1(a)	$D - 350 = 900 \times 0.25$
	$D = 575$ N
1(b)	$P = 575 \times 15$
	$P = 8625$ W or 8.625 kW

4	PE lost by A: $\pm mg \times 0.75$
	PE gained by B: $\pm 3g \times 0.75 \times 0.6 \left[= \pm 13.5\right]$
	KE gained by A **and** B: $\pm\left(\frac{1}{2} \times 3 \times 2^2 + \frac{1}{2} \times m \times 2^2\right)\left[= \pm(6 + 2m)\right]$
	Work done against resistance = $\pm \frac{10}{3} \times 0.75 \left[= \pm 2.5\right]$
	$\frac{1}{2} \times 3 \times 2^2 + \frac{1}{2} \times m \times 2^2 = 0.75mg - 13.5 - 2.5$
	$m = 4$
	Special case for use of N2L max 3 marks
	$2^2 = 0^2 + 2 \times a \times 0.75 \Rightarrow a = \frac{8}{3}$
	$mg - T = ma$ **and** $T - 3g \times 0.6 - \frac{10}{3} = 3a$ OR $mg - 3g \times 0.6 - \frac{10}{3} = (m + 3)a$
	$m = 4$

3(a)	$175 = \frac{1}{2}(15 + 20)t$
	Time = 10 s

3(b)(i)	Change in KE $= \pm\left(\frac{1}{2}\times 1400\times 20^2 - \frac{1}{2}\times 1400\times 15^2\right)$ $\left[= \pm(280000-157500) = \pm 122500\right]$ **OR** Work done against resistance $= \pm 800\times 175$ $\left[= \pm 140000\right]$
	Work done by engine $= \frac{1}{2}\times 1400\times 20^2 - \frac{1}{2}\times 1400\times 15^2 + 800\times 175$
	Av power $\times$ $(their\,10) = \frac{1}{2}\times 1400\times 20^2 - \frac{1}{2}\times 1400\times 15^2 + 800\times 175$
	Average power = 26250 W
	Special case for using N2L Maximum 2 marks
	$20^2 = 15^2 + 2\times a\times 175 \Rightarrow a = 0.5$; $DF - 800 = 1400\times 0.5 \Rightarrow DF = 1500$
	$DF\times 175 =$ Average power $\times$ $(their\,10) \Rightarrow$ Average power $= 26250$ W **OR** $P = 1500\times 15 = 22500$ and $P = 1500\times 20 = 30000$ so Average power $= \frac{1}{2}(22500+30000) = 26250$ W

3(b)(ii)	$their\,26250 = 800v$
	Speed = 32.8125 or $\frac{525}{16}$ m s^{-1}

4(a)(i)	$\frac{P}{30} - 1600 = 0 \Rightarrow P = 48000$ only
4(a)(ii)	$\frac{40000}{16} - 1600 = 18000a$
	Acceleration $= 0.05\,\text{m}\,\text{s}^{-2}$
4(b)	For attempt to resolve up the hill to form an equation
	$\frac{120000}{20} - 1600 - 18000g\sin\alpha = 0$
	$\alpha = 1.40$ $[1.4007\ldots]$

6(a)	Use of Newton's second law for P or Q or system
	$0.6g\sin 30 - T = 0.6a$ $T - 0.3g \times 0.4 = 0.3a$ $0.6g\sin 30 - 0.3g \times 0.4 = (0.3 + 0.6)a$
	For attempt to solve for T or a
	$a = 2\ \text{m s}^{-2}$ $T = 1.8\,\text{N}$
6(b)	PE change for $P = \pm 0.3g \times 2 \times 0.4 [= \pm 2.4]$ PE change for $Q = \pm 0.6g \times 2\sin 30 [= \pm 6]$
	KE change $= \frac{1}{2} \times (0.3 + 0.6)v^2$
	$\frac{1}{2} \times 0.9v^2 = 0.6g \times 2\sin 30 - 0.3g \times 2 \times 0.4 - 1.8$
	Speed $= 2\,\text{m s}^{-1}$
	Special Case for use of N2L
	$0.6g\sin 30 - 0.3g\sin\vartheta - 0.9 = 0.9a \rightarrow a = 1$
	$v^2 = 0^2 + 2x1x2 \rightarrow v = 2$