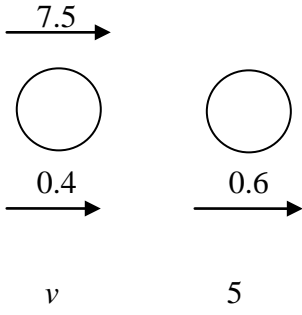
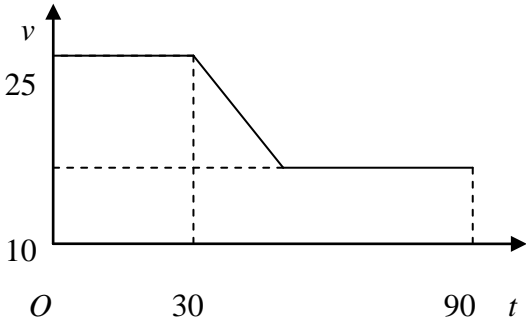
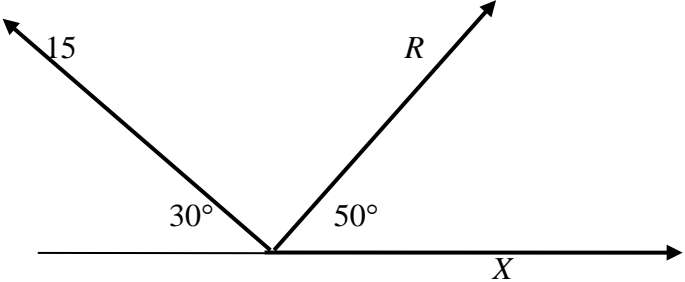
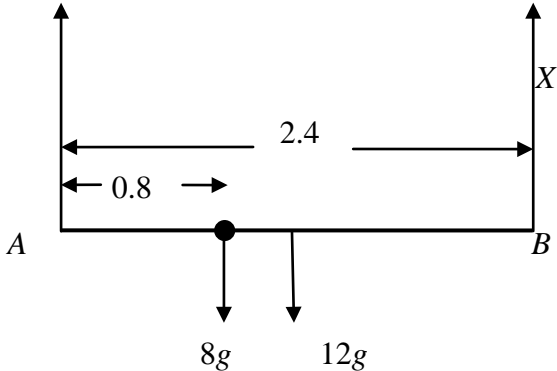
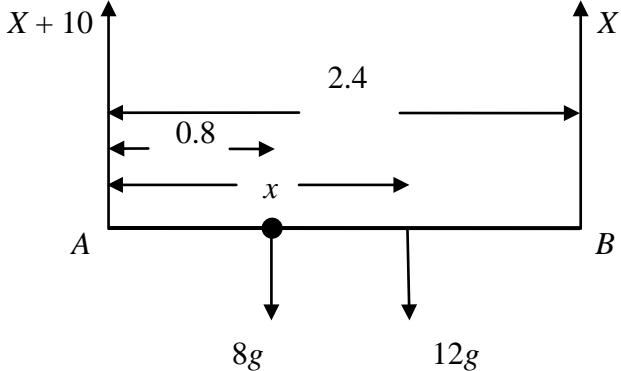
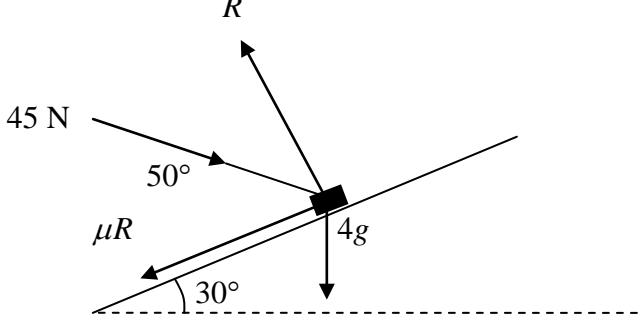
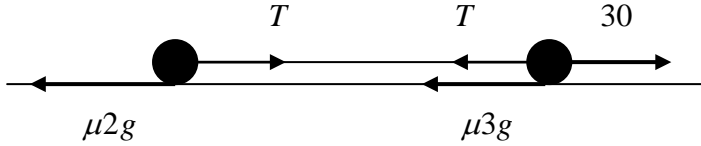


