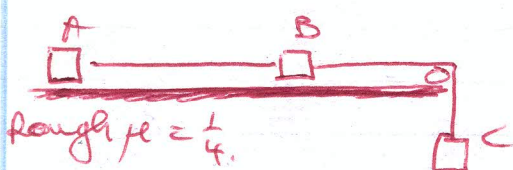
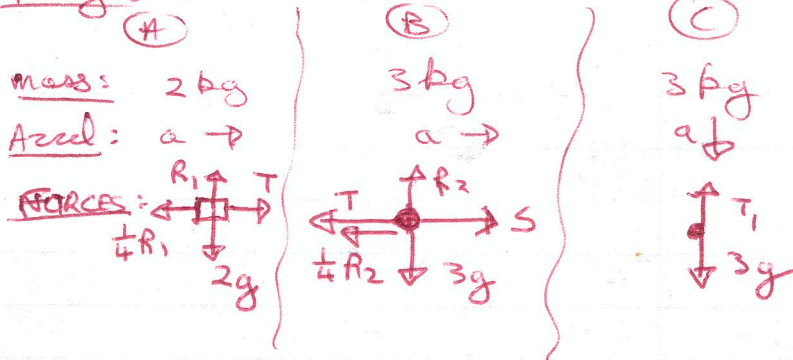


1983 Phys (Connected Bodies):



Analysis:



Application of NII:

(A)

$\perp$  to plane  
accel = 0

$\parallel$  to plane  
accel = a

NII  $\Rightarrow R_1 - 2g = 0$   
 $R_1 = 2g$

$T - \frac{1}{4}R_1 = 2a$

$\Rightarrow T - \frac{1}{4}(2g) = 2a$

$\Rightarrow T - \frac{g}{2} = 2a$  (1)

(B)

$\perp$  to plane  
accel = 0

$\parallel$  to plane  
accel = a

NII  $\Rightarrow R_2 - 3g = 0$   
 $R_2 = 3g$

NII  $\Rightarrow S - T - \frac{1}{4}R_2 = 3a$

$\Rightarrow S - T - \frac{1}{4}(3g) = 3a$

$\Rightarrow S - T - \frac{3}{4}g = 3a$  (2)

(C)

NII  $\Rightarrow$   
 $3g - S = 3a$

$3g - S = 3a$  (3)

Solve for a: Add (1), (2), (3)  $\Rightarrow$

$3 - \frac{1}{2} - \frac{3}{4}$   
 $= \frac{12 - 2 - 3}{4}$   
 $= \frac{7}{4}$

$T - \frac{g}{2} = 2a$   
 $S - T - \frac{3}{4}g = 3a$   
 $3g - S = 3a$   
 $3g - \frac{1}{2}g - \frac{3}{4}g = 8a$   
 $\frac{7}{4}g = 8a$   
 $\Rightarrow a = \frac{7}{32}g \text{ ms}^{-2}$

Find T: (1)  $\Rightarrow$

$T - \frac{1}{2}g = 2\left(\frac{7}{32}g\right)$   
 $\Rightarrow T = \left(\frac{1}{2} + \frac{7}{16}\right)g$   
 $T = \frac{15}{16}g \text{ N}$

Find S: (3)  $\Rightarrow$

$3g - S = 3\left(\frac{7}{32}g\right)$   
 $\Rightarrow -S = \frac{21}{32}g - 3g$   
 $\Rightarrow S = 3g - \frac{21}{32}g$   
 $\Rightarrow S = \frac{96}{32}g - \frac{21}{32}g$   
 $S = \frac{75}{32}g \text{ N}$