Mark Scheme (Results)

January 2024

Pearson Edexcel International Advanced Level
In Mechanics M1 (WME01) Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

General Instructions for Marking

The total number of marks for the paper is 75.

Edexcel Mathematics mark schemes use the following types of marks:

'M' marks
These are marks given for a correct method or an attempt at a correct method. In Mechanics they are usually awarded for the application of some mechanical principle to produce an equation, e.g. resolving in a particular direction; taking moments about a point; applying a suvat equation; applying the conservation of momentum principle; etc.

The following criteria are usually applied to the equation.

To earn the M mark, the equation
(i) should have the correct number of terms
(ii) each term needs to be dimensionally correct

For example, in a moments equation, every term must be a 'force x distance' term or 'mass x distance', if we allow them to cancel 'g' s.

For a resolution, all terms that need to be resolved (multiplied by sin or cos) must be resolved to earn the M mark.

'M' marks are sometimes dependent (DM) on previous M marks having been earned, e.g. when two simultaneous equations have been set up by, for example, resolving in two directions and there is then an M mark for solving the equations to find a particular quantity – this M mark is often dependent on the two previous M marks having been earned.

'A' marks
These are dependent accuracy (or sometimes answer) marks and can only be awarded if the previous M mark has been earned. e.g. M0 A1 is impossible.

'B' marks
These are independent accuracy marks where there is no method (e.g. often given for a comment or for a graph).

A and B marks may be f.t. – follow through – marks.

General Abbreviations

These are some of the traditional marking abbreviations that will appear in the mark schemes:

- bod means benefit of doubt
- ft means follow through

- the symbol $\sqrt{}$ will be used for correct ft
- cao means correct answer only
- cso means correct solution only, i.e. there must be no errors in this part of the question to obtain this mark
- isw means ignore subsequent working
- awrt means answers which round to
- SC means special case
- oe means or equivalent (and appropriate)
- dep means dependent
- indep means independent
- dp means decimal places
- sf means significant figures
- * means the answer is printed on the question paper
- means the second mark is dependent on gaining the first mark

All A marks are 'correct answer only' (cao.), unless shown, for example, as A1 ft to indicate that previous wrong working is to be followed through. After a misread however, the subsequent A marks affected are treated as A ft, but manifestly absurd answers should never be awarded A marks.

For misreading which does not alter the character of a question or materially simplify it, deduct two from any A or B marks gained, in that part of the question affected.

If a candidate makes more than one attempt at any question:

- If all but one attempt is crossed out, mark the attempt which is NOT crossed out.
- If either all attempts are crossed out or none are crossed out, mark all the attempts and score the highest single attempt.

Ignore wrong working or incorrect statements following a correct answer.

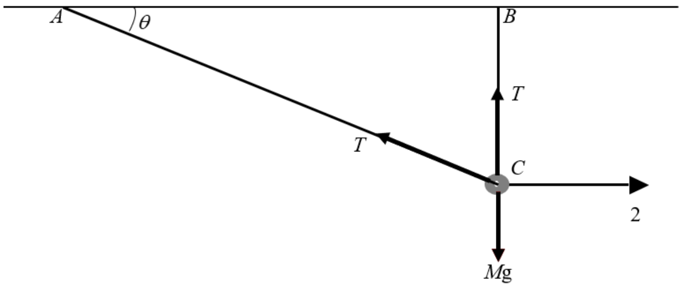
General Principles for Mechanics Marking

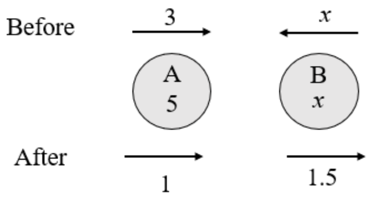
(NB specific mark schemes may sometimes override these general principles)

