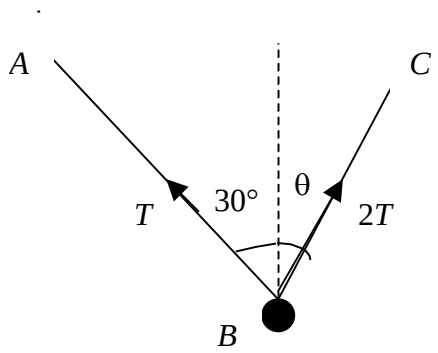
Edexcel
Success through qualifications

Mock Paper Mark Scheme

Advanced Subsidiary/Advanced GCE
General Certificate of Education

Question number	Scheme	Marks
1. (*a*)	$34^2 = 16^2 + 2 \,.\, a \,.\, 150$	M1 A1
	$\Rightarrow \quad a = 3 \text{ m s}^{-2}$	A1 (3)
(*b*)	hence $t = \dfrac{34-16}{a} = 6$ s	M1 A1 (2)
(*c*)	$v^2 = 16^2 + 2.3.75$	
	$\Rightarrow \quad v \approx 26.6 \text{ m s}^{-1}$	M1 A1 (2) **7**
2. (*a*)		
	R(→) $T \sin 30° = 2T \sin \theta$	M1 A1
	$\Rightarrow \sin \theta = 0.25$	
	$\Rightarrow \quad \theta \approx 14.5°$	M1 A1 (4)
(*b*)	R(↑) $T \cos 30 + 2T \cos \theta = 2g$	M1 A1
	$\Rightarrow T \approx 6.99$ N	M1 A1 (4)

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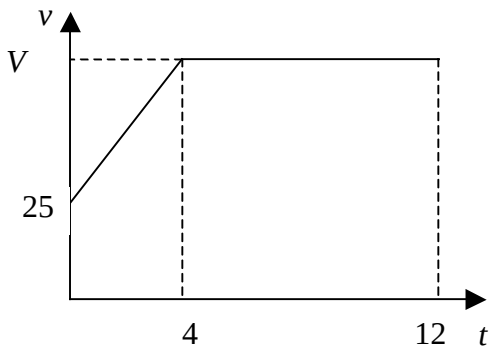
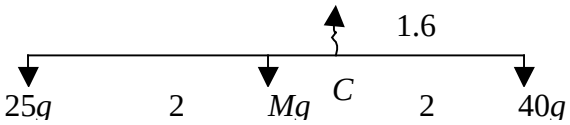
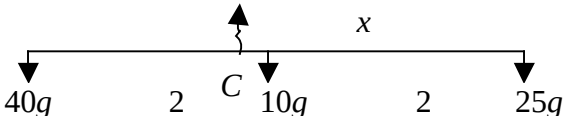
3. (*a*)		B1 (shape) B1 (figs) (2)
(*b*)	$600 = 8V, + \frac{1}{2}(25 + V).4$ $\Rightarrow V = 55$	M1 A1, A1 A1 (4)
(*c*)	$a = \frac{55-25}{4} = 7.5 \text{ m s}^{-2}$	M1 A1 (2)
4. (*a*)	 M(*C*) $40g \cdot 1.6 = Mg \cdot 0.4 + 25g \cdot 2.4$ $\Rightarrow M = 10$ kg	M1 A1 A1 (3)
(*b*)	 M(*C*) $25g.x + 10g.(x-2) = 40g.(4-x)$ $\Rightarrow 75x = 180$ $\Rightarrow x = 2.4$ m	M1 A1 A1 M1 A1 (5)

