Pearson Edexcel

Mark Scheme (Results)

Summer 2022

Pearson Edexcel GCE
AL Further Mathematics (9FM0)
Paper 4C Further Mechanics 2

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Summer 2022
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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.

EDEXCEL GCE MATHEMATICS
General Instructions for Marking

1. The total number of marks for the paper is 75.

2. The Edexcel Mathematics mark schemes use the following types of marks:

- **M** marks: method marks are awarded for 'knowing a method and attempting to apply it', unless otherwise indicated.
- **A** marks: Accuracy marks can only be awarded if the relevant method (M) marks have been earned.
- **B** marks are unconditional accuracy marks (independent of M marks)
- Marks should not be subdivided.

3. Abbreviations

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

- bod – benefit of doubt
- ft – follow through
- the symbol $\sqrt{}$ will be used for correct ft
- cao – correct answer only
- cso - correct solution only. There must be no errors in this part of the question to obtain this mark
- isw – ignore subsequent working
- awrt – answers which round to
- SC: special case
- oe – or equivalent (and appropriate)
- dep – dependent
- indep – independent
- dp decimal places
- sf significant figures
- ∗ The answer is printed on the paper
- ☐ The second mark is dependent on gaining the first mark

4. 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.

5. Where a candidate has made multiple responses <u>and indicates which response they wish to submit</u>, examiners should mark this response.
If there are several attempts at a question <u>which have not been crossed out</u>, examiners should mark the final answer which is the answer that is the <u>most complete</u>.

6. Ignore wrong working or incorrect statements following a correct answer.

7. Mark schemes will firstly show the solution judged to be the most common response expected from candidates. Where appropriate, alternatives answers are provided in the notes. If examiners are not sure if an answer is acceptable, they will check the mark scheme to see if an alternative answer is given for the method used.

Question	Scheme	Marks	AOs
1 (a)	Moments about y-axis	M1	3.4
	$\left((5+k)m\bar{x} = -3kma + 6ma + 3ma\right)$ $\quad \bar{x} = \frac{(9-3k)a}{5+k}$	A1	1.1b
	Moments about x-axis	M1	3.4
	$\left((5+k)m\bar{y} = 4kma + 4ma - 12ma\right)$ $\quad \bar{y} = \frac{(4k-8)a}{5+k}$	A1	1.1b
		(4)	
	$\Rightarrow 9\left[(9-3k)^2 + (4k-8)^2\right] = (5+k)^2$ $\left(224k^2 - 1072k + 1280 = 0\right)$	M1	3.1a
	$\Rightarrow k = \frac{5}{2}$, or $k = \frac{16}{7}$	A1	2.2a
		(2)	
(b)			
			(6 marks)

Notes:

(a)	
M1	Moments equation to find $\bar{x}$ – need all terms and dimensionally correct Allow with m cancelled throughout Allow if they have a common factor of g
A1	Correct expression for $\bar{x}$ Any equivalent form. Allow recovery
M1	Moments equation to find $\bar{y}$ – need all terms and dimensionally correct Allow with m cancelled throughout Allow if they have a common factor of g
A1	Correct expression for $\bar{y}$ Any equivalent form. Allow recovery
(b)	
M1	Use their moments equations to form a quadratic equation in k only with no square root (need not simplify)
A1	Obtain both correct values. Accept 2.5 and 2.3 or better (2.2857…)

Question	Scheme	Marks	AOs
2 (a)	Use of $P = Fv$	B1	3.3
	Equation of motion $\left(F - 3v^2 = 60a\right)$	M1	2.1
	$\frac{200}{v} - 3v^2 = 60v\frac{\mathrm{d}v}{\mathrm{d}x}$	A1	2.5
	$\frac{\mathrm{d}v}{\mathrm{d}x} = \frac{200 - 3v^3}{60v^2}$ *	A1*	2.2a
		(4)	
2(b)	$\Rightarrow \int \frac{60v^2}{200 - 3v^3}\,\mathrm{d}v = \int 1\,\mathrm{d}x \quad \left(-\frac{60}{9}\ln\left(200 - 3v^3\right) = x(+C)\right)$	M1	1.1b
	$D = \left[-\frac{60}{9}\ln\left(200 - 3v^3\right)\right]_2^4 = -\frac{60}{9}\ln\left(\frac{200 - 3\times 64}{200 - 3\times 8}\right)$	M1	1.1b
	$= \frac{60}{9}\ln\frac{176}{8} = \frac{60}{9}\ln 22$	A1	1.1b
		(3)	
		(7)	

