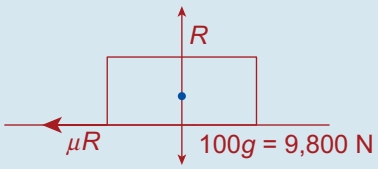
Q. 4. (i)



$R = 9{,}800$ N

$\Rightarrow \mu R = \frac{1}{4}(9{,}800)$

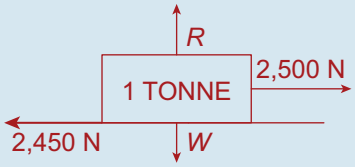
$= 2{,}450$ N

$\Rightarrow$ Limiting friction $= 2{,}450$ N

(ii) $\frac{2{,}450}{250} = 9.8$

$\therefore$ 10 slaves needed.

(iii)

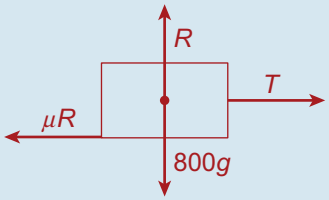


$F = ma$

$\Rightarrow (2{,}500 - 2{,}450) = (1{,}000)a$

$\Rightarrow a = 0.05$ m/s^2

Q. 5. (i)



$R = 800g$

$= 7{,}840$

$\Rightarrow \mu R = \frac{1}{8}(7{,}840)$

$= 980$ N … limiting friction

(ii) $\frac{980}{200} = 4.9 \Rightarrow 5$ dogs required.

(iii) $T = 5(200) = 1{,}000$ N

$F = ma$

$\Rightarrow 1000 - 980 = 800a$

$\Rightarrow 800a = 20$

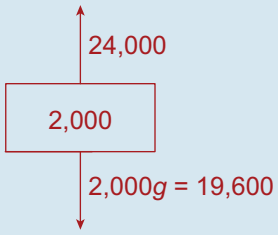
$\Rightarrow a = 0.025$ m/s^2

Q. 6. (a) Momentum is the product of mass and velocity.

(b) A newton is the force required to accelerate one kilogram at one metre per second squared.

(c) The change in momentum per unit time is proportional to the applied force and takes place along the straight line in which the force acts.

(d) (i) $1{,}440 + 8(70) = 2{,}000$

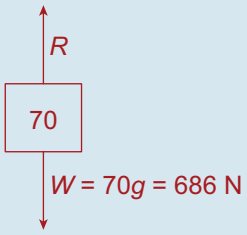


$F = ma$

$\Rightarrow (24{,}000 - 19{,}600) = 2{,}000a$

$\Rightarrow a = 2.2$ m/s^2

(ii)

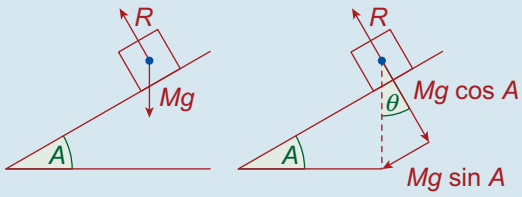


$F = ma$

$\Rightarrow (R - 686) = (70)(2.2)$

$\Rightarrow R = 840$ N

Q. 7. **Forces** **Resolved**



$F = ma$

$\Rightarrow Mg \sin A = Ma$

$\Rightarrow a = \frac{1}{7}g$

$= 1.4$ m/s^2

$v = u + at$

$\Rightarrow 7 = 0 + (1.4)t$

$\Rightarrow t = 5$ s

$s = ut + \frac{1}{2}at^2$

$= 0(5) + \frac{1}{2}(1.4)(25)$

$= 17.5$ m