

# Mark Scheme (Results)

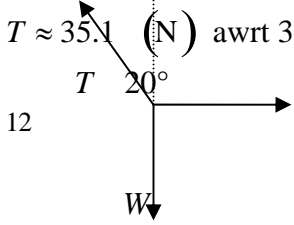
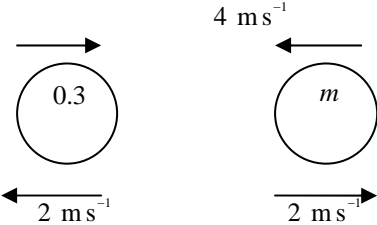
## Summer 2007

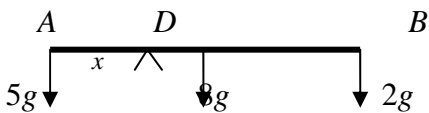
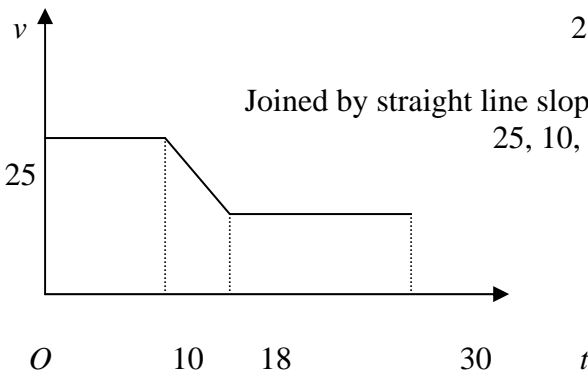
GCE

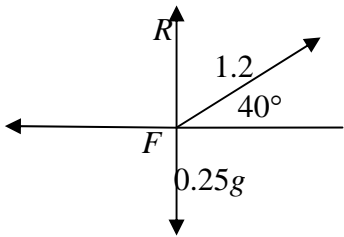
GCE Mathematics

Mechanics M1 6677

June 2007  
6677 Mechanics M1  
Mark Scheme

Question Number	Scheme	Marks
1.	<p>(a) <math>\rightarrow T \sin 20^\circ = 12</math></p>  <p>(b) <math>\uparrow W = T \cos 20^\circ</math> <math>\approx 33.0 \text{ (N)}</math></p> <p>awrt 33</p>	<p>M1 A1 A1 (3)</p> <p>M1 A1 DM1 A1 (4)</p> <p>[7]</p>
2.	 <p>(a) A: <math>I = 0.3(8 + 2)</math> <math>= 3 \text{ (Ns)}</math></p> <p>(b) LM <math>0.3 \times 8 - 4m = 0.3 \times (-2) + 2m</math> <math>m = 0.5</math></p> <p>Alternative to (b) B: <math>m(4 + 2) = 3</math> <math>m = 0.5</math></p> <p>The two parts of this question may be done in either order.</p>	<p>M1 A1 A1 (3)</p> <p>M1 A1 DM1 A1 (4)</p> <p>[7]</p> <p>M1 A1 DM1 A1 (4)</p>

Question Number	Scheme	Marks
3.	<p>(a) <math>M(C) 8g \times (0.9 - 0.75) = mg(1.5 - 0.9)</math> Solving to <math>m = 2</math> *</p> <p>(b)</p>  <p><math>M(D) 5g \times x = 8g \times (0.75 - x) + 2g(1.5 - x)</math> Solving to <math>x = 0.6</math> (<math>AD = 0.6</math> m)</p>	<p>M1 A1 DM1 A1 (4)</p> <p>M1 A2(1, 0) DM1 A1 (5) [9]</p>
4.	<p>(a)</p>  <p>2 horizontal lines</p> <p>Joined by straight line sloping down 25, 10, 18, 30 oe</p> <p>(b) <math>25 \times 10 + \frac{1}{2}(25 + V) \times 8 + 12 \times V = 526</math> Solving to <math>V = 11</math></p> <p>(c) "<math>v = u + at</math>" <math>\Rightarrow 11 = 25 - 8a</math> ft their V <math>a = 1.75 \text{ (ms}^{-2}\text{)}</math></p>	<p>B1 B1 B1 (3)</p> <p>M1 A1 A1 DM1 A1 (5)</p> <p>M1 A1ft A1 (3) [11]</p>

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5.	<p>(a)</p>  <p>↑ <math>\pm R + 1.2 \sin 40^\circ = 0.25g</math> Solving to <math>R = 1.7</math> (N)      accept 1.68</p> <p>(b)      → <math>F = 1.2 \cos 40^\circ</math> (<math>\approx 0.919</math>) Use of <math>F = \mu R</math> <math>1.2 \cos 40^\circ = \mu R</math>      ft their R <math>\mu \approx 0.55</math>      accept 0.548</p>	<p>M1 A1 DM1 A1    <b>(4)</b></p> <p>M1 A1 B1 DM1 A1ft</p> <p>A1 cao <b>(6)</b></p> <p><b>[10]</b></p>

Question Number	Scheme	Marks
<p><b>6.</b></p>	<p>(a) <math>s = ut + \frac{1}{2}at^2 \Rightarrow 3.15 = \frac{1}{2}a \times \frac{9}{4}</math>  <math>a = 2.8 \text{ (ms}^{-2}\text{)} *</math></p>	<p>M1 A1                      cso A1 (3)</p>
	<p>(b) N2L for <math>P</math>: <math>0.5g - T = 0.5 \times 2.8</math>  <math>T = 3.5 \text{ (N)}</math></p>	<p>M1 A1                      A1 (3)</p>
	<p>(c) N2L for <math>Q</math>: <math>T - mg = 2.8m</math>  <math>m = \frac{3.5}{12.6} = \frac{5}{18} *</math></p>	<p>M1 A1                      cso DM1 A1 (4)</p>
	<p>(d) The acceleration of <math>P</math> is equal to the acceleration of <math>Q</math>.</p>	<p>B1 (1)</p>
	<p>(e) <math>v = u + at \Rightarrow v = 2.8 \times 1.5</math>                      ( or <math>v^2 = u^2 + 2as \Rightarrow v^2 = 2 \times 2.8 \times 3.15</math> )  <math>(v^2 = 17.64, v = 4.2)</math>   <math>v = u + at \Rightarrow 4.2 = -4.2 + 9.8t</math>  <math>t = \frac{6}{9.8}, 0.86, 0.857 \text{ (s)}</math></p>	<p>M1 A1                         DM1 A1                      DM1 A1 (6)                      [17]</p>

Question Number	Scheme	Marks
7.	(a) $\mathbf{v} = \frac{8\mathbf{i} + 11\mathbf{j} - (3\mathbf{i} - 4\mathbf{j})}{2.5}$ or any equivalent $\mathbf{v} = 2\mathbf{i} + 6\mathbf{j}$	M1 A1 A1 (3)
	(b) $\mathbf{b} = 3\mathbf{i} - 4\mathbf{j} + \mathbf{v}t$ ft their $\mathbf{v}$ $= 3\mathbf{i} - 4\mathbf{j} + (2\mathbf{i} + 6\mathbf{j})t$	M1 A1 ft A1cao (3)
	(c) <b>i</b> component: $-9 + 6t = 3 + 2t$ $t = 3$	M1 M1 A1
	<b>j</b> component: $20 + 3\lambda = -4 + 18$ $\lambda = -2$	M1 A1 (5)
	(d) $v_B = \sqrt{2^2 + 6^2}$ or $v_C = \sqrt{6^2 + (-2)^2}$  Both correct  The speeds of <i>B</i> and <i>C</i> are the same      cso	M1 A1 A1 (3) [14]