- Rules for M marks:
    - correct no. of terms;
    - dimensionally correct;
    - all terms that need resolving (i.e. multiplied by cos or sin) are resolved.
- Omission or extra g in a resolution is an accuracy error not method error.
- Omission of mass from a resolution is a method error.
- Omission of a length from a moments equation is a method error.
- Omission of units or incorrect units is not (usually) counted as an accuracy error.
- DM indicates a dependent method mark, i.e. one that can only be awarded if a previous specified method mark has been awarded.
- Any numerical answer which comes from use of g = 9.8 should be given to 2 or 3 SF.
- Use of g = 9.81 should be penalised once per (complete) question.
    - N.B. Over-accuracy or under-accuracy of correct answers should only be penalised *once* per complete question. However, premature approximation should be penalised every time it occurs.
- Marks must be entered in the same order as they appear on the mark scheme.
- In all cases, if the candidate clearly labels their working under a particular part of a question i.e. (a) or (b) or (c)…then that working can only score marks for that part of the question.
- Accept column vectors in all cases.
- Misreads – if a misread does not alter the character of a question or materially simplify it, deduct two from any A or B marks gained, bearing in mind that after a misread, the subsequent A marks affected are treated as A ft

Mechanics Abbreviations

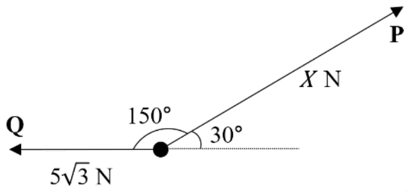
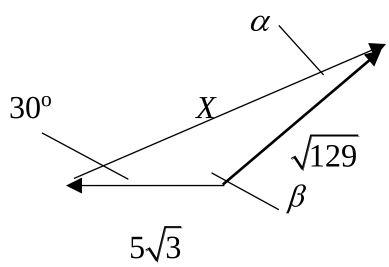
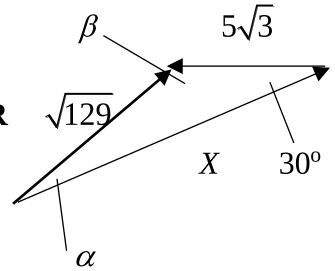
M(A)	Taking moments about A.
N2L	Newton's Second Law (Equation of Motion)
NEL	Newton's Experimental Law (Newton's Law of Impact)
HL	Hooke's Law
SHM	Simple harmonic motion
PCLM	Principle of conservation of linear momentum
RHS	Right hand side
LHS	Left hand side

QUESTION NUMBER	SCHEME	MARKS
1		
(a)	Horiz: $2 = T\cos\theta$	M1 A1
	T = 2.5	A1
		(3)
(b)	Vert: $T + T\sin\theta = Mg$	M1 A1
	M = 0.41 or 0.408	A1
		(3)
		(6)
	Notes for question 1	
	N.B. If they have different tensions, they can score all the marks in (a) but nothing in (b). If they have 2= $T\cos(\frac{4}{5})$ or similar and never recover, allow M1A0.	
(a) **M1** **A1** **A1**	 Horizontal equilibrium. Correct no. of terms, dimensionally correct, condone sin/cos confusion. Correct unsimplified equation. Correct answer. (ignore units)	
(b) **M1** **A1** **A1**	 Vertical equilibrium. Correct no. of terms, dimensionally correct, condone sin/cos confusion and missing g, to give an equation which must include M. Correct unsimplified equation Correct answer. (ignore units)	

QUESTION NUMBER	SCHEME	MARKS
2		
2(a)	CLM $(5\times3)-x^2=(5\times1)+\left(x\times1.5\right)$ **OR:** $5(-1--3)=x(1.5--x)$	M1A1
	$x=2.5$	A1
		(3)
2(b)	$I=\pm5(1-3)$ or $I=\pm2.5(1.5--2.5)$ ($I=\pm x(1.5--x)$)	M1A1
	$\lvert I\rvert=10$ (Ns)	A1
		(3)
		(6)
	Notes for question 2	
(a) **M1** **A1** **A1**	Forms CLM equation OR equates impulses, condone sign errors and extra g's and any correct cancellation, to give an equation in x only. Correct unsimplified equation Correct answer. If – 4 is seen, it must be rejected. (ignore units)	
(b) **M1** **A1** **A1**	Impulse-momentum equation, dimensionally correct, correct no. of terms for *A* or *B*. Condone sign errors but must be *attempting* a difference of momenta e.g. allow if they first state $I=\pm m(v-u)$ but then make a sign error and end up with a sum. If they clearly add the momenta, and there is no formula stated, M0. x does not need to be substituted. M0 if g is included. Correct numerical expression. cao must be positive. Ignore missing or wrong units. A0 if both 10 and another answer are given.	

