Oxford Cambridge and RSA

Practice Paper – Set 3

A Level Further Mathematics A

Y541/01 Pure Core 2

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 75

FINAL

This document consists of 16 pages

Text Instructions

1. Annotations and abbreviations

Annotation in scoris	**Meaning**
✓and✗	
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working
M0, M1	Method mark awarded 0, 1
A0, A1	Accuracy mark awarded 0, 1
B0, B1	Independent mark awarded 0, 1
SC	Special case
^	Omission sign
MR	Misread
Highlighting	
Other abbreviations in mark scheme	**Meaning**
E1	Mark for explaining a result or establishing a given result
dep*	Mark dependent on a previous mark, indicated by *
cao	Correct answer only
oe	Or equivalent
rot	Rounded or truncated
soi	Seen or implied
www	Without wrong working
AG	Answer given
awrt	Anything which rounds to
BC	By Calculator
DR	This question included the instruction: In this question you must show detailed reasoning.

2. Subject-specific Marking Instructions for ALevel Further Mathematics A

a Annotations should be used whenever appropriate during your marking. The A, M and B annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks. It is vital that you annotate standardisation scripts fully to show how the marks have been awarded. For subsequent marking you must make it clear how you have arrived at the mark you have awarded.

b An element of professional judgement is required in the marking of any written paper. Remember that the mark scheme is designed to assist in marking incorrect solutions. Correct solutions leading to correct answers are awarded full marks but work must not be judged on the answer alone, and answers that are given in the question, especially, must be validly obtained; key steps in the working must always be looked at and anything unfamiliar must be investigated thoroughly. Correct but unfamiliar or unexpected methods are often signalled by a correct result following an apparently incorrect method. Such work must be carefully assessed. When a candidate adopts a method which does not correspond to the mark scheme, escalate the question to your Team Leader who will decide on a course of action with the Principal Examiner.
If you are in any doubt whatsoever you should contact your Team Leader.

c The following types of marks are available.

M
A suitable method has been selected and *applied* in a manner which shows that the method is essentially understood. Method marks are not usually lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, e.g. by substituting the relevant quantities into the formula. In some cases the nature of the errors allowed for the award of an M mark may be specified.

A
Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated Method mark is earned (or implied). Therefore M0 A1 cannot ever be awarded.

B
Mark for a correct result or statement independent of Method marks.

E
Mark for explaining a result or establishing a given result. This usually requires more working or explanation than the establishment of an unknown result.

Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored. Sometimes this is reinforced in the mark scheme by the abbreviation isw. However, this would not apply to a case where a candidate passes through the correct answer as part of a wrong argument.

d When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. (The notation 'dep*' is used to indicate that a particular mark is dependent on an earlier, asterisked, mark in the scheme.) Of course, in practice it may happen that when a candidate has once gone wrong in a part of a question, the work from there on is worthless so that no more marks can sensibly be given. On the other hand, when two or more steps are successfully run together by the candidate, the earlier marks are implied and full credit must be given.

e The abbreviation FT implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect results. Otherwise, A and B marks are given for correct work only – differences in notation are of course permitted. A (accuracy) marks are not given for answers obtained from incorrect working. When A or B marks are awarded for work at an intermediate stage of a solution, there may be various alternatives that are equally acceptable. In such cases, what is acceptable will be detailed in the mark scheme. If this is not the case please, escalate the question to your Team Leader who will decide on a course of action with the Principal Examiner.
Sometimes the answer to one part of a question is used in a later part of the same question. In this case, A marks will often be 'follow through'. In such cases you must ensure that you refer back to the answer of the previous part question even if this is not shown within the image zone. You may find it easier to mark follow through questions candidate-by-candidate rather than question-by-question.

