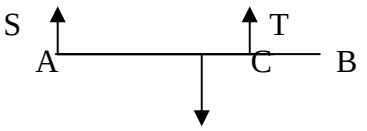
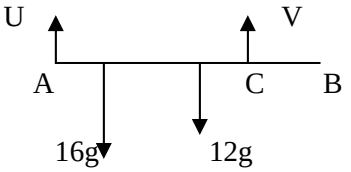
Question Number	Scheme	Marks
5.(a)		
	M(A): T x 4 = 12g x 2.5	M1 A1
	T = <u>7.5g or 73.5 N</u>	A1
	R(↑) $S + T = 12g$	M1
	$\Rightarrow$ S = <u>4.5g or 44.1 N</u>	A1 (5)
(b)		
	M(A) V x 4 = 16g x y + 12g x 2.5	M1 A1
	V = <u>4gy + 7.5g or 39.2y + 73.5 N</u>	A1 (3)
(c)	$V \leq 98 \Rightarrow 39.2y + 73.5 \leq 98$	M1
	$\Rightarrow y \leq 0.625 = 5/8$	DM1
	Hence "load must be no more than 5/8 m from A" (o.e.)	A1 (3)
		11

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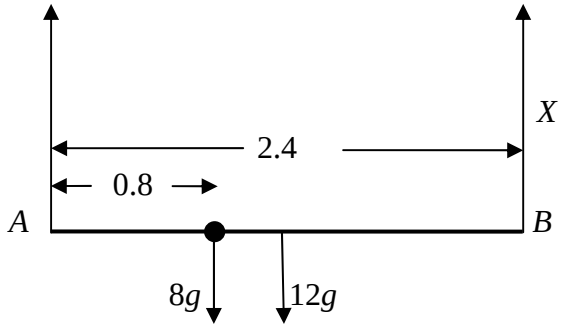
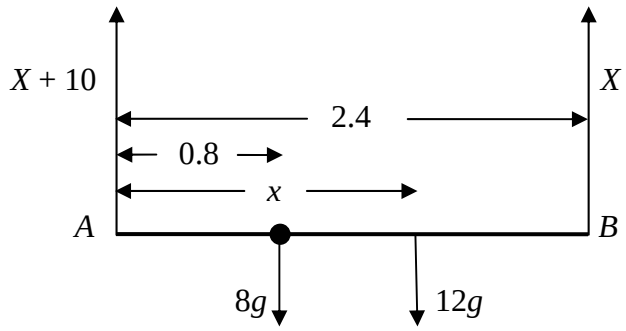
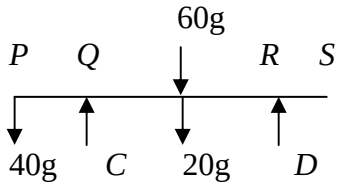
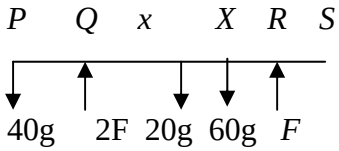
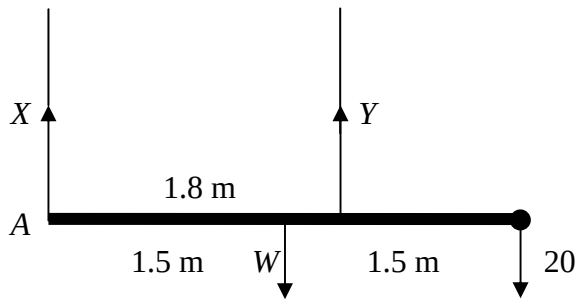
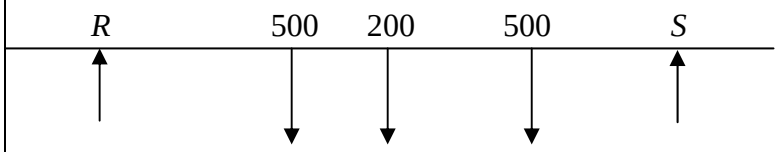
Question Number	Scheme	Marks
6.	(a) 	
	$M(A)$ $\quad 8g \times 0.8 + 12g \times 1.2 = X \times 2.4$	M1 A1
	$X \approx 85\ (\text{N})$ $\quad$ accept 84.9, $\frac{26g}{3}$	DM1 A1 **(4)**
	(b) 	
	$R(\uparrow)$ $\quad \underline{(X+10)} + \underline{X} = 8g + 12g$ $(X = 93)$	M1 <u>B1</u> A1
	$M(A)$ $\quad 8g \times 0.8 + 12g \times x = X \times 2.4$	M1 A1
	$x = 1.4\ (\text{m})$ $\quad$ accept 1.36	A1 **(6)** **[10]**

Question Number	Scheme	Marks
4 (a)		
	$C + D = 120g$	
	$M(Q),\ \ 80g.0.8 - 40g.0.4 = D.1.6$	M1 A1
	solving	M1 A1
	$C = 90g; D = 30g$	M1 A1 A1 (7)
(b)		
	$2F + F = 40g + 20g + 60g$	M1 A1
	$M(Q),\ \ 60gx + 20g.0.8 = 40g.0.4 + F.1.6$	
	solving	M1 A1
	$QX = x = \frac{16}{15}\ \text{m} = 1.07\text{m}$	M1 A1 (6) **[13]**

Question Number	Scheme	Marks
Q7 (a)	$M(Q),\quad 50g(1.4-x)+20g \text{ x } 0.7 = T_P \text{ x } 1.4$	M1 A1
	$T_P = 588 - 350x$ Printed answer	A1 (3)
(b)	$M(P),\quad 50gx+20g \text{ x } 0.7 = T_Q \text{ x } 1.4$ or $R(\uparrow),\ T_P + T_Q = 70g$	M1 A1
	$T_Q = 98 + 350x$	A1 (3)
(c)	Since $0 < x < 1.4$, $98 < T_P < 588$ and $98 < T_Q < 588$	M1 A1 A1 (3)
(d)	$98 + 350x = 3\,(588 - 350x)$	M1
	$x = 1.19$	DM1 A1 (3) **[12]**

Question Number	Scheme	Marks
Q4.	(a) 	
	M (A) $\quad W \times 1.5 + 20 \times 3 = Y \times 1.8$	M1 A2 (1, 0)
	$Y = \frac{5}{6}W + \frac{100}{3}$ ∗ cso	A1 (4)
	(b) $\uparrow$ $\quad X + Y = W + 20$ or equivalent	M1 A1
	$X = \frac{1}{6}W - \frac{40}{3}$	A1 (3)
	(c) $\frac{5}{6}W + \frac{100}{3} = 8\left(\frac{1}{6}W - \frac{40}{3}\right)$	M1 A1 ft
	$W = 280$	A1 (3)
		[10]
	Alternative to (b) M(C) $\quad X \times 1.8 + 20 \times 1.2 = W \times 0.3$	M1 A1
	$X = \frac{1}{6}W - \frac{40}{3}$	A1

Question Number	Scheme	Marks
Q4		
	$M(B)$, $500x + 500.2x + 200\text{x}3 = R\text{x}5 + S\text{x}1$ (or any valid moments equation)	M1 A1 A1
	$(\downarrow)\ R + S = 500 + 500 + 200 = 1200$ (or a moments equation)	M1 A1
	solving for x; $x = 1.2$ m	M1 A1 cso **[7]**