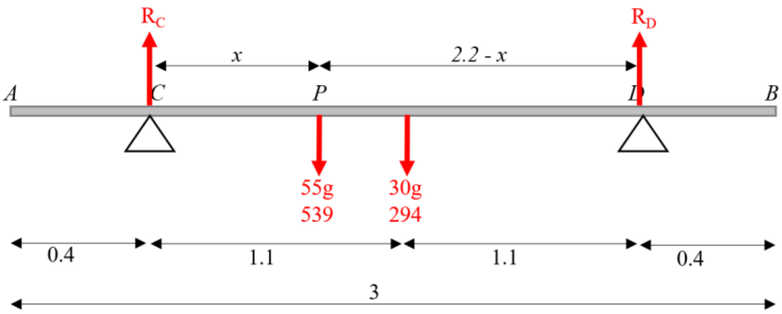
QUESTION NUMBER	SCHEME	MARKS
3(a)	*A* to *B* : $s=\left(\frac{u+v}{2}\right)t$: $400=\left(\frac{u+28}{2}\right)20$ Other possible equations: $28=u+20a$ $400=20u+\frac{1}{2}a\times 20^2$ $28^2=u^2+2\times 400a$ $400=(28\times 20)-\frac{1}{2}a\times 20^2$	M1
	$u=12*$	A1* cso
		(2)
3(b)	*A* to *B* : Any of the above equations with u = 12 e.g. $v=u+at$ $28=12+20a$ (leads to $a=0.8$)	M1 A1
	A to midpoint: $200=12t+\frac{1}{2}0.8t^2$ **OR:** find *v* and use it to find *t* e.g. $v^2=12^2+(2\times 0.8\times 200)$ => $v=\sqrt{464}$ and then one of : $\sqrt{464}=12+0.8t$ $200=\left(\frac{12+\sqrt{464}}{2}\right)t$ $200=\sqrt{464}t-\frac{1}{2}\times 0.8t^2$	M1 A1
	$t=12\ (s)$ or better $(11.9258..)$, $5\sqrt{29}-15$	A1
		(5)
3(c)	$D-260=1200(0.8)$	M1A1ft
	D=1220 (N)	A1
		(3)
		(10)
	Notes for question 3	
(a) **M1** **A1***	Complete method to find the value of *u*. (they may use two equations, eliminate *a* and solve for *u*) Correctly reaches the given answer. **N.B**. If they use 2 equations, we need to see *a* eliminated and *u* found correctly for this A mark. **N.B.** No marks if they use *u* =12 in (b) to find *a* and then use it in (a) to show that *u* = 12.	

(b) **M1** **A1** **M1** **A1** **A1**	 **Relevant *suvat* equation to find acceleration. This could be found in (a) or in (c) to earn these marks, but not necessarily used in (b).** Correct equation(s). Complete method to find an equation in t only. (they may find v (21.54065..) first). Must use their calculated acceleration and 12. Correct unsimplified equation in t only. Correct answer, t = 12 or better, $t = 11.9258...$ If seen, the negative value for t (– 41.9258..) must be rejected.	
(c) **M1** **A1ft** **A1**	 Use of $F=ma$. Correct no. of terms, dimensionally correct, a does not need to be substituted, condone sign errors. M0 if they use $a = g$. Correct unsimplified equation, ft on their a. Accept 1200 (N)	

