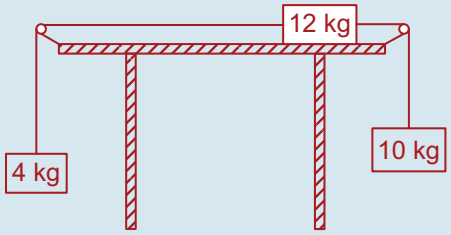
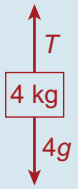
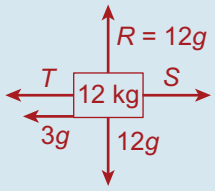
Q. 9.

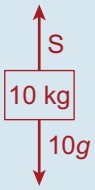




$T - 4g = 4a$ **Equation 1**



$S - T - 3g = 12a$ **Equation 2**



$10g - S = 10a$ **Equation 3**

Add 3 equations:

$26a = 3g$

$\Rightarrow a = \frac{3}{26}g$ m/s^2

Now, find least value of μ for which the particles will not move:

Equation 1: $T - 4g = 4a$

Equation 2: $S - T - 12\mu g = 12a$

Equation 3: $10g - S = 10a$ … add

$6g - 12\mu g = 26a$

$\Rightarrow 3g - 6\mu g = 13a$

$\Rightarrow a = \frac{3g(1 - 2\mu)}{13}$

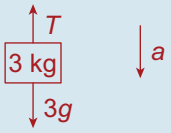
Let $a = 0$

$\Rightarrow 3g(1 - 2\mu) = 0$

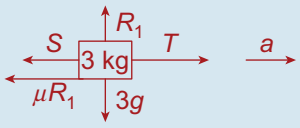
$\Rightarrow 1 - 2\mu = 0$

$\Rightarrow \mu = \frac{1}{2}$ … least value of μ for which the particles will not move.

Q. 10. (i)



$3g - T = 3a$ **Equation 1**

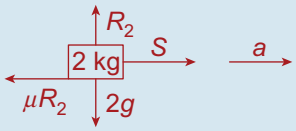


$R_1 = 3g$

$\Rightarrow \mu R_1 = \frac{1}{4}(3g)$

$= \frac{3}{4}g$

$T - S - \frac{3}{4}g = 3a$ **Equation 2**



$R_2 = 2g$

$\Rightarrow \mu R_2 = \frac{1}{4}(2g)$

$= \frac{1}{2}g$

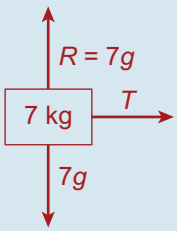
$S - \frac{1}{2}g = 2a$ **Equation 3**

Solving 3 equations:

$a = \frac{7}{32}g$ m/s^2

(ii) $\therefore S = \frac{15}{16}g$ N and $T = \frac{75}{32}g$ N

Q. 11. (i)



$T = 7a$ **Equation 1**

$3g - T = 3a$ **Equation 2**