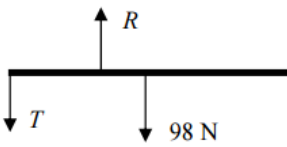
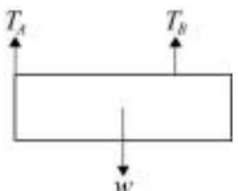


## Mechanics 2 Moments

<b>3(a)</b>		B1	1	correct force diagram, with labels and arrows.
<b>(b)</b>	$2T = 0.5 \times 98$ $T = 24.5 \text{ N}$ <p style="text-align: center;">AG</p>	M1 A1 A1	3	moment equation correct equation correct positive value for the tension from correct working
<b>(c)(i)</b>	$2 \times 2 \times 24.5 = 3 \times 9.8 \times m + 0.5 \times 98$ $m = \frac{98 - 49}{3 \times 9.8} = \frac{5}{3} = 1.67 \text{ kg (to 3 sf)}$ <p>Or</p> $2 \times 2.45 = 3 \times 9.8m$ $m = \frac{49}{29.4} = \frac{5}{3} = 1.67 \text{ kg}$	B1 M1 A1 A1	4	tension doubled moment equation correct equation correct mass
<b>(ii)</b>	$R = 24.5 \times 2 + 98 + \frac{5}{3} \times 9.8 = 163 \text{ N}$	(M1A1) (M1A1)	3	for equation for finding $m$
<b>(d)</b>	This allows the centre of mass to be placed at the <u>centre of the rod</u> for the moment calculations.	M1 A1 A1	3	considering vertical equilibrium with 3 terms correct equation correct reaction must be consistent with 3(c)(i) if awarding accuracy marks
<b>Total</b>		B1	1	correct explanation

<b>2(a)</b>		B1	1	Arrows + labels, $w$ in centre
<b>(b)</b>	$M(A) \quad 0.4W = 0.6T_B$ $T_B = \frac{2W}{3}$ $\text{Res } \uparrow \text{ or } M(B) \quad T_A = \frac{W}{3}$	M1 A1 M1 A1	4	Moments equation Accept 2 dp for each A1
<b>(c)</b>	Lamina is uniform $\Rightarrow$ weight acts at centre	B1	1	
<b>Total</b>		B1	6	

4(a)	Centre of mass of rod is 3 m from river bank Taking moments about $A$ , edge of bank: $3 \times 15 = 50x$ $x = 0.9$	B1  M1 A1	3	Use of centre of mass is centre of rod  Or resolve $R = 65g$ B1 Moments about any point (correct) M1 0.9 A1
(b)	Taking moments about $A$ : $50 \times 2 = 15 \times 3 + m \times 8$ $55 = 8m$ $m = 6\frac{7}{8}$ Mass is $6\frac{7}{8}$ kg	M1A1 A1		M1 3 terms, 2 correct
(c)	Centre of mass of rod is 3 m from river bank	E1	1	Centre of mass is at centre of rod
(d)	eg Woman is a particle The mass is a particle The plank is a rigid rod	E1	1	
<b>Total</b>			<b>9</b>	