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Mark Scheme (Results)

Summer 2013

GCE Further Pure Mathematics 1 (6667/01)

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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.
- 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
- $\ast$ The answer is printed on the paper
- $\sqsubset$ The second mark is dependent on gaining the first mark

4. 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.

5. 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.

6. 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.

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

8. In some instances, the mark distributions (e.g. M1, B1 and A1) printed on the candidate's response may differ from the final mark scheme

General Principles for Pure Mathematics Marking

(But note that specific mark schemes may sometimes override these general principles).

Method mark for solving 3 term quadratic:

1. Factorisation

$(x^2+bx+c)=(x+p)(x+q)$, where $|pq|=|c|$, leading to x =

$(ax^2+bx+c)=(mx+p)(nx+q)$, where $|pq|=|c|$ and $|mn|=|a|$, leading to x =

2. Formula

Attempt to use correct formula (with values for *a*, *b* and *c*).

3. Completing the square

Solving $x^2+bx+c=0$: $\left(x\pm\frac{b}{2}\right)^2 \pm q \pm c,\quad q\neq 0,$ leading to x =...

Method marks for differentiation and integration:

1. Differentiation

Power of at least one term decreased by 1. ($x^n \to x^{n-1}$)

2. Integration

Power of at least one term increased by 1. ($x^n \to x^{n+1}$)

Use of a formula

Where a method involves using a formula that has been learnt, the advice given in recent examiners' reports is that the formula should be quoted first.
Normal marking procedure is as follows:
Method mark for quoting a correct formula and attempting to use it, even if there are mistakes in the substitution of values.
Where the formula is not quoted, the method mark can be gained by implication from correct working with values, but may be lost if there is any mistake in the working.

Exact answers

Examiners' reports have emphasised that where, for example, an exact answer is asked for, or working with surds is clearly required, marks will normally be lost if the candidate resorts to using rounded decimals.

Answers without working

The rubric says that these may not gain full credit. Individual mark schemes will give details of what happens in particular cases. General policy is that if it could be done "in your head", detailed working would not be required.

Question Number	Scheme	Notes	Marks
1.	$\mathbf{M}=\begin{pmatrix} x & x-2 \\ 3x-6 & 4x-11 \end{pmatrix}$		
	det**M** = $x(4x-11)-(3x-6)(x-2)$	Correct attempt at determinant	M1
	x^2+x-12 (=0)	Correct 3 term quadratic	A1
	$(x+4)(x-3)$ (= 0) → x = ...	Their 3TQ = 0 and attempts to solve relevant quadratic using factorisation or completing the square or correct quadratic formula leading to x =	M1
	$x=-4,\ x=3$	Both values correct	A1
			(4)
			Total 4
Notes			
	$x(4x-11)=(3x-6)(x-2)$ award first M1		
	$\pm(x^2+x-12)$ seen award first M1A1		
	Method mark for solving 3 term quadratic: 1. <u>Factorisation</u> $(x^2+bx+c)=(x+p)(x+q)$, where $\lvert pq\rvert=\lvert c\rvert$, leading to x = $(ax^2+bx+c)=(mx+p)(nx+q)$, where $\lvert pq\rvert=\lvert c\rvert$ and $\lvert mn\rvert=\lvert a\rvert$, leading to x = 2. <u>Formula</u> Attempt to use <u>correct</u> formula (with values for a, b and c). 3. <u>Completing the square</u> Solving $x^2+bx+c=0$: $\left(x\pm\frac{b}{2}\right)^2\pm q\pm c$, $q\neq 0$, leading to x =...		
	Both correct with no working 4/4, only one correct 0/4		

Question Number	Scheme	Notes	Marks
2	$\mathrm{f}(x) = \cos\left(x^2\right) - x + 3$		
(a)	f(2.5) = 1.499..... f(3) = -0.9111.....	Either any one of f(2.5) = awrt 1.5 or f(3) = awrt -0.91	M1
	Sign change (positive, negative) (and $\mathrm{f}(x)$ is continuous) therefore root or equivalent.	Both f(2.5) = awrt 1.5 and f(3) = awrt -0.91, sign change and conclusion.	A1
	Use of degrees gives f(2.5) = 1.494 and f(3) = 0.988 which is awarded M1A0		**(2)**
(b)	$\dfrac{3-\alpha}{\text{"0.91113026188"}} = \dfrac{\alpha - 2.5}{\text{"1.4994494182"}}$	Correct linear interpolation method – accept equivalent equation - ensure signs are correct.	M1 A1ft
	$\alpha = \dfrac{3 \times 1.499... + 2.5 \times 0.9111....}{1.499... + 0.9111....}$		
	$\alpha = 2.81\,(2\text{d.p.})$	cao	A1
			(3)
			Total 5
Notes	Alternative (b)		
	Gradient of line is $-\dfrac{\text{'1.499...'} + \text{'0.9111...'}}{0.5} (= -4.82)\ (3\text{sf})$. Attempt to find equation of straight line and equate y to 0 award M1 and A1ft for their gradient awrt 3sf.		