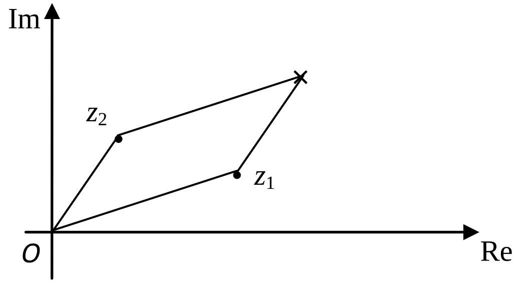
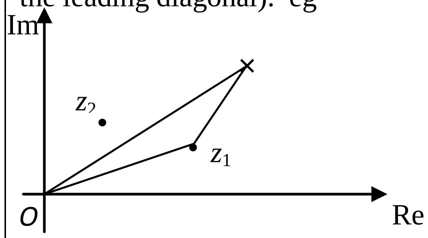
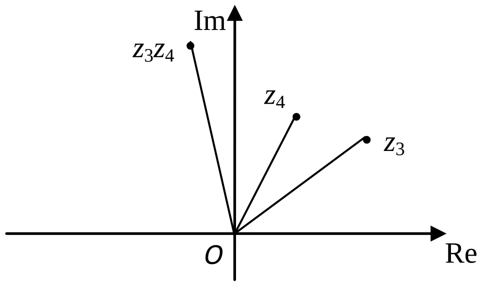
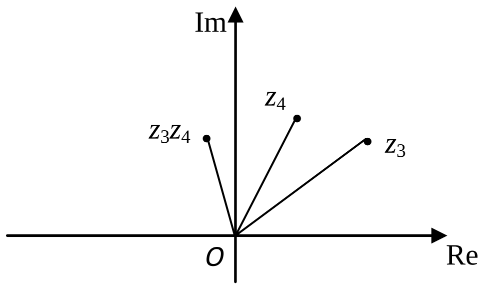
f Unless units are specifically requested, there is no penalty for wrong or missing units as long as the answer is numerically correct and expressed either in SI or in the units of the question. (e.g. lengths will be assumed to be in metres unless in a particular question all the lengths are in km, when this would be assumed to be the unspecified unit.) We are usually quite flexible about the accuracy to which the final answer is expressed; over-specification is usually only penalised where the scheme explicitly says so. When a value is given in the paper only accept an answer correct to at least as many significant figures as the given value. This rule should be applied to each case. When a value is not given in the paper accept any answer that agrees with the correct value to 2 s.f. Follow through should be used so that only one mark is lost for each distinct accuracy error, except for errors due to premature approximation which should be penalised only once in the examination. There is no penalty for using a wrong value for g. E marks will be lost except when results agree to the accuracy required in the question.

g Rules for replaced work: if a candidate attempts a question more than once, and indicates which attempt he/she wishes to be marked, then examiners should do as the candidate requests; if there are two or more attempts at a question which have not been crossed out, examiners should mark what appears to be the last (complete) attempt and ignore the others.NB Follow these maths-specific instructions rather than those in the assessor handbook.

h For a genuine misreading (of numbers or symbols) which is such that the object and the difficulty of the question remain unaltered, mark according to the scheme but following through from the candidate's data. A penalty is then applied; 1 mark is generally appropriate, though this may differ for some units. This is achieved by withholding one A mark in the question. Marks designated as cao may be awarded as long as there are no other errors. E marks are lost unless, by chance, the given results are established by equivalent working. 'Fresh starts' will not affect an earlier decision about a misread. Note that a miscopy of the candidate's own working is not a misread but an accuracy error.

i If a calculator is used, some answers may be obtained with little or no working visible. Allow full marks for correct answers (provided, of course, that there is nothing in the wording of the question specifying that analytical methods are required). Where an answer is wrong but there is some evidence of method, allow appropriate method marks. Wrong answers with no supporting method score zero. If in doubt, consult your Team Leader.

j If in any case the scheme operates with considerable unfairness consult your Team Leader.

Question			Answer	Marks	AO	Guidance	
1	**(a)**			**B1**	2.2a	2 lines drawn as shown to complete a parallelogram	Or 2 lines drawn to form a triangle which is either the upper or lower half of the parallelogram (split by the leading diagonal). eg 
				B1	2.2a	Cross (or $z_1 + z_2$ unambiguously indicated) in the correct place	
				[2]			
	(b)	**(i)**		**B1**	1.1	z_3 and z_4 approximately correctly positioned and labelled.	If no labels shown then **B1B1** can only follow if there is no ambiguity between points (eg magnitudes shown).
				B1	2.2a	Approximate correct length (eg z_4 length increased by 50%) and angle (about a quarter of the way round the 2nd quadrant).	$r = 1.8, \theta = \frac{5}{8}\pi$
				[2]			
	(b)	**(ii)**		**B1**	1.1	z_3 and z_4 approximately correctly positioned and labelled.	If no labels shown then **B1B1** can only follow if there is no ambiguity between points (eg magnitudes shown).
				B1	2.2a	Approximate correct length (eg z_3 length halved) and either the same angle as part **(b)(i)** or about a quarter of the way round the 2nd quadrant.	$r = 0.35, \theta = \frac{5}{8}\pi$
				[2]			