QUESTION NUMBER	SCHEME	MARKS
	N.B. They may do (ii) first using the **OR** method to find α (and possibly β) and then use either angle to do (i), using the Sine Rule or Cosine Rule.	
4	  **OR**  	
4(i)	Complete method to find an equation in X only: • Using correct vector triangle with cosine rule: $129 = X^2 + \left(5\sqrt{3}\right)^2 - 2X \times 5\sqrt{3}\cos 30^\circ$ • Using correct vector triangle with sine rule to find α: $\dfrac{\sqrt{129}}{\sin 30^\circ} = \dfrac{5\sqrt{3}}{\sin\alpha}$ $\alpha = 22.4109..^o$ => $\beta = 180^o - 30^o - 22.4109..^o = 127.589..^o$ Then sine rule: $\dfrac{X}{\sin\beta} = \dfrac{\sqrt{129}}{\sin 30^\circ} = \dfrac{5\sqrt{3}}{\sin\alpha}$ or cosine rule: $(5\sqrt{3})^2 = X^2 + 129 - 2X\sqrt{129}\cos\alpha$ or $X^2 = (5\sqrt{3})^2 + 129 - 2\times 5\sqrt{3}\times\sqrt{129}\cos\beta$ to find X. • Using components with magnitude: $\sqrt{129} = \sqrt{\left(X\cos 30^\circ - 5\sqrt{3}\right)^2 + \left(X\sin 30^\circ\right)^2}$	M1 A1
	Solves their equation (if quadratic, must include an X term) to find an X value.	M1
	$X = 18$	A1
4(ii)	**EITHER** Finds an equation in β only using their X: e.g. $\dfrac{18}{\sin\beta} = \dfrac{\sqrt{129}}{\sin 30^\circ}$	M2

	or $18^2 = (5\sqrt{3})^2 + 129 - 2\times 5\sqrt{3}\times\sqrt{129}\cos\beta$ or $\cos\beta = \dfrac{\mathbf{R.Q}}{\lvert\mathbf{R}\rvert\lvert\mathbf{Q}\rvert}$ *where* **R** *is the resultant* (β)=128° to nearest degree **OR** Finds a relevant angle (not β) first • Using triangle of forces: $\alpha = \sin^{-1}\left(\dfrac{\sin 30^\circ \times 5\sqrt{3}}{\sqrt{129}}\right) = 22.4109^o$ Or: $\alpha = \cos^{-1}\left(\dfrac{18^2 + 129 - (5\sqrt{3})^2}{2\times 18\times\sqrt{129}}\right) = 22.4109^o$ • Using components: Resultant force = $\left(18\cos 30^\circ - 5\sqrt{3}\right)\mathbf{i} + \left(18\sin 30^\circ\right)\mathbf{j}$ Leading to $\tan^{-1}\left(\dfrac{4\sqrt{3}}{9}\right) = 37.589^o$ or $\tan^{-1}\left(\dfrac{9}{4\sqrt{3}}\right) = 52.411^o$ or e.g $\sin^{-1}\left(\dfrac{9}{\sqrt{129}}\right) = 52.411^o$	A1 A1 M1 A1
	Completes the method to find required angle (β) eg • $150^o - \alpha$ or $210^o + \alpha$ • $180^o - 52.411^o$ or $180^o + 52.411^o$ • $90^o + 37.859^o$ or $270^o - 37.859^o$	M1
	(β)=128° to nearest degree Accept 232^o	A1
		(8)
	Notes for question 4	
	N.B. If 150° is used in either the sine or cosine rule, they are using an incorrect vector triangle and no M marks are available.	
(i) **M1** **A1**	Complete method to form an equation in X only. This could involve cosine rule and/or sine rule or components. Note the component forms: $\mathbf{P} = X\cos 30^\circ\,\mathbf{i} + X\sin 30^\circ\,\mathbf{j}$, condone cos/sin confusion $\mathbf{Q} = -5\sqrt{3}\mathbf{i}$ oe (they could have chosen different + directions) Correct equation	

