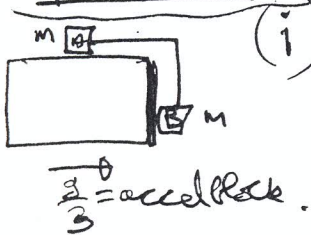


1991:

Q4. "A rectangular block moves across a ~~smooth~~ stationary horizontal surface with acceleration $\frac{g}{3}$ ". This means we do not have to analyse the forces acting on the block as we are told its acceleration. The question continues in part (i) to say "find the magⁿ and dirⁿ of the resultant forces acting on the particles". we need only analyse forces on the particles.



(i)	Particle	(A)	(B)
	MASS	m	m mass
	Accel	$\frac{g}{3} + a$	a accel
	FORCES		
(NII)	$\uparrow R - mg = 0$	$\leftrightarrow T = m(\frac{g}{3} + a)$	$\uparrow mg - T = ma$
	$R = mg$		$S = m(\frac{2g}{3})$
	(1)	(2)	(3) (4)

Solve (1), (3), (4) for a : (2) + (3) \Rightarrow $mg = ma + \frac{mg}{3} + ma$
 $\Rightarrow \frac{2g}{3} = 2a \Rightarrow a = \frac{g}{3}$

\therefore (2) $\Rightarrow T = m(\frac{g}{3} + \frac{g}{3}) = \frac{2mg}{3}$

$\therefore |R| = mg$, $|S| = \frac{mg}{3}$ and $|T| = \frac{2mg}{3}$
 dirⁿ R \uparrow dirⁿ S \rightarrow and dirⁿ T \rightarrow OR \uparrow (Diff part!)

(ii) assume both sides of block.

Particle	(A)	(B)
MASS	m	m
Accel	$\frac{g}{3} + f$	f $\frac{g}{3}$
FORCES:		

Particles to remain at rest relative to block $\Rightarrow f = 0$.

\therefore (NII) \Rightarrow $\uparrow R - mg = 0$ $\leftrightarrow T - \mu R = m\frac{g}{3}$ $\downarrow mg - T - \mu S = 0$ $\leftrightarrow S = m\frac{g}{3}$
 $R = mg$ $\downarrow T - \mu mg = \frac{mg}{3}$ $\therefore mg - T - \frac{\mu mg}{3} = 0$

Add (*) and ** $\Rightarrow -\mu mg + mg - \frac{\mu mg}{3} = \frac{mg}{3}$
 $\Rightarrow -\frac{4}{3}\mu mg = -\frac{2mg}{3} \Rightarrow \mu = \frac{1}{2}$