(7 marks)

Notes:

(a)	
B1	Seen or implied Not just quoted. Need at least 200 = Fv Could be on its own, in an equation or on a diagram
M1	Form equation of motion. Need all terms and dimensionally correct. Condone any correct form for acceleration and sign errors Allow with m not substituted
A1	Correct equation - any equivalent form with correct acceleration
A1*	Obtain given answer from correct working Must be as written in the question but could swap LHS and RHS
(b)	
M1	Separate variables and integrate to obtain $(x =)k\ln(......)$ (Constant of integration not required) Condone if the x is not explicitly stated but M0 if it is an incorrect function.
M1	Use limits correctly in an expression containing $k\ln\left(200 - 3v^3\right)$ to find D

	Substitute and subtract in the correct order
A1	Obtain **exact** answer from correct working Any equivalent single term No working seen is Max M1M0A0

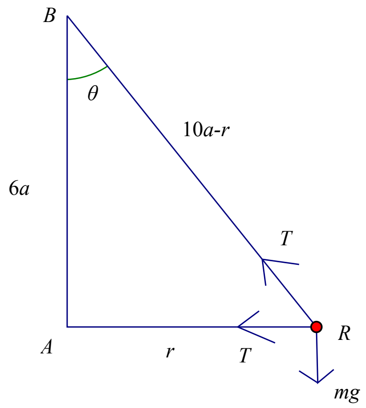
Question	Scheme	Marks	AOs
3(a)	Moments about *AC*:	M1	3.1a
	rod: CD, DE, EF, FA, AB, BC, BF, DF, CF Mass ratio: 4, 4, 5, 5, 3, 3, 8, 6, 10 From *AC*: 2a, 6a, 6a, 2a, 0, 0, 2a, 4a, 2a		
	$8a\times4a+2\times3a\times4a+2\times5a\times2a+10a\times4a+2\times4a\times2a=48a\bar{x}$	A1 A1	1.1b 1.1b
	$(132a=48\bar{x})\Rightarrow\bar{x}=\frac{11}{4}a$	A1	1.1b
		(4)	
(b)	Moments about *F*:	M1	3.1a
	$Mg(4a-\bar{x})=kMg\times4a$	A1ft	1.1b
	$\Rightarrow k=\frac{5}{16}$	A1	1.1b
		(3)	
	Moments about *C*:	M1	
	$4a(M+kM)=M\bar{x}+8akM$	A1ft	
	$\Rightarrow k=\frac{5}{16}$	A1	1.1b
		(3)	
		(7 marks)	

rod	CD	DE	EF	FA	AB	BC	BF	DF	CF
Mass ratio	4	4	5	5	3	3	8	6	10
From *AC*	$2a$	$6a$	$6a$	$2a$	0	0	$2a$	$4a$	$2a$

Notes:

(a)M1	Dimensionally correct equation for moments about *AC* or a parallel axis. **All terms** needed and horizontal distances Must be using the mass ratio. Allow slips, but not consistently density and not consistently lengths. Condone without *a*
A1 A1	One side of the equation correct Both sides of the equation correct
A1	Or equivalent single term Condone if *a* is missing in the working and appears at the end
(b)M1	Dimensionally correct moments equation. Accept any complete alternative method using *M* and *kM* to obtain an equation in *k* only. Condone if g and / or M cancelled throughout Condone incorrect distances Condone if use $M = 48$ throughout

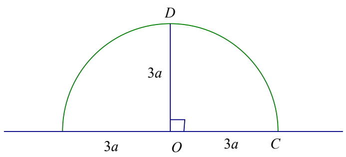
A1	Correct unsimplified equation (accept without g and/or M) Correct mass and distance combination for their $\bar{x}$
A1	Or 0.3125 Condone 0.31 or 0.313

