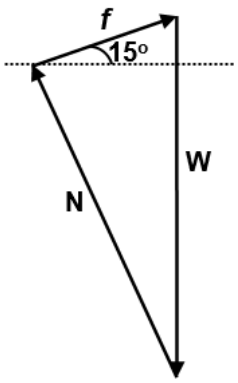
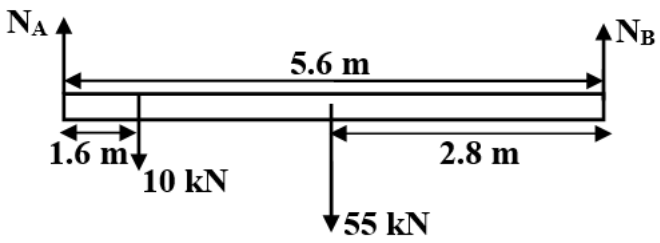
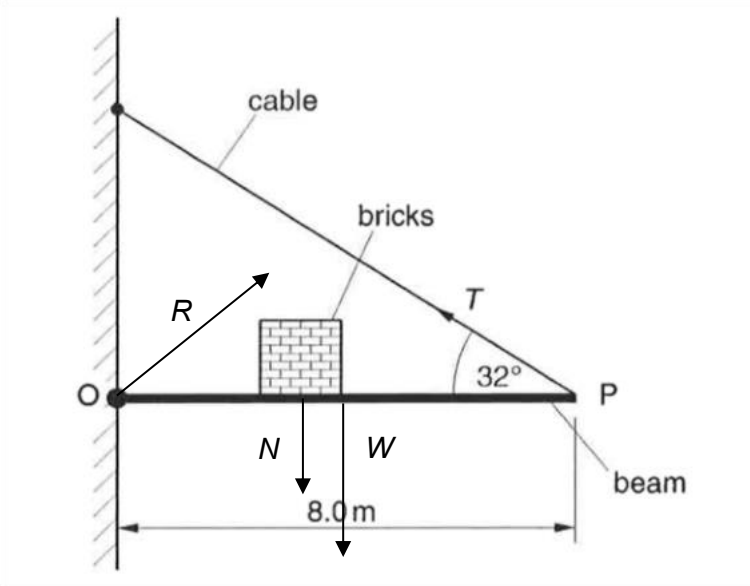
JURONG PIONEER JUNIOR COLLEGE
9478 H2 PHYSICS
FORCES AND MOMENTS ASSIGNMENT SOLUTIONS

Total marks: 15

Qn.	Solution	Mark Allocation
1(a)(i)	*f*: frictional force *N*: reaction force *W*: weight  	[1] correct vector [1] correct label (Any error minus 1 mark)
(a)(ii)	$W = mg = (39000)(9.81)$ $= 3.83 \times 10^5$ N $\cos 15^\circ = \frac{N}{W} = \frac{N}{39000g}$ $N = 3.70 \times 10^5$ N $N^2 + f^2 = W^2$ $f = \sqrt{(3900g)^2 - (3.7 \times 10^5)^2}$ $= 9.90 \times 10^4$ N	[1] [1] [1]
2(b)	 Taking moments about end A, $(10)(1.6) + (55)(2.8) - N_B(5.6) = 0$ $N_B = 30.4$ kN Consider vertical equilibrium, $\sum F_y = 0$ $N_A + N_B - 10 - 55 = 0$ $N_A = 34.6$ kN	 [1] [1] [1] [1]

2(a)	 *W*: weight of beam *N*: normal contact force by bricks on beam *R*: reaction force by pivot on beam	[1] for drawing all three forces [1] for labelling all forces correctly
2(b)	As the bricks are moved towards P, the <u>clockwise moment due to the bricks about the pivot O will increase</u>. If the metal beam remains in equilibrium, the <u>anticlockwise moment due to *T* will also increase</u> so that sum of ACM = sum of CM. The tension *T* in the cable will <u>increase</u>.	[1] [1]
2(c)	Applying Principles of Moments about pivot O, $(T\sin 32°)(8.0) = 150(9.81)(8.0-5.3)+210(9.81)(4.0)$ $T \approx 2900\,\text{N}$	[1] [1]