Question Number	Scheme	Notes	Marks
3(a)	**Ignore part labels and mark part (a) and part (b) together.**		
	$\mathrm{f}\left(\frac{1}{2}\right)=2\left(\frac{1}{2}\right)^3-9\left(\frac{1}{2}\right)^2+k\left(\frac{1}{2}\right)-13$	Attempts f(0.5)	M1
	$\left(\frac{1}{4}\right)-\left(\frac{9}{4}\right)+\left(\frac{k}{2}\right)-13=0\Rightarrow k=......$	Sets f(0.5) = 0 **and** leading to k=	dM1
	k = 30	cao	A1
	Alternative using long division:		
	$2x^3-9x^2+kx-13\div(2x-1)$ $=x^2-4x+\frac{1}{2}k-2\,(\text{Quotient})$ $\text{Remainder}\,\frac{1}{2}k-15$	Full method to obtain a remainder as a function of k	M1
	$\frac{1}{2}k-15=0$	Their remainder = 0	dM1
	$k=30$		A1
	Alternative by inspection:		
	$(2x-1)(x^2-4x+13)=2x^3-9x^2+30x-13$	First M for $(2x-1)(x^2+bx+c)$ or $(x-\frac{1}{2})(2x^2+bx+c)$ Second M1 for ax^2+bx+c where ($b=-4$ or $c=13$) or ($b=-8$ or $c=26$)	M1dM1
	k = 30		A1
			(3)
(b)	$\mathrm{f}(x)=(2x-1)(x^2-4x+13)$ *or* $\left(x-\frac{1}{2}\right)(2x^2-8x+26)$	M1: $(x^2+bx\pm13)$ or $(2x^2+bx\pm26)$ Uses inspection or long division or compares coefficients **and** $(2x-1)$ or $\left(x-\frac{1}{2}\right)$ to obtain a quadratic factor of this form.	M1
	$x^2-4x+13$ or $2x^2-8x+26$	A1 $(x^2-4x+13)$ or $(2x^2-8x+26)$ seen	A1
	$x=\frac{4\pm\sqrt{4^2-4\times13}}{2}$ or equivalent	Use of correct quadratic formula for their 3TQ or completes the square.	M1
	$x=\frac{4\pm6i}{2}=2\pm3i$	oe	A1
			(4)
			Total 7

Question Number	Scheme	Notes	Marks
4(a)	$y = \frac{4}{x} = 4x^{-1} \Rightarrow \frac{dy}{dx} = -4x^{-2} = -\frac{4}{x^2}$	$\frac{dy}{dx} = k\,x^{-2}$	M1
	$xy = 4 \Rightarrow x\frac{dy}{dx} + y = 0$	Use of the product rule. The sum of two terms including dy/dx, one of which is correct.	
	$\frac{dy}{dx} = \frac{dy}{dt}.\frac{dt}{dx} = -\frac{2}{t^2}.\frac{1}{2}$	their $\frac{dy}{dt} \times \left(\frac{1}{\text{their } \frac{dx}{dt}} \right)$	
	$\frac{dy}{dx} = -4x^{-2}$ *or* $x\frac{dy}{dx} + y = 0$ or $\frac{dy}{dx} = -\frac{2}{t^2}.\frac{1}{2}$ or equivalent expressions	Correct derivative $-4x^{-2}$, $-\frac{y}{x}$ or $\frac{-1}{t^2}$	A1
	So, $m_N = t^2$	Perpendicular gradient rule $m_N m_T = -1$	M1
	$y - \frac{2}{t} = t^2(x - 2t)$	$y - \frac{2}{t} =$ their $m_N(x - 2t)$ or $y = mx + c$ with their m_N and $(2t, \frac{2}{t})$ in an attempt to find 'c'. **Their gradient of the normal must be different from their gradient of the tangent and have come from calculus and should be a function of *t*.**	M1
	$ty - t^3x = 2 - 2t^4$ *		A1* cso
			(5)
(b)	$t = -\frac{1}{2} \Rightarrow -\frac{1}{2}y - \left(-\frac{1}{2}\right)^3 x = 2 - 2\left(-\frac{1}{2}\right)^4$	Substitutes the given value of t into the normal	M1
	$4y - x + 15 = 0$		
	$y = \frac{4}{x} \Rightarrow x^2 - 15x - 16 = 0$ or $\left(2t, \frac{2}{t}\right) \to \frac{8}{t} - 2t + 15 = 0 \Rightarrow 2t^2 - 15t - 8 = 0$ or $x = \frac{4}{y} \Rightarrow 4y^2 + 15y - 4 = 0$.	Substitutes to give a quadratic	M1
	$(x+1)(x-16) = 0 \Rightarrow x =$ or $(2t+1)(t-8) = 0 \Rightarrow t =$ or $(4y-1)(y+4) = 0 \Rightarrow y =$	Solves their 3TQ	M1
	$(P: x = -1, y = -4)(Q:) x = 16, y = \frac{1}{4}$	Correct values for x and y	A1
			(4)
			Total 9

