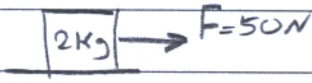
CH # 7

1. $P = \bar{F} \cdot \bar{v}$

To find v at $t = 2$, we need (a):

$F_{net} = ma \Rightarrow a = \frac{50}{2} = 25\ m/s^2$



$\Rightarrow v = v_0 + at$

$v = 0 + 25(2) = 50\ m/s$

$\Rightarrow P = 50 \times 50 \times \cos 0 = 2500\ W$

$\boxed{P = 2500 W}$

2. $W = \vec{F} \cdot \vec{d}$

$\vec{d} = \Delta x \hat{i} + \Delta y \hat{j} = 10\hat{i} - 10\hat{j}$

$\therefore W = (4\hat{i} + 3\hat{j}) \cdot (10\hat{i} - 10\hat{j})$

$W = 40 - 30 = 10\ J$

$\boxed{W = 10 J}$

3. $(\Delta K = W)$

4. $\boxed{P_{avg} = \frac{W}{t}}$, $W = \bar{F} \cdot \bar{d}$ and $\bar{F} = ma$

Finding a: $a = \frac{v - v_0}{t} = \frac{10}{3}\ m/s^2 \Rightarrow F = 1500 \times \frac{10}{3} = 5000 N$

Finding $\vec{d} = v_0 t + \frac{1}{2} a t^2$

$\vec{d} = 0 + \frac{1}{2} \frac{10}{3} (3)^2 = 15 m$

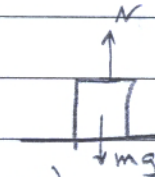
$\Rightarrow P_{avg} = \frac{5000 \times 15}{3} = 25\,000\ W = 25 KW$

$\boxed{P_{avg} = 25 Kw}$

CH7 →

Cont. (ch#7)

5. $\Delta K = W_a \Rightarrow K_f - K_i = W_a = \vec{F}_k \cdot \vec{d}$



$\frac{1}{2} m(v_f^2 - v_i^2) = \mu_k N d \cos 180$, $(N = mg)$

$\frac{1}{2} m[(3.69)^2 - (9.1)^2] = -0.6 \times m \times 9.8 \times d$

$\Rightarrow$ $\boxed{d = 5.88 m}$

6. $\vec{F} = 4\hat{i} + 2\hat{j}$, $\vec{d} = 5\hat{i}$

$\Rightarrow W = \vec{F} \cdot \vec{d} = (4\hat{i} + 2\hat{j}) \cdot (5\hat{i})$

$\boxed{W = 20 J}$

7. $\Delta K = W_a \Rightarrow \frac{1}{2} m(v_f^2 - v_i^2) = F d \cos 0$

$\frac{1}{2} \times 6 (v_f^2 - 0) = 12 \times 3$

$\boxed{v_f = 3.46 m/s \approx 3.5 m/s}$

8. $\Delta K = W_a + W_f = F d + (-f_k d)$

$\frac{1}{2} m (v_f^2 - v_i^2) = \underset{F \quad d}{(12 \times 3)} - \underset{\mu_k \quad m \quad g \quad d}{(0.15 \times 6 \times 9.8 \times 3)}$

$\frac{1}{2} \times 6 (v_f^2) = 9.54$

$\Rightarrow v_f = 1.78 ms \approx 1.8 m/s$

$\boxed{v_f = 1.8 m/s}$

Conti. Ch.7

9. For spring : $x_i = 2m$, $x_f = 1m$, $k = 20\,N/m$

$K_i = 0$

$$\Delta K = W_s \Rightarrow K_f - K_i = \left(\tfrac{1}{2} k x_i^2 - \tfrac{1}{2} k x_f^2\right)$$

$$K_f = \tfrac{1}{2} \times 20 (4 - 1) = 30\,J$$

$$\boxed{K_f = 30\,J}$$ when $x = 1m$

10. for spring: $x_i = 0$, $x_f = 0.4\,m$
$V_i = 0 \Rightarrow K_i = 0$,

$\Rightarrow$ $$\Delta K = W_s + W_g \Rightarrow K_f = \tfrac{1}{2} k (x_i^2 - x_f^2) + mgd$$

$$K_f = \tfrac{1}{2} \times 380 \times (0 - 0.4^2) + 20 \times 9.8 \times 0.4$$

$$\tfrac{1}{2} \times 20\, V_f^2 = 48 \Rightarrow V_f = 2.19\,m/s$$

$$\boxed{V_f \approx 2.2\,m/s}$$

End.