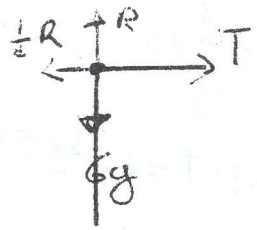
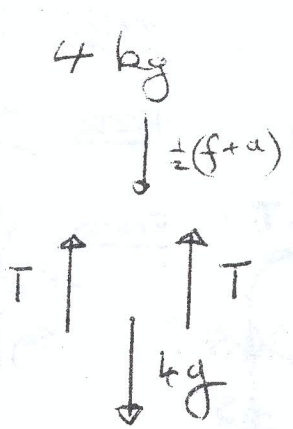
1988 Q4.

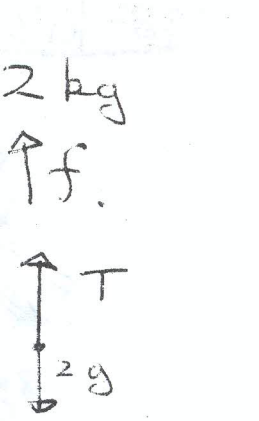
MASS

ACCEL

FORCES.







NII: ↕ ⟷

$R - 6g = 0$

$R = 6g$

$\Rightarrow$ Friction $= \frac{1}{6}6g$

$= g$

$T - \text{Friction} = 6a$

$T - g = 6a$

$-2T + 4g = 4\left[\frac{1}{2}(f+a)\right]$

$-2T + 4g = 2f + 2a$

$T - 2g = 2f$

Equations of motion.

$T - g = 6a$ (A)

$-2T + 4g = 2f + 2a$ (B)

$T - 2g = 2f$ (C)

Add $g = 3a + 4f$. (*)

(A) − (C) $\Rightarrow$ $T - g = 6a$

$-T + 2g = -2f$

$g = 6a - 2f$ (**)

$\Rightarrow g = 8a + 4f$.

$2g = 12a - 4f$

Add $3g = 20a$

$\Rightarrow \boxed{a = \frac{3g}{20}}\ ms^{-2}$.

$\therefore$ (*) $\Rightarrow$ $g = 8\left(\frac{3g}{20}\right) + 4f$

$\Rightarrow g - \frac{24g}{20} = 4f \Rightarrow -\frac{4g}{20} = 4f \Rightarrow \boxed{f = -\frac{g}{20}}$

$\Rightarrow$ Accel of 4kg mass $= \frac{1}{2}(f+a) = \frac{1}{2}\left(\frac{g}{20} + \frac{3g}{20}\right) = \frac{g}{20}\ ms^{-2}$.

$\boxed{\text{Accel 4kg mass} = \frac{g}{20}}$

Tension: (A) $\Rightarrow T - g = 6\left(\frac{3g}{20}\right) \Rightarrow T = g + \frac{18g}{20} = \frac{38g}{20} = 1.9g$

$\boxed{T = 1.9g\ N}$