Question Number	Scheme	Notes	Marks
5(a)	$(r+2)(r+3)=r^2+5r+6$		B1
	$\sum(r^2+5r+6)=\frac{1}{6}n(n+1)(2n+1)+5\times\frac{1}{2}n(n+1),+6n$	M1: Use of correct expressions for $\sum r^2$ **and** $\sum r$ B1ft: $\sum k = nk$	M1,B1ft
	$=\frac{1}{3}n\left[\frac{1}{2}(n+1)(2n+1)+\frac{15}{2}(n+1)+18\right]$	M1:Factors out n ignoring treatment of constant. A1: Correct expression with $\frac{1}{3}n$ or $\frac{1}{6}n$ factored out, allow recovery.	M1 A1
	$\left(=\frac{1}{3}n\left[n^2+\frac{3}{2}n+\frac{1}{2}+\frac{15}{2}n+\frac{15}{2}+18\right]\right)$ $=\frac{1}{3}n\left[n^2+9n+26\right]$ *	Correct completion to printed answer	A1*cso
			(6)
5(b)	$\sum_{r=n+1}^{3n}=\frac{1}{3}3n\left((3n)^2+9(3n)+26\right)-\frac{1}{3}n\left(n^2+9n+26\right)$	M1: f(**3*n***) – f(*n* or *n*+1) and attempt to use part (a). A1: Equivalent correct expression	M1A1
	3f(***n***) – f(*n* or *n*+1) is M0		
	$(=n\left(9n^2+27n+26\right)-\frac{1}{3}n\left(n^2+9n+26\right))$		
	$=\frac{2}{3}n\left(\frac{27}{2}n^2+\frac{81}{2}n+39-\frac{1}{2}n^2-\frac{9}{2}n-13\right)$	Factors out $=\frac{2}{3}n$ dependent on previous M1	dM1
	$=\frac{2}{3}n\left(13n^2+36n+26\right)$	Accept correct expression.	A1
	$(a=13, b=36, c=26)$		
			(4)
			Total 10

Question Number	Scheme	Notes	Marks
6(a)	$y=2a^{\frac{1}{2}}x^{\frac{1}{2}} \Rightarrow \frac{dy}{dx}=a^{\frac{1}{2}}x^{-\frac{1}{2}}$	$x^{\frac{1}{2}} \to x^{-\frac{1}{2}}$	
	$y^2=4ax \Rightarrow 2y\frac{dy}{dx}=4a$	$ky\frac{dy}{dx}=c$	M1
	or $\frac{dy}{dx}=\frac{dy}{dt}.\frac{dt}{dx}=2a.\frac{1}{2ap}$	$\frac{dy}{dt}\times\frac{1}{\frac{dx}{dt}}$. Can be a function of *p or t*.	
	$\frac{dy}{dx}=a^{\frac{1}{2}}x^{-\frac{1}{2}}$ or $2y\frac{dy}{dx}=4a$ or $\frac{dy}{dx}=2a.\frac{1}{2ap}$	Differentiation is accurate.	A1
	$y-2ap=\frac{1}{p}(x-ap^2)$	Applies $y-2ap=$ their $m\left(x-ap^2\right)$ or $y=$ (their m)$x+c$ using $x=ap^2$ *and* $y=2ap$ in an attempt to find c. **Their *m* must be a function of *p* from calculus.**	M1
	$py-x=ap^2$ *	Correct completion to printed answer*	A1 cso
			(4)
(b)	$qy-x=aq^2$		B1
			(1)
(c)	$qy-aq^2=py-ap^2$	Attempt to obtain an **equation** in one variable *x* or *y*	M1
	$y(q-p)=aq^2-ap^2$ $y=\frac{aq^2-ap^2}{q-p}$	Attempt to isolate *x* or *y*	M1
	$y=a(p+q)$ *or* $ap+aq$ $x=apq$	A1: Either one correct simplified coordinate A1: Both correct simplified coordinates	A1,A1
	$(R(apq,ap+aq))$		
			(4)
(d)	$'apq'=-a$	Their *x* coordinate of $R=-a$	M1
	$pq=-1$	**Answer only**: Scores 2/2 if *x* coordinate of *R* is *apq* otherwise 0/2.	A1
			(2)
			Total 11

