

General Certificate of Education

Mathematics 6360

MPC2 Pure Core 2

Mark Scheme

2008 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Key to mark scheme and abbreviations used in marking

M	mark is for method			
m or dM	mark is dependent on one or more M marks and is for method			
A	mark is dependent on M or m marks and is for accuracy			
В	mark is independent of M or m marks and	d is for method a	and accuracy	
Е	mark is for explanation			
$\sqrt{\text{or ft or F}}$	follow through from previous			
	incorrect result	MC	mis-copy	
CAO	correct answer only	MR	mis-read	
CSO	correct solution only	RA	required accuracy	
AWFW	anything which falls within	FW	further work	
AWRT	anything which rounds to	ISW	ignore subsequent work	
ACF	any correct form	FIW	from incorrect work	
AG	answer given	BOD	given benefit of doubt	
SC	special case	WR	work replaced by candidate	
OE	or equivalent	FB	formulae book	
A2,1	2 or 1 (or 0) accuracy marks	NOS	not on scheme	
−x EE	deduct x marks for each error	G	graph	
NMS	no method shown	c	candidate	
PI	possibly implied	sf	significant figure(s)	
SCA	substantially correct approach	dp	decimal place(s)	

No Method Shown

Where the question specifically requires a particular method to be used, we must usually see evidence of use of this method for any marks to be awarded. However, there are situations in some units where part marks would be appropriate, particularly when similar techniques are involved. Your Principal Examiner will alert you to these and details will be provided on the mark scheme.

Where the answer can be reasonably obtained without showing working and it is very unlikely that the correct answer can be obtained by using an incorrect method, we must award **full marks**. However, the obvious penalty to candidates showing no working is that incorrect answers, however close, earn **no marks**.

Where a question asks the candidate to state or write down a result, no method need be shown for full marks.

Where the permitted calculator has functions which reasonably allow the solution of the question directly, the correct answer without working earns **full marks**, unless it is given to less than the degree of accuracy accepted in the mark scheme, when it gains **no marks**.

Otherwise we require evidence of a correct method for any marks to be awarded.

MPC2

Q Q	Solution	Marks	Total	Comments
1(a)		B1	1	OE; accept ' $k = 1.5$ '
1(a)	$\sqrt{x^3} = x^{\frac{3}{2}}$	Di	1	OE, accept $\kappa = 1.5$
	$\frac{\mathrm{d}y}{\mathrm{d}x} = 2x - \frac{3}{2}x^{\frac{1}{2}}$			At least one index reduced by 1 and no
(b)(i)	$\frac{\mathrm{d}y}{1} = 2x - \frac{3}{2}x^{\frac{1}{2}}$	M1		
	dx 2	B1		term of the form $\sqrt{ax^2}$.
		A1F	3	For $2x$ For $-1.5 x^{0.5}$.Ft on ans (a) non-integer k
			-	1.5 x .14 on ans (a) non-integer k
(ii)	When $x = 4$, $y = 8$	B1		
	•			
	y'(4) = ;	M1		Attempt to find $\frac{dy}{dx}$ when $x = 4$
		1,11		u.i
	$= 2(4) -1.5(\sqrt{4}) = 5$	A1F		Ft on one earlier error provided non-
				integer powers in (a) and (b)(i)
	Tangent: $y - 8 = 5(x - 4)$	m1		y - y(4) = y'(4)[x - 4] OE
	y = 5x - 12	A1	5	CSO; must be $y = 5x - 12$
	Total		9	
2(a)	$Arc PQ = r\theta$	M1		$r\theta$
	$=6\pi$ (cm)	A1	2	Condone missing units throughout the
(1)				paper
(b)	$\alpha + \alpha + \frac{3\pi}{2} = \pi$	M1		OE
	$\alpha + \alpha + \frac{3\pi}{7} = \pi$ $\alpha = \frac{2\pi}{7}$			
	$\alpha = \frac{2\pi}{}$		•	Accept equivalent fractions eg $\frac{4\pi}{14}$ and
	7	A1	2	17
				condone 0.286π or better
				3π
(c)	Chord $PQ = 2 \times 14 \times \cos \alpha$	M1		OE eg $2 \times 14 \times \sin \frac{3\pi}{14}$ or 17.45-17.5
				$\frac{1}{1}$
				inclusive or $\sqrt{14^2 + 14^2 - 2 \times 14^2 \times \cos \frac{3\pi}{7}}$
	Perimeter = $17.45 + 6\pi$			·
	= 36.307 = 36.3 (cm)	A1	2	Condone > 3sf
2()	Total	D.1	6	OF.
3(a)	$r = 16 \div 20 = 0.8$	B1	1	OE
(b)	a = 20			OE Using a correct formula with $a = 20$ or
	$\frac{a}{1-r} = \frac{20}{1-0.8}$	M1		r = c's 0.8
	= 100	A1F	2	ft on c's value of r provided $ r < 1$
	(25)			10 10 0 0 miles of / provided / < 1
(c)	$\{S_{20} = \} \frac{a(1 - r^{20})}{1 - r}$	M1		OE Using a correct formula with $n = 20$
	$S_{20} - f = 1 - r$	1V1 1		OE Using a correct formula with $n=20$
	$= 100(1 - 0.8^{20}) = 98.847\{07\}$	A1	2	Condone > 3dp
(d)	<i>n</i> th term = $20 r^{n-1} = 20(0.8)^{n-1}$	M1		Ft on c's r . Award even if 16^{n-1} seen
	$= 20 \times 0.8^{-1} \times 0.8^n$			
	$=25\times0.8^n$	A1	2	CSO; AG
	Total		7	