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(*c*)	(i) Weight acts at centre of plank (ii) Plank remains straight (iii) Weights act at the ends of the plank	B1 B1 (11) B1 (3)
5. (*a*)	"$v^2 = u^2 + 2as$": $V^2 = 2 \cdot 9.8 \cdot 1.6$	M1
	$\Rightarrow V = 5.6$ m s^{-1}	A1 (2)
(*b*)	$78 \cdot 5.6 = 84 \cdot v$	M1 A1
	$\Rightarrow v = 5.2$ m s^{-1}	A1 (3)
(*c*)	$84 \cdot 5.2 = F \cdot 0.06 - 84g \cdot 0.06$	M1 A1 A1
	$\Rightarrow F = 8103.2$ N	A1 (4)
(*d*)	"$F = ma$": $8103.2 - 84g = 84a \Rightarrow a = 86.67$	M1 A1
	"$v^2 = u^2 + 2as$": $5.2^2 = 2 \cdot 86.67 \cdot s$	M1
	$\Rightarrow s \approx 0.156$ m, or 0.16 m to 2 s.f.	A1 (4)
6. (*a*)	At time t $\mathbf{r}_A = (-5 + 2t)\mathbf{i} + (10 + 2t)\mathbf{j}$	B1
	$\mathbf{r}_B = (3 - 2t)\mathbf{i} + (4 + 5t)\mathbf{j}$	B1
	i components equal when $-5 + 2t = 3 - 2t \Rightarrow t = 2$ h	M1 A1
	$t = 2$: $\mathbf{r}_A = -\mathbf{i} + 14\mathbf{j}$; $\mathbf{r}_B = -\mathbf{i} + 14\,\mathbf{j} \Rightarrow$ collide	M1 A1 (6)
(*b*)	New $\mathbf{r}_A = (-5 + t)\mathbf{i} + (10 + t)\,\mathbf{j}$	
	$\Rightarrow AB = \mathbf{r}_B - \mathbf{r}_A = (8 - 3t)\mathbf{i} + (-6 + 4t)\mathbf{j}$	M1 A1 (2)
(*c*)	$t = 2$: $\overrightarrow{AB} = 2\mathbf{i} + 2\mathbf{j}$, $\Rightarrow$ dist. $= \sqrt{(2^2 + 2^2)} \approx 2.83$ km	M1 M1 A1 (3)
(*d*)	B north of $A \Rightarrow 8 - 3t = 0 \Rightarrow t = 8/3 \Rightarrow$ time 1440 hours	M1 A1 (2)

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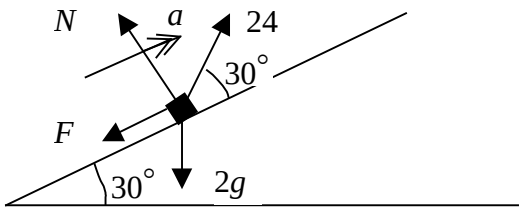
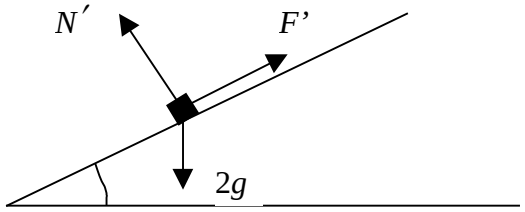
7. (*a*)		
	R(↖) $N + 24\cos 60° = 2g\cos 30°$	M1 A1 A1
	$\Rightarrow N = 16.97 - 12 = 4.97$ N	
	$\Rightarrow F = 0.4 \,.\, 4.97 = 1.99$ N	M1 A1
	R(↗) $2a = 24\cos 30° - 2g\cos 60° - 1.99$	M1 A1
(*b*)	$\Rightarrow a \approx 4.5$ m s^{-2}	A1 (8)
		
	R(↖) $N' = 2g\cos 30° = 16.97$	M1 A1
	$\Rightarrow F'_{\max} = 0.4 \,.\, 16.97 = 6.79$ N	
	Component of weight down plane = $2g\sin 30° = 9.8$ N	M1
(*c*)	$9.8 > F'_{\max} \Rightarrow$ net force down plane $\Rightarrow$ parcel moves	A1 (4)
	$2f = 9.8 - 6.79, \Rightarrow f \approx 1.5$ m s^{-2}	M1 A1, A1