Question			Answer	Marks	AO	Guidance	
2	(a)		$\mathbf{A}=\begin{pmatrix}3&0\\0&1\end{pmatrix}$	B1 [1]	1.1		
	(b)		Stretch scale factor 1/3 parallel to *x*-axis	M1	1.1	Must be complete description (except no need to specify 2-D)	
			$\mathbf{A}^{-1}=\begin{pmatrix}\frac{1}{3}&0\\0&1\end{pmatrix}$	A1 [2]	2.2a		
	(c)		Reflection in the line $y=-x$	B1 [1]	1.2		
	(d)		$\mathbf{BA}=\begin{pmatrix}0&-1\\-1&0\end{pmatrix}\begin{pmatrix}3&0\\0&1\end{pmatrix}=\dots$	M1	1.1a	For understanding that the matrix representing successive transformations is the product in the correct order. ie **BA**, not **AB**	
			$\dots=\begin{pmatrix}0&-1\\-3&0\end{pmatrix}$	A1 [2]	1.1		
	(e)		$(\mathbf{BA})^{-1}=-\frac{1}{3}\begin{pmatrix}0&1\\3&0\end{pmatrix}$	M1	1.1a	For carrying out the procedure for inverting the matrix found in **(d)** (or **BA** worked out from scratch)	OR **M1** find $\mathbf{A}^{-1}\mathbf{B}^{-1}$ from scratch **A1** demonstrate that $(\mathbf{BA})(\mathbf{A}^{-1}\mathbf{B}^{-1})$ is equal to **I**
			$\mathbf{A}^{-1}\mathbf{B}^{-1}=\begin{pmatrix}\frac{1}{3}&0\\0&1\end{pmatrix}\begin{pmatrix}0&-1\\-1&0\end{pmatrix}=\begin{pmatrix}0&-\frac{1}{3}\\-1&0\end{pmatrix}$ $=-\frac{1}{3}\begin{pmatrix}0&1\\3&0\end{pmatrix}=(\mathbf{BA})^{-1}$ **AG**	A1 [2]	1.1	Calculation and statement of equality. Needs to be in the same form, not just an assertion	

Question			Answer	Marks	AO	Guidance	
3			$\cosh^2 x - \sinh^2 x = 1$	M1	1.1a	Use of identity to leave an equation in either just cosh$x$ or just sinh$x$	
			$2\sinh^2 x + 5\sinh x - 3 = 0$	M1	1.1	Reduction to 3 term quadratic in sinh$x$ or $\cosh^2 x$	$4\cosh^4 x - 45\cosh^2 x + 50 = 0$
			sinh$x$ = ½ or –3	A1	1.1		$\cosh^2 x$ = 5/4 or 10
			$x = \ln\left(\frac{1}{2} + \sqrt{\frac{5}{4}}\right)$	M1	1.1	Use of ln formula for $\sinh^{-1}$ or $\cosh^{-1}$	Do not allow eg $\cosh^{-1}(-\sqrt{10})$ unless this is rejected (NB eg $\ln(3-\sqrt{10})$ is not real).
			$x = \ln\left(\frac{1}{2} + \frac{1}{2}\sqrt{5}\right)$	A1	1.1	Must be in the correct form but allow $\ln\left(\frac{1+\sqrt{5}}{2}\right)$. p = ½, q = ½, r = 5	If using $\cosh^{-1}$ "rogue" solutions must be convincingly rejected. Most likely to see $\ln(3+\sqrt{10})$
			$x = \ln\left(-3 + \sqrt{10}\right)$	A1	1.1	p = –3, q = 1, r = 10	
				[6]			

Question			Answer	Marks	AO	Guidance	
4	(a)		The x-z plane	B1 [1]	2.2a	or $y = 0$	
	(b)		$\frac{2a - a^2}{3} = -1$	B1	1.1		
			$a^2 - 2a - 3 = 0 \Rightarrow a = -1,\ 3$	M1	3.1a	BC. Rearranging the quadratic equation and solving.	
			$a > 0 \Rightarrow a = 3$	A1 [3]	2.3	discarding a = -1	
	(c)		Any reflection is self-inverse... oe	B1	2.4	eg "If you do a reflection twice it gets back to where it started"	
			...so $\mathbf{A}^2 = \mathbf{A}\mathbf{A}^{-1} = \mathbf{I}$	B1 [2]	2.4		

