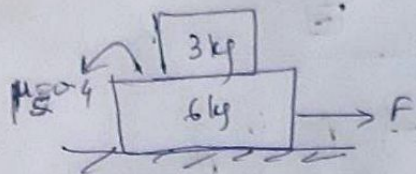
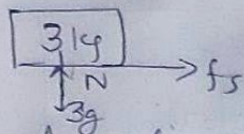


② Medium

Two blocks A and B of masses 6kg and 3kg rest on a smooth horizontal surface as shown in the figure. If coefficient of friction between A and B is 0.4, the maximum horizontal force (in N) which can make them without separation?



Ans:- FBD of 3kg:-



Since only force acting horizontally is static friction f_s and 3kg is accelerating forward

$$\Rightarrow f_s = ma = 3a \leq \mu_s N = \mu_s mg$$

$$\Rightarrow 3a \leq 0.4 \times 3 \times 10$$

$$\Rightarrow a \leq 4 \text{ m/s}^2$$

Now, Since the system is moving together

$$\Rightarrow a_{\text{system}} = a = \frac{F}{9} \rightarrow \text{Total mass}$$

Now, $\frac{F}{9} \leq 4 \Rightarrow F \leq 36 \text{ N} \Rightarrow F_{\text{max}} = 36 \text{ N}$

Concepts Used	
①	Static friction and its limiting value
②	Block with friction system

Formulae Used	
①	$F = ma$
②	$f_s \leq \mu_s mg$

[Since no motion in vertical direction]