

$$T = kv^2 + 30g \quad \dots \text{maximum speed attained is } 20 \text{ m/s}$$

$$\Rightarrow T = \left(\frac{g}{30}\right)(20)^2 + 30g$$

$$\Rightarrow T = \frac{40}{3}g + 30g$$

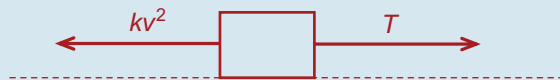
$$\Rightarrow T = \frac{130g}{3} \text{ N}$$

$$P = Tv$$

$$= \left(\frac{130g}{3}\right)(20)$$

$$= \frac{2,600g}{3} \text{ watts}$$

(iii)  $P = \frac{2,600g}{3}$



At maximum speed

$$T = kv^2 \quad \dots \text{but } T = \frac{P}{v} = \frac{2,600g}{3v}$$

$$\Rightarrow \frac{2,600g}{3v} = \left(\frac{g}{30}\right)v^2$$

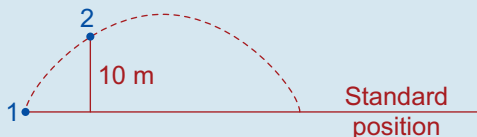
$$\Rightarrow 3v^3 = 78,000$$

$$\Rightarrow v^3 = 26,000$$

$$\Rightarrow v = 29.625 \text{ m/s}$$

## Exercise 6B

Q. 1.



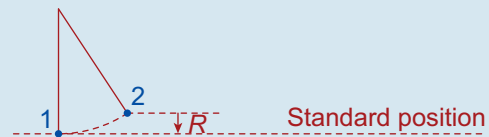
$$\frac{1}{2}M(20)^2 + Mg(0) = \frac{1}{2}Mv^2 + Mg(10)$$

$$\Rightarrow 200 = \frac{1}{2}v^2 + 98$$

$$\Rightarrow v = \sqrt{204}$$

$$= 14.28 \text{ m/s}$$

Q. 2.



$$\frac{1}{2}M(2)^2 + Mg(0) = \frac{1}{2}M(0)^2 + Mgh$$

$$\Rightarrow 2 = 9.8h$$

$$\Rightarrow h = \frac{2}{9.8}$$

$$= \frac{10}{49} \text{ m}$$