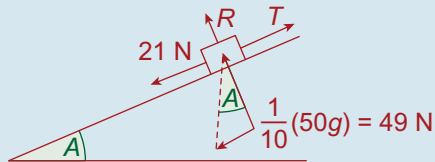


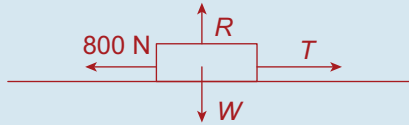
Q. 9.



No acceleration $\Rightarrow T = 21 + 49$
 $= 70 \text{ N}$

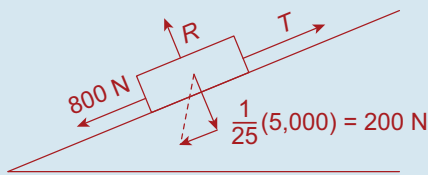
$P = Fv \Rightarrow 350 = (70)v$
 $\Rightarrow v = 5 \text{ m/s}$

Q. 10. (i)



$T = 800 \text{ N}$
 $P = Fv \Rightarrow P = 800(5)$
 $= 40,000 \text{ W}$
 $= 40 \text{ kW}$

(ii)

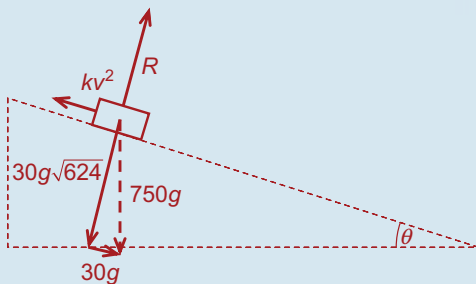


$T = 800 + 200 = 1,000$
 $P = Fv \Rightarrow 40,000 = (1,000)v$
 $\Rightarrow v = 40 \text{ m/s}$

Q. 11. (i) Horizontal $= T \cos \theta$

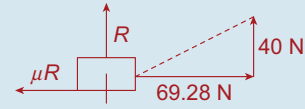
$= 80 (0.8660)$
 $= 69.28 \text{ N}$

Q. 13. (i)



When train attains a speed of 30 m/s
 $kv^2 = 30g$
 $\Rightarrow k(30)^2 = 30g$
 $\Rightarrow 30k = g \Rightarrow k = \frac{g}{30}$

Vertical $= T \sin \theta$
 $= 80(0.5)$
 $= 40 \text{ N}$

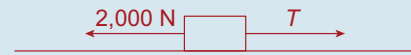


(ii) $R + 40 = 196 \Rightarrow R = 156 \text{ N}$

(iii) $\mu R = \frac{1}{3}(156) = 52 \text{ N}$
 $F = ma \Rightarrow (69.28 - 52) = 20a$
 $\Rightarrow a = 0.864 \text{ m/s}^2$

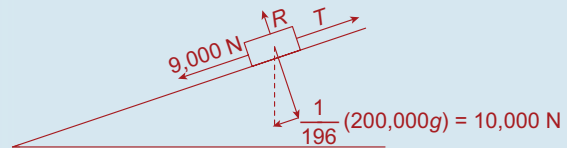
(iv) Work $= Fs$
 $= 69.28(0.5)$
 $= 34.64 \text{ J}$

Q. 12. (i)



$P = Tv \Rightarrow 500,000 = T(10)$
 $\Rightarrow T = 50,000$

$F = ma \Rightarrow (50,000 - 2,000)$
 $= 200,000a$
 $\Rightarrow a = 0.24 \text{ m/s}^2$



(ii) $P = Tv \Rightarrow 500,000 = T(20)$
 $\Rightarrow T = 25,000 \text{ N}$

$F = ma$
 $\Rightarrow (25,000 - 10,000 - 9,000)$
 $= 200,000a$
 $\Rightarrow a = 0.03 \text{ m/s}^2$

$\sin \theta = \frac{1}{25}$

$\Rightarrow \cos \theta = \frac{\sqrt{624}}{25}$