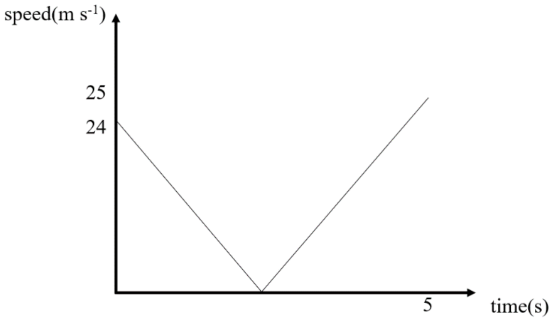
M1 **A1**	Provided they have found an X value, not necessarily correctly, this mark can be awarded. Correct answer. If seen, a negative value must be rejected.	
(ii) **M2** **A1** **A1** **M1** **A1** **M1** **A1**	**EITHER** Complete method to find an equation in β only Correct equation cao **OR** Complete method to find a relevant angle Correct relevant angle: $22.4109^o, 37.589^o, 52.411^o$ Completes the method to find the required angle cao	

QUESTION NUMBER	SCHEME	MARKS
5		
5(a)	M(D) $(R_C \times 2.2) = 55g(2.2 - x) + 30g(1.1)$	M1A1
	$(R_C) = (686 - 245x)$ (N) *	A1 *
	N.B. The M mark here is not available if they use $R_C = 4R_D$ to obtain the given result.	
		(3)
5(b)	$R_C = 4R_D$	M1
	Vert: $R_C + R_D = 55g + 30g \quad \Rightarrow \frac{5}{4}(686 - 245x) = 55g + 30g$ Relevant moments equations: M(C): $55gx + 30g(1.1) = R_D(2.2)$ M(A): $R_C(0.4) + R_D(2.6) = 55g(x + 0.4) + 30g(1.5)$ M(P): $R_C x + 30g(1.1 - x) = R_D(2.2 - x)$ M(G): $R_C(1.1) = 55g(1.1 - x) + R_D(1.1)$ M(B): $R_D(0.4) + R_C(2.6) = 30g(1.5) + 55g(2.6 - x)$	M1A1
	$x = 0.08$	A1
		(4)
5(c)	M(C): $Mg(0.4) = 30g(1.1)$	M1 A1
	$M = 83$ or 82.5 or $\frac{165}{2}$ oe	A1
	Other possible equations with $S_D = 0$ Vert: $S_C = Mg + 30g$ M(A) : $S_C(0.4) = 30g(1.5)$ M(G) : $S_C(1.1) = Mg(1.5)$ M(D) : $S_C(2.2) = 30g(1.1) + Mg(2.6)$ M(B) : $S_C(2.6) = 30g(1.5) + Mg(3)$	

	from which S_C would need to be eliminated to give an equation in M only.	
		(3)
		(10)

	Notes for question 5	
(a) **M1** **A1** **A1***	 Forms an equation in R_C and x only. Dimensionally correct and the correct no. of terms. Either a moments equation about D or two other equations combined to eliminate R_D. Correct unsimplified equation Correctly reaches the given answer with at **least one line of intermediate working.**	
(b) **M1** **M1** **A1** **A1**	 **Use** of $R_C = 4R_D$ Complete method to form an equation in x only. Dimensionally correct and the correct no. of terms. Either vertical resolution or a moments equation(s) with R_C and R_D eliminated. R_C **must be replaced with the given expression in (a)**. R_D replaced with $\frac{1}{4}R_C$ but condone $4R_C$ for the method mark. Correct unsimplified equation in x only. Correct answer	
(c) **M1** **A1** **A1**	 Use $S_D = 0$ and forms an equation in M only. Dimensionally correct and the correct no. of terms. M0 if $S_D \neq 0$. Correct unsimplified equation Correct answer, 83 or 82.5 o.e.	

