Questions

1. Jack Itthup is able to lift a 85 kg bar bell 1.0 meters above his head 10. times in 4.6 seconds. How much power does Jack put out each repetition?

$$T = \frac{\text{time}}{\text{\# of rev}} = \frac{4.6\text{ s}}{10.} = .46\text{ s}$$

$$P = \frac{W}{t} = \frac{Fd}{t} = \frac{mgd}{t} = \frac{(85\text{ kg})(9.81\text{ m/s}^2)(1.0\text{ m})}{.46\text{ s}} = 1800\text{ Watts}$$

2. Anne Sadeedor drops a 12.3 kg ball from a height of 7.89 meters. Neglecting air resistance, what is the
   a. potential energy of the ball before it is dropped.

$$PE = mgh = (12.3\text{ kg})(9.81\text{ m/s}^2)(7.89\text{ m}) = 952\text{ J}$$

   b. kinetic energy of the ball just before it hits the ground.

$$E_i = E_f = PE_{top} = KE_{bottom} = 952\text{ J}$$

   c. velocity of the ball just before it strikes the ground.

$$v = \sqrt{\frac{2KE}{m}} = \sqrt{\frac{2\,(952\text{ J})}{12.3\text{ kg}}} = 12.4\ \tfrac{m}{s}\text{ down}$$

$$vf = \sqrt{2ad} = \sqrt{2(9.81\text{ m/s})(7.89\text{ m})} = 12.4\ \tfrac{m}{s}\text{ down}$$

3. A plastic dart is loaded into a spring gun having a spring constant of 84 N/m. If the spring is compressed .20 m determine the PE of the dart just before it is released.

$$PE = \tfrac{1}{2}\,kx^2 = \tfrac{1}{2}\,(84\text{ N/m})(.20\text{ m})^2 = 1.7\text{ J}$$

Energy

"And that, ladies and gentlemen, is the way the ball bounces."

Definitions

1. Work - a force acting upon an object to cause a displacement.
2. Power - The rate at which work is performed
3. Mechanical Energy - is the energy which is possessed by an object due to its motion or its stored energy of position.
4. Kinetic Energy - the energy an object possesses due to its motion.
5. Potential Energy - the energy possessed by an object due to its position.
6. Internal Energy - total potential energy and kinetic energy possessed by the particles that make up an object, but excludes the potential and kinetic energies of the system as a whole.
7. Transformation - a conversion from one form of energy to another.
8. Transferal - the passing of energy between masses.
9. Conservation of Energy – energy cannot be created or destroyed, only transformed or transferred.
10. Spring Force - a force that always pushes or pulls the mass back toward its original equilibrium position

Equations (on Reference Tables)

1. $W = Fd = \Delta E_T$

2. $P = \frac{W}{t} = \frac{Fd}{t} = Fv$

3. $KE = \frac{1}{2} mv^2$

4. $PE = mg\Delta h$

5. $E_t = PE + KE + Q$

6. $F_{spring} = k\,x$

7. $PE_{spring} = \frac{1}{2} kx^2$

Equations (NOT on Reference Tables)

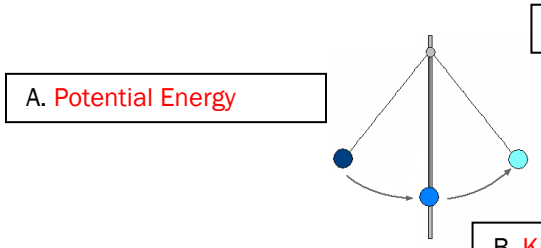
8. $T_p = 2\pi\sqrt{\frac{\ell}{g}}$

9. $E_i = E_f$

10. $Eff = \frac{Out}{In} \times 100$

11. $T_s = 2\pi\sqrt{\frac{m}{k}}$

- Label the forms of mechanical energy at each point in the pendulum's motion.



A. Potential Energy

C. Potential Energy

B. Kinetic Energy