

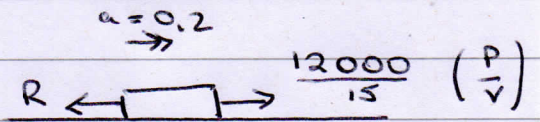
# ASSIGNMENT TEST 6 SOLUTIONS.

1.

a)  $[F = ma]$

$$\frac{12000}{15} - R = 1000 \times 0.2$$

$$R = 600 \text{ N}$$



b)

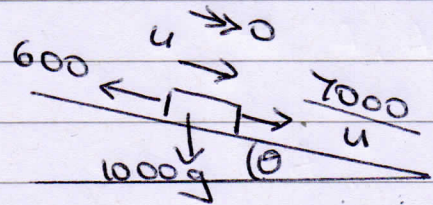
$[F = ma]$

$$\frac{7000}{u} + 1000g \sin \theta - 600 = 0$$

$$\sin \theta = \frac{1}{40}$$

$$u = 19.7$$

$$= 20 \text{ ms}^{-1} \text{ (2 sf)}$$



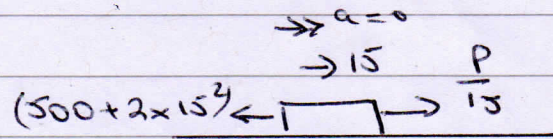
2.

a)  $[F = ma]$

$$\frac{P}{15} - (500 + 2 \times 15^2) = 0$$

$$P = 14250$$

$$= 14.3 \text{ kW (3 sf)}$$



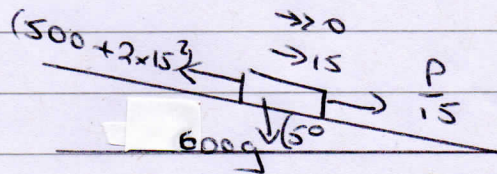
b)

$[F = ma]$

$$\frac{P}{15} + 600g \sin 5^\circ - (500 + 2 \times 15^2) = 0$$

$$P = 6562.86 \text{ W}$$

$$= 6.6 \text{ kW (2 sf)}$$



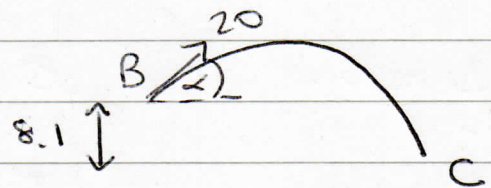
3. a) INPUT at A = OUTPUT at B.

$$PE_A = PE_B + KE_B + W.D \text{ against } R.$$

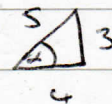
$$80g \times 32.5 = 80g \times 8.1 + \frac{1}{2} \times 80 \times 20^2 + 60R.$$

$$R = 52.16 \\ = 52 \text{ N (2sf)}$$

b)  $\uparrow$ :  $[s = ut + \frac{1}{2}at^2]$



$$-8.1 = 20 \sin \alpha \times t - \frac{1}{2}gt^2$$



$$\tan \alpha = \frac{3}{4}$$

$$\sin \alpha = \frac{3}{5}$$

$$* 4.9t^2 - 12t - 8.1 = 0$$

$$\cos \alpha = \frac{4}{5}.$$

$$t = \frac{12 \pm \sqrt{(144 + 4 \times 4.9 \times 8.1)}}{2 \times 4.9}$$

\* (use the solve button on your calculator)

$$t = 3 \text{ s}$$

c)  $\rightarrow [s = ut + \frac{1}{2}at^2]$   $a = 0$

$$s = 20 \cos \alpha \times t \\ = 48 \text{ m}$$

3d) Using energy. (easiest method)

$$\text{INPUT} = \text{OUTPUT}$$

$$PE_B + KE_B = KE_C$$

$$80g \times 8.1 + \frac{1}{2} \times 80 \times 20^2 = \frac{1}{2} \times 80 \times v^2$$

$$v = 23.638$$

$$= 24 \text{ ms}^{-1}$$

Using suvat

3d)  $\uparrow$ .  $[v = u + at]$

$$v_v = 20 \sin \alpha - 3g$$

$$\rightarrow v_H = 20 \cos \alpha$$

Final velocity

$$V = \sqrt{(20 \sin \alpha - 3g)^2 + (20 \cos \alpha)^2}$$

$$= 23.6$$

$$= 24 \text{ ms}^{-1} \text{ (2sf)}$$