Question Number	Scheme	Notes	Marks
7	$z_1 = 2+3\text{i}, \quad z_2 = 3+2\text{i}$		
(a)	$z_1 + z_2 = 5+5\text{i} \Rightarrow \lvert z_1 + z_2 \rvert = \sqrt{5^2+5^2}$	Adds z_1 and z_2 and correct use of Pythagoras. i under square root award M0.	M1
	$\sqrt{50}\ (=5\sqrt{2})$		A1 cao
			(2)
(b)	$\frac{z_1 z_3}{z_2} = \frac{(2+3\text{i})(a+b\text{i})}{3+2\text{i}}$ $= \frac{(2+3\text{i})(a+b\text{i})(3-2i)}{(3+2\text{i})(3-2\text{i})}$	Substitutes for z_1, z_2 and z_3 and multiplies by $\frac{3-2\text{i}}{3-2\text{i}}$	M1
	$(3+2\text{i})(3-2\text{i}) = 13$	13 seen.	B1
	$\frac{z_1 z_3}{z_2} = \frac{(12a-5b)+(5a+12b)\text{i}}{13}$	M1: Obtains a numerator with 2 real and 2 imaginary parts. A1: As stated or $\frac{(12a-5b)}{13} + \frac{(5a+12b)}{13}\text{i}$ ONLY.	dM1A1
			(4)
(c)	$12a-5b=17$ $5a+12b=-7$	Compares real and imaginary parts to obtain 2 equations which both involve *a* and *b*. Condone sign errors only.	M1
	$60a-25b=85$ $60a+144b=-84$ $\Rightarrow b=-1$	Solves as far as $a =$ or $b =$	dM1
	$a = 1, b = -1$	Both correct	A1
		Correct answers with no working award 3/3.	
			(3)
(d)	$\arg(w) = -\tan^{-1}\left(\frac{7}{17}\right)$	Accept use of $\pm\tan^{-1}$ or $\pm\tan$. awrt ± 0.391 or ± 5.89 implies M1.	M1
	=awrt -0.391 or awrt 5.89		A1
			(2)
			Total 11

Question Number	Scheme	Notes	Marks
8(a)	$\mathbf{A}^2 = \begin{pmatrix} 6 & -2 \\ -4 & 1 \end{pmatrix}\begin{pmatrix} 6 & -2 \\ -4 & 1 \end{pmatrix} = \begin{pmatrix} 44 & -14 \\ -28 & 9 \end{pmatrix}$	M1:Attempt both $\mathbf{A}^2$ and $7\mathbf{A} + 2\mathbf{I}$	M1A1
	$7\mathbf{A} + 2\mathbf{I} = \begin{pmatrix} 42 & -14 \\ -28 & 7 \end{pmatrix} + \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 44 & -14 \\ -28 & 9 \end{pmatrix}$	A1: Both matrices correct	
	OR $\mathbf{A}^2 - 7\mathbf{A} = \mathbf{A}(\mathbf{A} - 7\mathbf{I})$	M1 for expression and attempt to substitute and multiply (2x2)(2x2)=2x2	
	$\mathbf{A}(\mathbf{A} - 7\mathbf{I}) = \begin{pmatrix} 6 & -2 \\ -4 & 1 \end{pmatrix}\begin{pmatrix} -1 & -2 \\ -4 & -6 \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} = 2\mathbf{I}$	A1 cso	
			(2)
(b)	$\mathbf{A}^2 = 7\mathbf{A} + 2\mathbf{I} \Rightarrow \mathbf{A} = 7\mathbf{I} + 2\mathbf{A}^{-1}$	Require one correct line using accurate expressions involving $\mathbf{A}^{-1}$ and identity matrix to be clearly stated as $\mathbf{I}$.	M1
	$\mathbf{A}^{-1} = \frac{1}{2}(\mathbf{A} - 7\mathbf{I})$*		A1* cso
	Numerical approach award 0/2.		
			(2)
(c)	$\mathbf{A}^{-1} = \frac{1}{2}\begin{pmatrix} -1 & -2 \\ -4 & -6 \end{pmatrix}$	Correct inverse matrix or equivalent	B1
	$\frac{1}{2}\begin{pmatrix} -1 & -2 \\ -4 & -6 \end{pmatrix}\begin{pmatrix} 2k+8 \\ -2k-5 \end{pmatrix} = \frac{1}{2}\begin{pmatrix} -2k-8+4k+10 \\ -8k-32+12k+30 \end{pmatrix}$	Matrix multiplication involving their inverse and k: (2x2)(2x1)=2x1. N.B. $\begin{pmatrix} 6 & -2 \\ -4 & 1 \end{pmatrix}\begin{pmatrix} 2k+8 \\ -2k-5 \end{pmatrix}$ is M0	M1
	$\begin{pmatrix} k+1 \\ 2k-1 \end{pmatrix}$ or $(k+1,\ 2k-1)$	$(k+1)$ first A1, $(2k-1)$ second A1	A1,A1
	Or:		
	$\begin{pmatrix} 6 & -2 \\ -4 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2k+8 \\ -2k-5 \end{pmatrix}$	Correct matrix equation.	B1
	$6x - 2y = 2k + 8$ $-4x + y = -2k - 5 \Rightarrow x = ... or\ y = ...$	Multiply out and attempt to solve simultaneous equations for x or y in terms of k.	M1
	$\begin{pmatrix} k+1 \\ 2k-1 \end{pmatrix}$ or $(k+1,\ 2k-1)$	$(k+1)$ first A1, $(2k-1)$ second A1	A1,A1
			(4)
			Total 8