Question	Scheme	Marks	AOs
4(a)			
	Resolve vertically	M1	3.4
	$T\cos\theta = mg$	A1	1.1b
	$T = \left(\frac{mg}{\cos\theta} = \frac{6.8mg}{6}\right) = \frac{17mg}{15}$	A1	1.1b
		(3)	
4(b)	Equation of motion	M1	3.1b
	$mr\omega^2 = T + T\sin\theta \quad \left(m\times 3.2a\omega^2 = their\ T\left(1+\frac{8}{17}\right)\right)$	A1 A1	1.1b 1.1b
	Solves for ω or ω^2	M1	1.1b
	$\left(\frac{r\omega^2}{g} = \frac{1+\sin\theta}{\cos\theta} = \frac{6.8+3.2}{6}, \quad \omega^2 = \frac{10g}{6\times 3.2a}\right) \quad \omega = \sqrt{\frac{25g}{48a}} = \frac{5}{4}\sqrt{\frac{g}{3a}}$	A1	1.1b
		(5)	
			(8 marks)

Notes:

(a)M1	Need all terms. Condone sin/cos confusion
A1	Correct unsimplified equation.
A1	Correct answer only $1.1mg$ or better ($1.13\ldots mg$) Do not ignore subsequent working if they try to combine this with a tension in *AR*
(b)M1	Equation for circular motion. Need all terms and dimensionally correct. Condone sin/cos confusion and sign errors. Any correct form for acceleration
A1 A1	Unsimplified equation with at most one error Correct unsimplified equation

	Allow M1A1A0 for $mr\omega^2 = T' + (\mathit{their}\ (a))\sin\theta$
M1	Clear attempt to substitute for trig and tension or divide their two equations to solve for ω or ω^2 in terms of a and g Independent M mark but requires an equation using tension and trig.
A1	Any equivalent form $0.72\sqrt{\frac{g}{a}}$ or better (0.7216…)

Question	Scheme	Marks	AOs
5(a)	Using sector: distance $OG = \dfrac{2\times 3a\sin\frac{\pi}{4}}{3\times\frac{\pi}{4}}$	B1	1.1b
	Using Pythagoras: $2d^2 = \dfrac{32a^2}{\pi^2}$ $\left(d^2+d^2=OG^2\right)$ Or using trigonometry: Distance from $OC = OG\cos 45° = OG\sin 45°$	M1	2.1
	$d=\sqrt{\dfrac{16a^2}{\pi^2}}=\dfrac{4a}{\pi}$ *	A1*	2.2a
		(3)	
5(a) alt	Using semicircle of radius $3a$: $\bar{y}=\dfrac{4\times 3a}{3\pi}\left(=\dfrac{4a}{\pi}\right)$ 	B1	1.1b
	Moments about diameter: $\dfrac{9\pi a^2}{2}\times\dfrac{4a}{\pi}=2\times\dfrac{9\pi a^2}{4}\times d$	M1	2.1
	$\Rightarrow d=\dfrac{4a}{\pi}$ *	A1*	2.2a
		(3)	
(b)	<table><tr><td></td><td>*ABCO*</td><td>*ODEF*</td><td>*ODC*</td></tr><tr><td>Mass ratio</td><td>9</td><td>9</td><td>$\frac{9\pi}{4}$</td></tr><tr><td>From *FC*</td><td>$-\frac{3a}{2}$</td><td>$\frac{3a}{2}$</td><td>$\frac{4a}{\pi}$</td></tr></table>	B1	1.2
	Moments about *FC*:	M1	3.1a
	$-9\times\dfrac{3a}{2}+9\times\dfrac{3a}{2}+\dfrac{9\pi}{4}\times\dfrac{4a}{\pi}=\left(18+\dfrac{9\pi}{4}\right)\bar{x}\left(=9a\right)$	A1	1.1b
	$\bar{x}=\dfrac{4a}{8+\pi}$	A1	1.1b
		(4)	

