4			Let R_P and R_Q be the normal reactions upwards Assume the person stands on the end beyond Q and that the beam is in equilibrium Taking moments about Q: $50g \times 0.3 + R_P \times 2.1 = 4g \times 0.9$ $R_P = \dfrac{3.6g - 15g}{2.1} \left[= -53.2\right] < 0$ So the beam will tip.	**M1** **A1** **A1** **[3]**	**3.1b** **1.1b** **3.2a**	Finding moment of a force about any point Correct equation from moments about Q Conclusion must be clear from correct working (R_P need not be evaluated but must be clear that it is negative)	If the weight of the person shown between P and Q allow M1 maximum. Could also be obtained from moments about P and resolving to evaluate R_P
			Alternative solution If the person stands x m beyond Q so that the beam is on the point of tipping $R_P = 0$ Taking moments about Q $4g \times 0.9 = 50gx$ giving $x = 0.072$ $0.072 < 0.3$ so this is possible while standing on the beam	**M1** **A1** **A1**		Finding moment of a force about any point Correct equation from moments about Q Conclusion must be clear from correct working and reference to 0.3 m	
			Second alternative solution Largest clockwise moment of the weight of the person about Q is $50g \times 0.3 = 15g \left[= 147\right]$ Anticlockwise moment of the weight of the beam is $4g \times 0.9 = 3.6g \left[= 35.28\right]$ The moment of the person's weight is larger so the beam will tip	**M1** **A1** **A1**		Finding moment of a force about any point Both correct moments about Q required Conclusion must be clear from a comparison of moments of two forces	SC 2 (omitting g) $0.9 \times 4 < 0.3 \times 50$ $3.6 < 15$ So the beam will tip.