QUESTION NUMBER	SCHEME	MARKS
6(a)	A to B : $V^2 = 24^2 + 2(-g)(-2.5)$	M1 A1
	OR: e.g. $0 = 24^2 - 2gh$ and $V^2 = 2g(h+2.5)$ oe	
	$V = 25$	A1
		(3)
6(b)	Some possible equations in t: $25 = -24 + gt$ $2.5 = \frac{(25+(-24))t}{2}$ $2.5 = -24t + \frac{1}{2}gt^2$ $2.5 = 25t - \frac{1}{2}gt^2$ Or they may find t_{UP} $\left(\frac{24}{g}\right)$ and t_{DOWN} $\left(\frac{25}{g}\right)$ AND add	M1 A1
	$t = 5 \quad (s)$	A1
		(3)
6(c)	From A to C: $10 = 24t + \frac{1}{2}(-g)t^2$	M1 A1
	Complete method to find the required time: e.g. solving the above quadratic and finding the positive difference in the roots **N.B.** Allow this mark if they solve their quadratic, and give the answer as a range of values: $t_1 \leqslant t \leqslant t_2$	M1
	4, 4.0 or 3.98 (s)	A1
	ALT 1: From A to C: $W^2 = 24^2 - 2\times 10g$	M1A1
	$0 = W - g(\frac{1}{2}t)$	M1
	4.0 or 3.98 (s)	A1
	ALT 2: From A to C: $W^2 = 24^2 - 2\times 10g$	M1A1
	$0 = Wt + \frac{1}{2}(-g)t^2$	M1
	4.0 or 3.98 (s)	A1
		(4)

6(d)		B1 shape B1 ft labels
		(2)
		(12)
	Notes for question 6	
(a) **M1** **A1** **A1**	 Complete method to find an equation in *V* only. Condone sign errors. Correct equation in *V* only using *g*. Note the sign of 2.5 and *g* should be the same. cao	
(b) **M1** **A1** **A1**	 Complete method to find an equation in *t* only. Condone sign errors. Correct equation in *t* only using *g*. cao	
(c) **M1** **A1** **M1** **A1**	 Forming an equation or equations which could lead to a relevant time. Condone sign errors. Correct equation(s) Complete method to find the required time. cao	
(d) **B1** **B1ft**	 Correct shape. It should appear symmetrical with regards to gradients but the end point should be higher than the start point. Vertex on horizontal axis. Correct labels (24, 25 and 5), ft on their answers to (a) and (b), provided they are positive. **N.B.** ignore an incorrect time when $v = 0$. **Neither mark available if using a velocity-time graph**.	

QUESTION NUMBER	SCHEME	MARKS
	N.B. Column vectors acceptable throughout apart from the answer to (b).	
7(a)	$\sqrt{12^2+16^2}=20\,(\text{km h}^{-1})$	M1 A1
		(2)
7(b)	$(19\mathbf{i}+22\mathbf{j})+t(12\mathbf{i}-16\mathbf{j})$	M1 A1
		(2)
7(c) **(i)**	Displacement vector $\overrightarrow{LS}=(19+12t-26)\mathbf{i}+(22-16t-15)\mathbf{j}$ or $\overrightarrow{SL}=(26-19-12t)\mathbf{i}+(15-22+16t)\mathbf{j}$	M1
	Correct with **i** and **j** collected $\overrightarrow{LS}=(12t-7)\mathbf{i}+(7-16t)\mathbf{j}$ or $\overrightarrow{SL}=(7-12t)\mathbf{i}+(16t-7)\mathbf{j}$	A1
	Use of Pythagoras to find the distance $\left\lvert\overrightarrow{LS}\right\rvert=\sqrt{(12t-7)^2+(7-16t)^2}$	M1
	Correct 3TQ $400t^2-392t\ +98$	A1
	Min occurs when t = 0.49	A1
	Alternative for last 3 marks: Closest when relative pv is perpendicular to relative velocity i.e $\left[(12t-7)\mathbf{i}+(7-16t)\mathbf{j}\right].(12\mathbf{i}-16\mathbf{j})=0$ $400t-196=0$ Min occurs when t = 0.49	M1 A1 A1
(ii)	$\sqrt{1.96}=1.4$ (km)	M1
	$1.4>1.3$ so it is safe for S to continue its course.	A1 **cso**
		(7)
	Alternative for (c)(i) and (ii):	
7(c)		
(i)	Path of S: $y-22=\frac{-16}{12}(x-19)$	M1
	Normal through L: $y-15=\frac{12}{16}(x-26)$	A1
	Solve for either x OR y	M1
	x = 24.88 OR y = 14.16	A1
	24.88 = 12t +19 OR 14.16 = 22 – 16t => t = 0.49	A1
(ii)	$\sqrt{(26-24.88)^2+(15-14.16)^2}=1.4$	M1
	$1.4>1.3$ so it is safe for S to continue its course.	A1 **cso**
		(7)