Question			Answer	Marks	AO	Guidance	
5	(a)		$3x + 4y = 28$ so $a = 3$, $b = 4$, $c = 28$ (or any non-zero multiples) so $D = \frac{\lvert 3\times -6 + 4\times 4 - 28\rvert}{\sqrt{3^2+4^2}}$	M1	1.1	Identifying a, b and c and substituting a, b, c and (x_1, y_1) correctly into distance formula	
			$D = 6$	A1	1.1		
			Alternative solution $y - 4 = \frac{4}{3}(x+6)$ oe so $-0.75x + 7 - 4 = \frac{4}{3}(x+6) \Rightarrow x = -2.4,\ y = 8.8$	M1		Finding equation of perpendicular line through (–6, 4) and solving simultaneously to find foot of perpendicular	
			$D = \sqrt{(-2.4 - -6)^2 + (8.8-4)^2} = 6$	A1			
				[2]			
	(b)		$\begin{pmatrix}2\\1\\-4\end{pmatrix} \times \begin{pmatrix}3\\-1\\1\end{pmatrix} = \begin{pmatrix}-3\\-14\\-5\end{pmatrix}$	B1	1.1a	Correctly finding a mutual perpendicular **BC**	
			$D = \frac{\left\lvert \left(\begin{pmatrix}11\\-1\\5\end{pmatrix} - \begin{pmatrix}4\\3\\-2\end{pmatrix}\right) . \begin{pmatrix}-3\\-14\\-5\end{pmatrix} \right\rvert}{\left\lvert \begin{pmatrix}-3\\-14\\-5\end{pmatrix} \right\rvert}$ or $\frac{\left\lvert \begin{pmatrix}7\\-4\\7\end{pmatrix} . \begin{pmatrix}-3\\-14\\-5\end{pmatrix} \right\rvert}{\left\lvert \begin{pmatrix}-3\\-14\\-5\end{pmatrix} \right\rvert}$	M1	1.1	Correct substitution into distance formula	
			$D = 0$	A1	1.1		
			Alternative solution $4 + 2\lambda = 11 + 3\mu$, $3 + \lambda = -1 - \mu$ and $-2 - 4\lambda = 5 + \mu$	M1		Looking for a PoI so all 3 (3rd might be seen later)	
			$\lambda = -1,\ \mu = -3$	A1		Correctly solving any 2 equations	
			eg $-2 - 4(-1) = 2 = 5 + -3$ so lines intersect so $D = 0$	A1		Must be checked in the unsolved equation.	Value of each side must be found, not just equality asserted.
				[3]			

	(c)		There are two points, one on each line, such that the distance between the points is 0... ...and so the lines must intersect.	**E1ft** **E1ft** **[2]**	3.1a 2.4		If *D* found to be non-zero in **(b)** then allow “Because there are not two points...” A convincing demonstration that the two direction vectors are not parallel **and** “...and so the lines must be skew”

Question			Answer	Marks	AO	Guidance	
6	(a)		$\mathbf{AB}=\begin{pmatrix}1 & 2\\ a & -1\end{pmatrix}\begin{pmatrix}2 & -1\\ 4 & 1\end{pmatrix}=\begin{pmatrix}10 & 1\\ 2a-4 & -a-1\end{pmatrix}$	M1	3.1a	Finding **AB** (or **BC**)	
			$(\mathbf{AB})\mathbf{C}=\begin{pmatrix}10 & 1\\ 2a-4 & -a-1\end{pmatrix}\begin{pmatrix}5 & 0\\ -2 & 2\end{pmatrix}$ $=\begin{pmatrix}48 & 2\\ 12a-18 & -2a-2\end{pmatrix}$	A1	2.1	Finding (**AB**)**C** (or **A**(**BC**))	
			$\mathbf{BC}=\begin{pmatrix}2 & -1\\ 4 & 1\end{pmatrix}\begin{pmatrix}5 & 0\\ -2 & 2\end{pmatrix}=\begin{pmatrix}12 & -2\\ 18 & 2\end{pmatrix}$	M1	1.1	Finding **BC** (or **AB**)	
			$\mathbf{A}(\mathbf{BC})=\begin{pmatrix}1 & 2\\ a & -1\end{pmatrix}\begin{pmatrix}12 & -2\\ 18 & 2\end{pmatrix}$ $=\begin{pmatrix}48 & 2\\ 12a-18 & -2a-2\end{pmatrix}=(\mathbf{AB})\mathbf{C}$ (which demonstrates associativity of matrix multiplication)	A1 [4]	2.1	Correct final matrix and statement of equality	
	(b)		$\mathbf{AC}=\begin{pmatrix}1 & 2\\ a & -1\end{pmatrix}\begin{pmatrix}5 & 0\\ -2 & 2\end{pmatrix}=\begin{pmatrix}1 & 4\\ 5a+2 & -2\end{pmatrix}$	M1	1.1	Finding **AC** (or **CA**)	
			$\mathbf{CA}=\begin{pmatrix}5 & 0\\ -2 & 2\end{pmatrix}\begin{pmatrix}1 & 2\\ a & -1\end{pmatrix}=\begin{pmatrix}5 & 10\\ 2a-2 & -6\end{pmatrix}\neq\mathbf{AC}$ (so matrix multiplication is not commutative)	A1 [2]	2.1	Finding the other and statement of non-equality	
	(c)		$\begin{pmatrix}1 & 2\\ a & -1\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}x+2y\\ ax-y\end{pmatrix}$	M1	3.1a	Multiplying the vector into the matrix using the correct procedure	
			$x + 2y = 3x \Rightarrow y = x$	A1	2.2a		
			$ax - y = 3y$ and $y = x \Rightarrow a = 4$	A1 [3]	2.2a		

