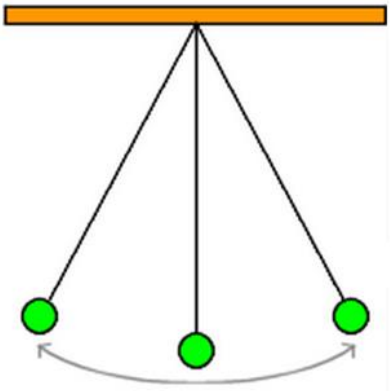
5. How much kinetic energy will the skier have at point C?
   (A) 15 000 J
   (B) 25 000 J
   (C) 35 000 J
   (D) 45 000 J

6. What speed will the skier be traveling at point B?
   (A) 28.2 m/s
   (B) 36.3 m/s
   (C) 40.0 m/s
   (D) 45.5 m/s

7. How much work is done by an applied force to lift a 15 N block 3.0 meters vertically at a constant speed?
   (A) 5 J
   (B) 45 J
   (C) 65 J
   (D) 80 J



8. The flashlight shown above has no batteries. It is operated by squeezing and letting go of the handle. Inside the body of the flashlight are gears. Which sequence best identifies the energy transfers that take place within the flashlight?
   (A) Chemical → kinetic → light
   (B) Chemical → electrical → light
   (C) Kinetic → chemical → light
   (D) Kinetic → electrical → light



9. A pendulum (shown above) is set in motion by pulling it back and letting it go. As it travels back and forth, why does this pendulum eventually stop?
   (A) The mechanical energy was destroyed.
   (B) The kinetic energy and potential energy are balanced.
   (C) The pendulum runs out of power.
   (D) The friction transforms the potential and kinetic energy into thermal energy.

10. Which sequence best identifies the energy transfers that take place within a wind turbine (shown above)?
    (A) Kinetic energy → electrical energy → mechanical energy
    (B) Kinetic energy → mechanical energy → electrical energy
    (C) Mechanical energy → kinetic energy → electrical energy
    (D) Mechanical energy → electrical energy → kinetic energy