Question Number	Scheme	Marks
1.	<p>(a) $I = mv \Rightarrow 3 = 0.4 \times v$ $v = 7.5 \text{ (ms}^{-1}\text{)}$</p> <p>(b) </p> <p>LM $0.4 \times 7.5 = 0.4v + 0.6 \times 5$ $0 = 0.4v \Rightarrow v = 0 \quad *$ cso</p>	<p>M1 A1 A1 (3)</p> <p>M1 A1 A1 cso (3) (6 marks)</p>
2.	<p>(a) $v^2 = u^2 + 2as \Rightarrow 17.5^2 = u^2 + 2 \times 9.8 \times 10$ Leading to $u = 10.5$</p> <p>(b) $v = u + at \Rightarrow 17.5 = -10.5 + 9.8T$ $T = 2\frac{6}{7} \text{ (s)}$</p>	<p>M1 A1 A1 (3) M1 A1 ft. M1 A1 (4) (7 marks)</p>
3.	<p>(a) $\tan \theta = \frac{8}{6}$ $\theta \approx 53^\circ$</p> <p>(b) $\mathbf{F} = 0.4(6\mathbf{i} + 8\mathbf{j}) (= 2.4\mathbf{i} + 3.2\mathbf{j})$ $\mathbf{F} = \sqrt{(2.4^2 + 3.2^2)} = 4$</p> <p>(c) $\mathbf{v} = 9\mathbf{i} - 10\mathbf{j} + 5(6\mathbf{i} + 8\mathbf{j})$ $= 39\mathbf{i} + 30\mathbf{j} \text{ (ms}^{-1}\text{)}$</p>	<p>M1 A1 (2) M1 M1 A1 (3) M1 A1 A1 (3) (8 marks)</p>

Question Number	Scheme	Marks
<p>4. (a)</p>	 <p style="text-align: right;">shape 25, 10, 30, 90</p>	<p>B1 B1 (2)</p>
<p>(b)</p>	$(b) \quad 30 \times 25 + \frac{1}{2}(25 + 10)t + 10(60 - t) = 1410$ $7.5t = 60$ $t = 8 \text{ (s)}$ $a = \frac{25 - 10}{8} = 1.875 \text{ (ms}^{-2}\text{)}$	<p>M1 A1 A1</p>
<p>5. (a)</p>		<p>M1 A1</p>
<p>(b)</p>	$(\uparrow) \quad 15 \sin 30^\circ = R \sin 50^\circ$ $R \approx 9.79 \text{ (N)}$ $(\rightarrow) \quad X - 15 \cos 30^\circ = R \cos 50^\circ$ $X \approx 19.3 \text{ (N)}$	<p>M1 A1 (4)</p> <p>M1 A2 ft</p> <p>M1 A1 (5)</p> <p>(9 marks)</p>

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

Question Number	Scheme	Marks
<p>7. (a)</p>	<div style="text-align: center;">  </div> <p> $R = 45 \cos 40^\circ + 4g \cos 30^\circ$ $R \approx 68$ </p> <p>(b) Use of $F = \mu R$</p> <p>$F + 4g \sin 30 = 45 \cos 50^\circ$</p> <p>Leading to $\mu \approx 0.14$</p>	<p>M1 A2, 1, 0</p> <p>M1 A1 (5) accept 68.4</p> <p>M1</p> <p>M1 A2, 1, 0</p> <p>M1 A1(6) accept 0.136</p> <p>(11 marks)</p>
<p>8. (a)</p>	<div style="text-align: center;">  </div> <p> $s = ut + \frac{1}{2}at^2 \Rightarrow 6 = \frac{1}{2}a \times 9$ $a = 1\frac{1}{3} \text{ (ms}^{-2}\text{)}$ </p> <p>(b) N2L for system $30 - \mu 5g = 5a$ ft their a, accept symbol</p> <p>$\mu = \frac{14}{3g} = \frac{10}{21}$ or awrt 0.48</p> <p>(c) N2L for P $T - \mu 2g = 2a$ ft their μ, their a, accept symbols</p> <p>$T - \frac{14}{3g} \times 2g = 2 \times \frac{4}{3}$</p> <p>Leading to $T = 12 \text{ (N)}$ awrt 12</p> <p>(d) The acceleration of P and Q (or the whole of the system) is the same.</p>	<p>M1</p> <p>A1 (2)</p> <p>M1 A1ft</p> <p>M1 A1 (4)</p> <p>M1 A1 ft</p> <p>M1 A1 (4)</p> <p>B1 (1)</p>

Question Number	Scheme	Marks
(e)	$v = u + at \Rightarrow v = \frac{4}{3} \times 3 = 4$ <p>N2L (for system or either particle)</p> $-5\mu g = 5a \quad \text{or equivalent}$ $a = -\mu g$ $v = u + at \Rightarrow 0 = 4 - \mu g t$ <p>Leading to $t = \frac{6}{7} \text{ (s)}$ accept 0.86, 0.857</p>	<p>B1 ft on a</p> <p>M1</p> <p>M1</p> <p>A1 (4)</p> <p>(15 marks)</p>