Question			Answer	Marks	AO	Guidance	
7			$\frac{z+7\mathrm{i}}{z-24}=\frac{x+\mathrm{i}y+7\mathrm{i}}{x-24+\mathrm{i}y}\times\frac{x-24-\mathrm{i}y}{x-24-\mathrm{i}y}$	M1	3.1a	Substituting $z = x + \mathrm{i}y$ into $\frac{z+7\mathrm{i}}{z-24}$ and multiplying top and bottom by conjugate of bottom	
			$\mathrm{Im}\frac{z+7\mathrm{i}}{z-24}=\frac{-xy+(y+7)(x-24)}{(x-24)^2+y^2}=\frac{1}{4}$	M1	2.1	Multiplying out (ignore errors in real part) and equating imaginary part to ¼ (without i unless later cancelled or recovered)	
			$28x-96y-672=x^2-48x+576+y^2$	M1	1.1	Multiplying out to get horizontal equation with no *xy* term and no double brackets	
			$0=(x-38)^2-1444+(y+48)^2-2304+1248$	M1	1.1	Completing both squares with half signed coefficients of *x* and *y*	
			$(x-38)^2+(y+48)^2=2500$	A1	2.2a		
			So the shape of *C* is a circle...	E1	3.2a		
			...centre 38 – 48i, radius 50	E1 [7]	3.2a	Or (38, –48)	

Question			Answer	Marks	AO	Guidance	
8			Limits 1 & 3 seen	B1	3.1a		
			$V=\pi\int_1^3\left((x-3)\sqrt{\ln x}\right)^2 dx=\pi\int_1^3 (x-3)^2\ln x\,dx$	M1	3.1a	Correct substitution into formula (ignore limits) and simplification to integrable (by parts) form	
			$V=\pi\left(\left[\frac{1}{3}(x-3)^3\ln x\right]_1^3-\int_1^3\frac{1}{3}(x-3)^3\frac{1}{x}dx\right)$	*M1	1.1a	Integration by parts with $(x-3)^2$ (may be expanded) being integrated.	
			$\frac{1}{x}(x-3)^3=x^2-9x+27-\frac{27}{x}$ soi	A1	1.1	May come implicitly from previously expanded form	ie from $\int_1^3 x^2\ln x-6x\ln x+9\ln x\,dx$ integrated by parts term by term
			$V=\frac{\pi}{3}\left(\left[(x-3)^3\ln x-\frac{x^3}{3}+\frac{9x^2}{2}+27x-27\ln x\right]_1^3\right)$	A1	1.1	Completing the integral. NB $\left[(x-3)^3\ln x\right]_1^3=0$ so may be omitted provided it is seen earlier	
			$\frac{\pi}{3}((3-3)^3\ln 3-\frac{3^3}{3}+\frac{9\times 3^2}{2}-27\times 3+27\ln 3$ $-(1-3)^3\ln 1+\frac{1^3}{3}-\frac{9\times 1^2}{2}+27\times 1-27\ln 1)$	dep *M1	1.1	Correctly dealing with limits	
			So volume of S is $\frac{\pi}{9}\left(81\ln 3-80\right)$ oe	A1	3.2a		
				[7]			