	Alternative for (c)(i) :	
	Path of S: $(19\mathbf{i}+22\mathbf{j})+t(12\mathbf{i}-16\mathbf{j})$	
	Normal through L : $(26\mathbf{i}+15\mathbf{j})+k(16\mathbf{i}+12\mathbf{j})$ oe	M1 A1
	Solve for t	M1
	t = 0.49	A2
		(5)
		(11)
	Notes for question 7	

(a) **M1** **A1**	 Use of Pythagoras to find the speed. Since this is a 3,4,5 triangle the correct answer may appear without working. cao
(b) **M1** **A1**	 Correct structure Correct answer o.e. with **i**'s and **j**'s
(c) (i) **M1** **A1** **M1** **A1** **A1**	 Subtraction used to find the displacement vector $\overrightarrow{LS}$ or $\overrightarrow{SL}$ Correct components for $\overrightarrow{LS}$ or $\overrightarrow{SL}$ with **i**'s and **j**'s collected, seen or implied. Use of Pythagoras with their components, which must have come from attempt at subtracting or adding **s** and **l**, to form a 3TQ for distance or distance squared. Correct 3TQ, seen or implied, e.g allow $400t^2-392t+96.31$ **cao** Note: The correct value t = 0.49 may appear without working as a result of the quadratic solver on a calculator. Other methods may include completing the square or differentiation. **N.B.** Correct 3TQ = 1.3^2 oe can score max M1A1M1A1
(ii) **M1** **A1cso**	 Use of their t value, which must have come from an attempt to minimise the distance LS, to find the shortest distance between S and L. Note: The correct value 1.4 may appear without working since the quadratic solver on a calculator will give a min value for d^2 as 1.96. Correct conclusion by comparing 1.4 and 1.3. **N.B**. Accept e.g. '1.4 therefore it is safe'.

QUESTION NUMBER	SCHEME	MARKS
8(a)	Perp. to plane for P: $R = mg\cos a$	M1A1
	P: $T = mg\sin\alpha + F$ Q: $T = 0.5mg$ **N.B.** $mg\sin\alpha + F = 0.5mg$ scores M1A1 (LHS) B1 RHS)	M1 A1 B1
	Use of $F = \mu R$	B1
	$0.5mg = \dfrac{5mg}{13} + \mu\dfrac{12mg}{13}$	dM1
	$\mu = \dfrac{1}{8}$	A1
		(8)
8(b)	$mg\sin\alpha - F = ma$ $\left(a = \dfrac{7g}{26} \quad (\text{ms}^{-2})\right)$	M1 A1
	$V^2 = 0^2 + 2\left(\dfrac{7g}{26}\right)0.8$	M1
	V = 2.1 or 2.05	A1
		(4)
		(12)
	Notes for question 8	
(a)		
M1	Resolve perpendicular to find an expression for R in terms of m, condone sin/cos confusion and sign errors.	
A1	Correct unsimplified equation.	
M1	Form an equilibrium equation for P. Correct no. of terms, dimensionally correct. If F=ma is used then a must be zero.	
A1	Correct unsimplified equation.	
B1	Correct equation	
B1	Use of $F = \mu R$, seen or implied, in an equation.	
dM1	Dependent on previous M mark, replace trig and form an equation in μ only.	
A1	Correct answer. Accept 0.125, 0.13	
(b)		
M1	Use of F=ma for P. Correct no. of terms, dimensionally correct, ignore sin/cos confusion.	
A1	Correct equation, trig and F do not need to be substituted.	
M1	Use their calculated acceleration to form an equation in V. M0 if they use g.	
A1	Correct answer 2/3sf	

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