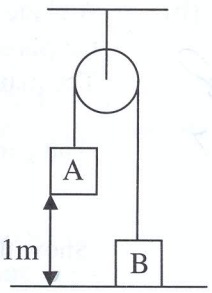
4. **(a)** A light inextensible string passes over a small fixed smooth pulley.
A particle A of mass 10 kg is attached to one end of the string and a particle B of mass 5 kg is attached to the other end.



The system is released from rest when B touches the ground and A is 1 m above the ground.

Find **(i)** the speed of A as it hits the ground

(ii) the height that B rises above the horizontal ground.

(i) $10g - T = 10f$ 5

$T - 5g = 5f$ 5

$5g = 15f$

$f = \frac{g}{3}$ 5

A $v^2 = u^2 + 2as$

$= 0 + 2\left(\frac{g}{3}\right)(1)$

$v = \sqrt{\frac{2g}{3}}$ or 2.556 m/s 5

(ii) B $v^2 = u^2 + 2as$

$0 = \frac{2g}{3} - 2gs$

$s = \frac{1}{3}$

height $= 1 + \frac{1}{3} = \frac{4}{3}$ m. 5

25