(b) alt	<table><tr><td></td><td>*ABCO*</td><td>*ODEF*</td><td>*ODC*</td></tr><tr><td>Mass ratio</td><td>9</td><td>9</td><td>$\frac{9\pi}{4}$</td></tr><tr><td>From *BOE*</td><td>0</td><td>0</td><td>$\frac{4\sqrt{2}a}{\pi}$</td></tr></table>	B1	1.2
	Moments about *BOE*:	M1	3.1a
	$\left(18+\frac{9\pi}{4}\right)d=\frac{9\pi}{4}\times\frac{4\sqrt{2}a}{\pi}$	A1	1.1b
	$\bar{x}=d\cos 45°=\frac{4a}{8+\pi}$	A1	1.1b
		(4)	
(c)	$\bar{y}=\frac{4a}{8+\pi}$ from *OD* or $\bar{y}=3a+\frac{4a}{8+\pi}$ from *FE*	B1ft	1.1b
	Complete method to find a relevant angle	M1	3.1a
	$\theta°=\tan^{-1}\left(\frac{\bar{x}}{3a+\bar{y}}\right)=\tan^{-1}\left(\frac{4a}{28a+3\pi a}\right)$	A1ft	1.1b
	$\theta=6.1$	A1	1.1b
		(4)	
			(11 marks)

Notes:

(a)B1	Correct application of standard result from formula booklet. Must substitute for α but need not simplify Implied if you see $\left(=\frac{4\sqrt{2}a}{\pi}\right)$
M1	Correct strategy to find the distance for the quadrant Need to see use of $\frac{1}{\sqrt{2}}$ or $\frac{\sqrt{2}}{2}$ somewhere in the solution
A1*	Obtain the given result from correct working.
(b)B1	Correct masses and distance from *FC* or a parallel axis or *BOE* Seen or implied (a bright candidate might realise that if taking moments about *FC* then the two squares cancel each other).
M1	Moments about *FC* or a parallel axis or *BOE*. All terms required, and dimensionally correct. Condone sign errors. Accept as part of a vector equation.

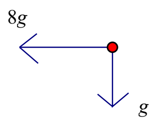
A1	Correct unsimplified equation for their axis
A1	Or equivalent with no errors seen Accept $0.36a$ or better $(0.3590\ldots a)$
(c)B1ft	Allow use of symmetry seen or implied. Accept $\bar{y} = \bar{x}$ (From FE, $\bar{y} = \dfrac{28a + 3\pi a}{8 + \pi}$) Accept + / -
M1	Correct strategy to find a relevant angle (θ or $90 - \theta$) Need to substitute their values of $\bar{x}$ and distance from $F \neq \dfrac{4a}{\pi}$.
A1ft	Correct unsimplified expression for a relevant angle. Follow their $\bar{x}$ and $\bar{y}$
A1	6.1 or better (6.10067…) The question defines θ as measured in degrees. 0.106 can score B1M1A1ftA0 Do not ISW

Question	Scheme	Marks	AOs
6(a)	Mass of cone $= \int_0^9 \pi y^2 \lambda x \, dx = \pi\lambda \int_0^9 \frac{x^3}{9} dx$	M1	3.4
	$= \pi\lambda \left[\frac{x^4}{36}\right]_0^9 \quad \left(= \frac{729\pi\lambda}{4} (\text{kg})\right)$	A1	1.1b
	Moments: $\int_0^9 \pi y^2 \lambda x \times x \, dx = \pi\lambda \int_0^9 \frac{x^4}{9} dx$	M1	3.4
	$= \frac{\pi\lambda}{45}\left[x^5\right]_0^9 \quad \left(= \frac{\pi\lambda}{5} \times 9^4\right)$	A1	1.1b
	$\Rightarrow d = \dfrac{\frac{\pi\lambda}{5} \times 9^4}{\frac{\pi\lambda}{4} \times 9^3}$	DM1	2.1
	$d = \frac{36}{5} = 7.2 (\text{cm})$	A1	1.1b
		(6)	
(b)	Remains at rest $\Rightarrow$ centre of mass at centre of plane surface	B1	2.1
	Moments about diameter of plane surface:	M1	3.1b
	$(9-d)W \left\{= \left(9 - \frac{36}{5}\right)W\right\} = \frac{3}{8} \times 3 \times kW$	A1ft	1.1b
	$k = \frac{8}{5}$	A1	1.1b
		(4)	
		(10 marks)	

Notes:

(a)	NB: Some candidates are confusing the mass and the volume. For the first M1A1: - If they have a correct method for the mass and they tell you that this is mass, award the marks. - If they have a correct method for the mass say nothing, but use it correctly, award the marks. - If they have a correct method for the mass, say nothing, and use it as the moment, then M0 because this implies that they do not think it is the mass.
M1	Use the model to find the mass of the cone. Allow without limits.
A1	Correct integration. Correct limits seen or implied Substitution not required.

