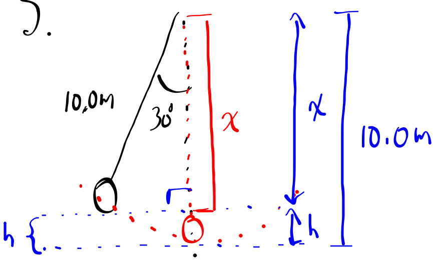
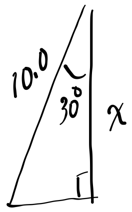
PP|287

5.



$h = 1.3m$



$\cos\theta = \frac{adj}{hyp}$

$\cos 30° = \frac{x}{10.0m}$

$x = (10.0m)\cos 30°$

$x = 8.7m$

$E_{total} = E'_{total}$

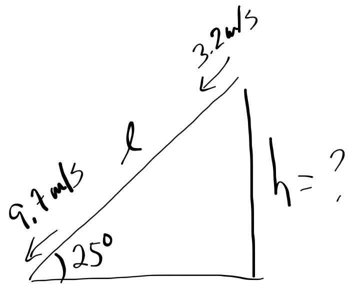
(top) (bottom)

$\cancel{E_k}^{0} + E_g = E_k' + \cancel{E_g'}^{0}$

$E_g = E_k'$

$\cancel{m}gh = \frac{1}{2}\cancel{m}v^2$

7.



frictionless

(top) (bottom)

$E_{total} = E'_{total}$

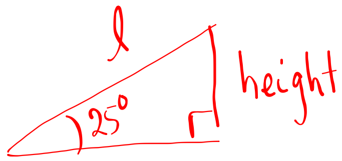
$E_k + E_g = E_k' + \cancel{E_g'}$

$\frac{1}{2}\cancel{m}v_1^2 + \cancel{m}gh = \frac{1}{2}\cancel{m}v_2^2$

$\frac{1}{2}(3.2)^2 + 9.81h = \frac{1}{2}(9.7)^2$

① solve for h

②



$\sin\theta = \frac{opp}{hyp}$

Law of Conservation of Mechanical Energy

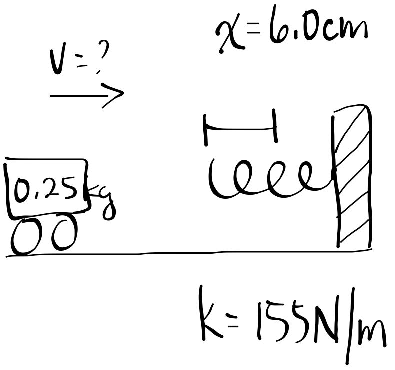
If there are no non-conservative forces acting on an object (i.e. an isolated system), the total mechanical energy is conserved.

$$E_{total} = E'_{total}$$

(before) (after)

$$E_k + E_g + E_e = E_k' + E_g' + E_e'$$

mp/292



$$E_{total} = E'_{total}$$

(before compression) (max compression)

$$E_k + \cancel{E_e}^{\,0} = \cancel{E_k'}^{\,0} + E_e'$$

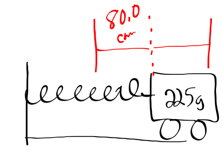
$$\cancel{\frac{1}{2}} mv^2 = \cancel{\frac{1}{2}} kx^2$$

$$v^2 = \frac{kx^2}{m}$$

$$v^2 = \frac{(155 N/m)(0.060 m)^2}{0.25 kg}$$

$$\boxed{v = 1.5 \ m/s}$$

MP|294



$k = 145\,N/m$

a) $V_{max} = ?$

b) $x = ?$, when $V = \frac{1}{2}V_{max}$

a) $E_{total} = E'_{total}$

(max stretch) (equilibrium)

$\cancel{E_k} + E_e = E_k' + \cancel{E_e'}$

0 0

$\cancel{\frac{1}{2}}kx^2 = \cancel{\frac{1}{2}}mv^2$

$v^2 = \frac{kx^2}{m}$

$v^2 = \frac{(145\,N/m)(0.800\,m)^2}{0.225\,kg}$

$V = \pm 20.3\,m/s$

The maximum speed is 20.3 m/s

b) What is $x = ?$
When $V = 10.15\,m/s$

$E_{total} = E'_{total}$

(full stretch) (partial stretch)

$^0\cancel{E_k} + E_e = E_k' + E_e'$

$\cancel{\frac{1}{2}}kx_1^2 = \cancel{\frac{1}{2}}mv^2 + \cancel{\frac{1}{2}}kx_2^2$?

$kx_1^2 = mv^2 + kx_2^2$

$\left(145\frac{N}{m}\right)(0.800\,m)^2 = (0.225\,kg)\left(10.15\frac{m}{s}\right)^2 + (145\,N/m)x_2^2$

$92.8\,J = 23.2\,J + \left(145\frac{N}{m}\right)x_2^2$

÷2 → E_{total} ÷2 → E_k ÷2 → E_e

$69.6\,J = \left(145\frac{N}{m}\right)x_2^2$

$x_2^2 = \frac{69.6\,J}{145\,N/m}$

$x_2 = \pm 0.693\,m$ $\boxed{\pm 69.3\,cm}$

The mass will be 69.3 cm from the equilibrium when it is going at $\frac{1}{2}$ of V_{max}.

TO DO

1. PP/287 $(E_g + E_k)$
2. PP/296 $(E_e + E_k)$

   9 b) 3.4 m/s

   12 a) 6.34 m/s

3. Video Analysis (Individual)

   Power Calculation (Group)

   Ball Toss (Group)