

Question Number	Scheme	Marks
4(a)	$M(R), 40g(x-3) + 2.5g \times 2 = 30g \times 0.5$ $x = 3.25 \text{ m from } P$	M1 A2 A1 (4)
(b)	Mass of the box is concentrated at the point Q oe	B1 (1)
(c)	$M(R), 3Mg + 30g \times 0.5 = 2.5g \times 2 + 40g \times 2$ $M = \frac{70}{3}, 23 \text{ or better}$	M1 A2 A1 (4) 9
Notes		
4(a)	M1 for moments about R to give an equation in x (or another unknown distance) <i>only</i> (i.e. M0 if reaction at P is non-zero) Correct no. of terms, dimensionally correct	
	A2 for a correct equation in x <i>only</i> (allow consistent omission of g) -1 each error	
	Alternative: Instead of $M(R)$, they may write down 2 equations and eliminate the normal reaction at R , N_R , to obtain an equation in a distance <i>only</i> : $(\uparrow)N_R = 40g + 30g + 2.5g$ Possible equations: $M(P), 40gx + 30g \times 2.5 + 2.5g \times 5 = 3N_R$ $M(Q), 40g(5-x) + 30g \times 2.5 = 2N_R$ $M(G), 40g(2.5-x) + 0.5N_R = 2.5g \times 2.5$ Equations must have correct no. of terms and be dimensionally correct but M0 if reaction at P is non-zero	
	Third A1 for $\frac{13}{4} \text{ m}$ oe Allow 3.3 m	
(b)	B1 for <i>mass</i> or <i>weight</i> of box acts at Q but B0 if extra wrong answers	
(c)	M1 for moments about R to give an equation in M <i>only</i> (i.e. M0 if reaction at P is non-zero) Correct no. of terms, dimensionally correct	
	A2 for a correct equation in M <i>only</i> (allow consistent omission of g) -1 each error	
	Alternative: Instead of $M(R)$, they may write down 2 equations and eliminate the normal reaction at R , S_R , to obtain an equation in M <i>only</i> : $(\uparrow)S_R = 40g + 30g + 2.5g + Mg$ Possible equations: $M(P), 42.5g \times 5 + 30g \times 2.5 = 3S_R$ $M(Q), Mg \times 5 + 30g \times 2.5 = 2S_R$ $M(G), Mg \times 2.5 + 0.5S_R = 42.5g \times 2.5$ Equations must have correct no. of terms and be dimensionally correct but M0 if reaction at P is non-zero	
	Third A1 for $\frac{70}{3}$ oe or 23 or better Accept 24	