Question			Answer	Marks	AO	Guidance	
9	(a)		$\cosh(\text{i}z) = \dfrac{\text{e}^{\text{i}z} + \text{e}^{-\text{i}z}}{2}$	**M1**	2.1	Use of correct exponential form for cosh	
			$= \dfrac{\cos z + \text{i}\sin z + \cos z - \text{i}\sin z}{2}$	**M1**	1.1	Correct use of Euler's formula at least once	
			$= \dfrac{2\cos z}{2} = \cos z$ **AG**	**A1** **[3]**	2.1	Both **M** marks must be awarded. Must have cosh(iz) = or LHS =	Proof must be complete for **A1**
	(b)		cosz = 2 => cosh(iz) = 2 => z = (cosh^{-1}2)/i	**M1**	3.1a		
			$= -\text{i}\ln(2+\sqrt{3})$	**A1** **[2]**	1.1	± inside or outside the ln (ie allow eg iln(2 + √3) or iln(2 – √3) and condone eg ±iln(2 + √3) www)	or $2\pi n$ ± iln(2 + √3) for any integer n

Question			Answer	Marks	AO	Guidance	
10	(a)	(i)	$\dfrac{\text{d}^2\theta}{\text{d}t^2} = -\left(\dfrac{5}{2}\right)^2\theta$				
			$\theta = A\cos\omega t + B\sin\omega t$ or $R\cos(\omega t + \phi)$ with any positive value for ω	**M1**	1.1		
			$\theta = A\cos\dfrac{5}{2}t + B\sin\dfrac{5}{2}t$ or $R\cos\left(\dfrac{5}{2}t + \phi\right)$	**A1** **[2]**	1.1		If **M0** then **SC1** for $\theta = A\cos\dfrac{5}{2}t$ or $\theta = A\sin\dfrac{5}{2}t$
	(a)	(ii)	The model predicts infinite oscillations of the same amplitude; in practice the amplitude must decrease over time.	**E1** **[1]**	3.5b		

	(b)	**(i)**	AE: $4m^2 + 16m + 25 = 0$ $-2 \pm \frac{3}{2}\mathrm{i}$ $\theta = \mathrm{e}^{-2t}\left(A\cos\frac{3}{2}t + B\sin\frac{3}{2}t\right)$	**M1** **A1** **A1ft** **[3]**	1.1a 1.1 1.1	Writing down the AE correctly or using $\theta = A\mathrm{e}^{mt}$ and substituting into (*) to derive a three term quadratic AE. Their $\mathrm{e}^{pt}\left(A\cos qt + B\sin qt\right)$ for solution of AE = $p \pm q\mathrm{i}$	
	(b)	**(ii)**	$t = 0$, $\theta = 0.9 \Rightarrow A = 0.9$ $\frac{\mathrm{d}\theta}{\mathrm{d}t} = -2\mathrm{e}^{-2t}\left(A\cos\frac{3}{2}t + B\sin\frac{3}{2}t\right)$ $+\mathrm{e}^{-2t}\left(-\frac{3}{2}A\sin\frac{3}{2}t + \frac{3}{2}B\cos\frac{3}{2}t\right)$ $t = 0$, $\frac{\mathrm{d}\theta}{\mathrm{d}t} = 0 \Rightarrow -2A + \frac{3}{2}B = 0$ $B = 1.2$ $\theta = \mathrm{e}^{-2t}\left(0.9\cos\frac{3}{2}t + 1.2\sin\frac{3}{2}t\right)$	**B1** **M1** **M1** **A1** **[4]**	3.4 1.1a 3.4 1.1	 Attempt to differentiate using the product and chain rules (A may be replaced by a number). Substituting $t = 0$ into $\frac{\mathrm{d}\theta}{\mathrm{d}t}$ to derive an equation in (A and) B	
	(b)	**(iii)**	In the modified model $\theta \to 0$ as $t \to \infty$ oe This is the behaviour we would expect to observe with a real swing door and so the model is an improvement.	**B1** **B1** **[2]**	3.5a 3.5c	ie the amplitude decays etc	
	(c)		Need $4m^2 + \lambda m + 25 = 0$ to have repeated solutions so $\lambda^2 - 4\times4\times25 = 0$ $\lambda > 0 \Rightarrow \lambda = 20$	**M1** **A1** **[2]**	3.5c 3.3	Using "$b^2 - 4ac$" = 0 directly Not –20 or ±20	or $\left(2m + \frac{\lambda}{4}\right)^2 + 25 - \frac{\lambda^2}{16} = 0$ and equating part outside brackets to 0

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