	Allow 2/2 if π not seen and consistent with (b) if attempted
M1	Use the model to find the moment of the cone (usual rules for integration) Allow without limits
A1	Correct integration. Correct limits seen or implied Substitution not required. Allow 2/2 if π not seen and consistent with (a)
M1	Complete method to find the distance of the centre of mass from the vertex. A complete method requires the two preceding M marks. They need to get as far as a value for d. If they have a method that comes directly to this stage you might not see the λ or π
A1	Correct only If all you see is $\Rightarrow d = \frac{9^5}{45} \div \frac{9^4}{36}$ or even $\Rightarrow d = \frac{9}{5} \times 4$ then award 6/6 Allow 6/6 if π not seen throughout but otherwise correct
(b)B1	Correct deduction for location of c of m Stated or implied by their moments equation
M1	Moments about diameter of plane face(s) M0 if the moments equation contradicts the centre of mass being on the interface M0 if using volume in place of mass
A1ft	Correct unsimplified equation. Follow their 7.2 Alternative moments equations: Using vertex: $W\bar{x} + kW\left(9 + \frac{3}{8} \times 3\right) = (W + kW) \times 9$ Using base: $W(12 - \bar{x}) + kW\left(3 - 3 \times \frac{3}{8}\right) = (W + kW)3$ If they are working with the axis at an angle they will possibly have trig terms which should cancel.
A1	Correct only

Question	Scheme	Marks	AOs
7(a)	Conservation of energy:	M1	3.1b
	$\frac{1}{2}mu^2 = \frac{1}{2}mv^2 + mg \times \frac{2a}{5}(1-\cos\theta)$	A1	1.1b
	Equation of motion towards O	M1	3.1b
	$T - mg\cos\theta = \frac{5mv^2}{2a}$	A1	1.1b
	Complete method to find T in terms of u, a and θ	DM1	2.1
	$T = mg\cos\theta + \frac{5m}{2a}\left(u^2 - \frac{4a}{5}g\left(1-\cos\theta\right)\right)$ $= 3mg\cos\theta - 2mg + \frac{5mu^2}{2a}$ *	A1*	2.2a
		(6)	
(b)	Require $T \geq 0$ when $\theta = \pi$: $\frac{5mu^2}{2a} \geq mg\left(2+3\right)$	M1	2.1
	$u^2 \geq 2ag$, minimum $u = \sqrt{2ag}$	A1	1.1b
		(2)	
(c)	$\theta = \frac{\pi}{2}, u = 2\sqrt{ag} \Rightarrow T = -2mg + \frac{5m}{2a} \times 4ag$	B1	1.1b
			
	Magnitude of acceleration $= g\sqrt{64+1}$	M1	2.1
	$= \sqrt{65}g$	A1	1.1b
		(3)	
(d)	Consider the uniformity / dimensions of the package String might be extensible. include the weight of the string	B1	3.5c
		(1)	

	(12 marks)
Notes:	
(a)M1	Need all terms. Dimensionally correct. Condone sign errors and sin/cos confusion Allow with $\frac{2a}{5}\cos\theta$ in place of $\frac{2a}{5}(1-\cos\theta)$
A1	Correct unsimplified equation
M1	Need all terms. Dimensionally correct. Condone sign errors and sin/cos confusion
A1	Correct unsimplified equation
M1	Complete method, e.g. using conservation of energy and the circular motion, to form sufficient equations to obtain an expression without v A complete method requires the two preceding M marks.
A1*	Obtain given result from correct working
(b)M1	Identify correct condition for complete circle and solve for u. Condone working from $T = 0$
A1	Allow $u \geq \sqrt{2ag}$ Condone $u > \sqrt{2ag}$, and $u = \sqrt{2ag}$
(c)B1	Correct T or v^2 seen or implied
M1	Use of Pythagoras with their horizontal component of acceleration
A1	Correct only, or $8.1g$ $(8.062\ldots g)$ or better
(d) B1	Any valid suggestion **relating to the model**. Allow negatives of statements within the model e.g. not model the package as a particle. B0 if multiple suggestions including one incorrect. B0 for accuracy of g as this is not part of the description of the model.