Question Number	Scheme	Notes	Marks
9(a)	$u_1 = 8$ given $n=1 \Rightarrow u_1 = 4^1 + 3(1) + 1 = 8 \quad (\therefore \text{ true for } n = 1)$	$4^1 + 3(1) + 1 = 8$ seen	B1
	Assume true for $n = k$ so that $u_k = 4^k + 3k + 1$		
	$u_{k+1} = 4\left(4^k + 3k + 1\right) - 9k$	Substitute u_k into u_{k+1} as $u_{k+1} = 4u_k - 9k$	M1
	$= 4^{k+1} + 12k + 4 - 9k = 4^{k+1} + 3k + 4$	Expression of the form $4^{k+1} + ak + b$	A1
	$= 4^{k+1} + 3\left(k+1\right) + 1$	Correct completion to an expression in terms of k + 1	A1
	If <u>true for n = k</u> then <u>true for n = k + 1</u> and as <u>true for n = 1</u> <u>true for all n</u>	Conclusion with all 4 underlined elements that can be seen anywhere in the solution; n defined incorrectly award A0.	A1 cso
			(5)
(b)	**Condone use of *n* here.**		
	$lhs = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}^1 = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$ $rhs = \begin{pmatrix} 2(1)+1 & -4(1) \\ 1 & 1-2(1) \end{pmatrix} = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$	Shows true for m = 1	B1
	Assume $\begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}^k = \begin{pmatrix} 2k+1 & -4k \\ k & 1-2k \end{pmatrix}$		
	$\begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}^{k+1} = \begin{pmatrix} 2k+1 & -4k \\ k & 1-2k \end{pmatrix}\begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$	$\begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}\begin{pmatrix} 2k+1 & -4k \\ k & 1-2k \end{pmatrix}$ award M1	M1
	$= \begin{pmatrix} 6k+3-4k & -8k-4+4k \\ 3k+1-2k & -4k-1+2k \end{pmatrix}$	Or equivalent 2x2 matrix. $\begin{pmatrix} 6k+3-4k & -12k-4+8k \\ 2k+1-k & -4k-1+2k \end{pmatrix}$ award A1from above.	A1
	$= \left(\begin{pmatrix} 2k+3 & -4k-4 \\ k+1 & -2k-1 \end{pmatrix}\right)$		
	$= \begin{pmatrix} 2\left(k+1\right)+1 & -4\left(k+1\right) \\ k+1 & 1-2\left(k+1\right) \end{pmatrix}$	Correct completion to a matrix in terms of k + 1	A1
	If <u>true for m = k</u> then <u>true for m = k + 1</u> and as <u>true for m = 1</u> true <u>for all m</u>	Conclusion with all 4 underlined elements that can be seen anywhere in the solution; m defined incorrectly award A0.	A1 cso
			(5)
			Total 10

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