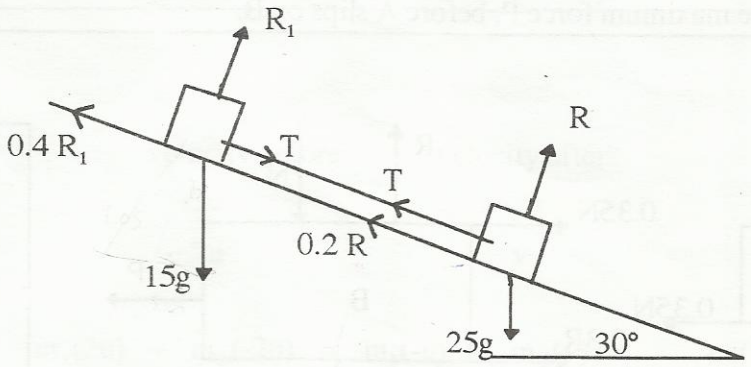
1998

4 (a) Blocks A and B, of mass 15 kg and 25 kg, respectively, are connected by a light, inextensible string as shown in the diagram. The coefficients of friction are 0.4 for block A and 0.2 for block B. The blocks move down the plane which is inclined at 30° to the horizontal. Find

(i) the acceleration of block B

(ii) the tension in the string.



10

Block A $R_1 = 15g\cos30° = \frac{15g\sqrt{3}}{2}$ or 127.306

$T + 15g\sin30° - 0.4\left(\frac{15g\sqrt{3}}{2}\right) = 15a$ eq (1) 5

Block B $R = 25g\cos30° = \frac{25g\sqrt{3}}{2}$ or 212.176

$25g\sin30° - T - 0.2\left(\frac{25g\sqrt{3}}{2}\right) = 25a$ eq (2) 5

Add equations (1) and (2) $\Rightarrow 20g - \frac{11g\sqrt{3}}{2} = 40a$

$\Rightarrow a = 2.566\ ms^{-2}$ or $\frac{40g - 11\sqrt{3}\,g}{80}$ 5

From equation (1) $T = 15(2.566) + 0.4(127.306) - 73.5$

$\Rightarrow T = 15.91\ N$ or $\frac{15g\sqrt{3}}{16}$ 5

30