Question	Scheme	Marks	AOs
8(a)	At equilibrium: $0.5g = \frac{25e}{1.25}$, $e = \frac{0.5\times10\times1.25}{25} = \frac{1}{4}$	B1	3.3
	For taut string, when distance x from equilibrium, equation of motion	M1	2.1
	Alternative for M1: Conservation of energy using a known point (E or B) and a general position: From E: $\frac{25e^2}{2\times1.25} + KE(\text{constant} \neq 0) + 0.5gx = \frac{25(e+x)^2}{2\times1.25} + \frac{1}{2}0.5v^2 + 0(\text{GPE})$ and differentiate wrt x for M1 $\Rightarrow 0.5g = \frac{25(e+x)}{1.25} + \frac{1}{2}v\frac{dv}{dx}$		
	$\frac{25(e+x)}{1.25} - 0.5g = -0.5\ddot{x}$	A1ft	1.1b
	$\ddot{x} = -40x$ hence SHM*	A1*	2.2a
	Periodic time:	M1	3.4
	$T = \frac{2\pi}{\sqrt{40}} = \frac{\pi}{\sqrt{10}}$ *	A1*	2.2a
		(6)	
(b)	Max KE $= 2.5 = \frac{1}{2}\times\frac{1}{2}\times \max v^2$ $\Rightarrow \max v^2 = 10$	B1	1.2
	Max speed $= a\omega$: $\sqrt{10} = a\sqrt{40}$	M1	3.4
	$AB = 1.25 + \frac{1}{4} + \frac{1}{2} = 2\ (\text{m})$ *	A1*	1.1b
		(3)	
(b) alt	Energy : $\frac{25e^2}{2.5} + 2.5 + 0.5ga = \frac{25(e+a)^2}{2.5}$	B1	
	Solve for a	M1	
	$AB = 1.25 + \frac{1}{4} + \frac{1}{2} = 2\ (\text{m})$ *	A1*	1.1b
		(3)	
(c)	$a = 0.5$, $x = 0.5\cos\sqrt{40}t$	B1	2.2a
	$-0.25 = 0.5\cos\sqrt{40}t$ $\Rightarrow t = 0.3311...$	M1	3.1a
	$v^2 = 40(0.5^2 - 0.25^2) = \frac{15}{2}$	M1	3.4
	Total time $= 2\times0.3311... + \frac{2\times\sqrt{7.5}}{10}$	DM1	3.1a
	$= 1.2\ (\text{s})$ or better	A1	2.2a

		(5)	
			(14 marks)

Notes:

(a)B1	Correct only Award if see $mg = \frac{\lambda e}{l}$ used in their equation of motion
M1	Equation of motion with x measured from the equilibrium position. Need all terms and dimensionally correct. Allow with their $e \neq 0$. Condone sign errors. Allow with a in place of $\ddot{x}$
A1ft	Correct unsimplified equation with their e or $e \neq 0$. Could have the negative of the whole equation or x replaced with $-x$ throughout
A1*	Reach **given conclusion** from correct working. Condone correct conclusion without explanation
M1	Use the model to find the periodic time: $T = \frac{2\pi}{\omega}$ From an equation of the form $\ddot{x} = -\omega^2 x$
A1*	Obtain given answer from correct **working** throughout. Available if only error is not to conclude SHM
(b)B1	Use the KE to find max v or max v^2
M1	Use the model to find the amplitude of the motion
A1*	Obtain the given answer from correct working.
(b) alt B1	Using correct λ and l and e or their e
M1	Requires an energy equation with all the right terms
A1*	Obtain the given answer from correct working.
(c) B1	Correct equation for SHM seen or implied
M1	Find the time until the string goes slack If working from $x = 0.5\sin\sqrt{40}t$ need $\frac{T}{4} + \frac{1}{\sqrt{40}}\sin^{-1}\frac{1}{2}$
M1	Use the model to find v or v^2 at the instant the string goes slack ($v = 2.738\ldots$) Using SHM formula or conservation of energy.
M1	Complete method to find the total time until return to B Requires the preceding M marks

	If they use suvat to find the time as a projectile it must be a complete method e.g. $\sqrt{\frac{15}{2}} = -\sqrt{\frac{15}{2}} + gt$ or a combination of $v^2 = u^2 + 2as$ and $s = ut + \frac{1}{2}at^2$
A1	$= 1.2(\text{s})$ or better Condone an answer to > 2 s.f. Not scored if they have used 9.8.