MPC2 (cont)

Q Q	Solution	Marks	Total	Comments
4(a)	$\{BC^2 = \} 7.6^2 + 8.3^2 - 2 \times 7.6 \times 8.3 \cos 65$	M1		RHS of cosine rule used
1(11)	= 57.76 + 68.89 - 53.3175	m1		Correct order of evaluation
	= 37.70 00.07 33.3173	1111		Correct order or evaluation
	$BC = \sqrt{73.33} = 8.563$ (= 8.56 m)	A1	3	AG; must see $\sqrt{73.33}$ or > 3sf value
	$BC = \sqrt{73.33} = 8.303$ (= 8.30 III)	Al	3	AG, must see $\sqrt{3.33}$ of > 381 value
	1			1
(b)	Area triangle = $\frac{1}{2} \times 7.6 \times 8.3 \times \sin 65$	M1		Use of $\frac{1}{2}bc\sin A$ OE
	$= 28.58 = 28.6 \text{ (m}^2\text{)}$	A1	2	Condone > 3sf
	– 28.38 – 28.0 (III)	AI	2	Condone > 381
(c)	Area of triangle = $0.5 \times BC \times AD$	M1		Or valid method to find sin <i>B</i> or sin <i>C</i>
(c)	$AD = [Ans (b)] \div [0.5 \times Ans (a)]$	m1		Or $AD = 7.6\sin B$; Or $AD = 8.3\sin C$
	AD = 6.67 = 6.7 (m)	A1	3	If not 6.7 accept 6.65 to 6.69 inclusive.
	Total		8	and the state of t
5(a)(i)	$\log_a 1 = 0$	B1	1	
2 (2)(1)	-84	21	-	
(ii)	$\log_a a = 1$	B1	1	
(11)		D1	1	
(b)	$\log_a x = \log_a (5 \times 6) - \log_a 1.5$	M1		One law of logs used correctly
(6)		1411		One law of logs used correctly
	$\log_a x = \log_a \left(\frac{5 \times 6}{1.5} \right)$	M1		A second law of logs used correctly
	(1.6)			
	$\log_a x = \log_a 20 \Longrightarrow x = 20$	A1	3	
	Total		5	
6(a)	8 = -8p + q	M1		Either equation. PI eg by combined eqn.
	4 = 8p + q	A1		Both (condone embedded values for the
				M1A1)
		m1		Valid method to solve two simultaneous equations in <i>p</i> and <i>q</i> to find either <i>p</i> or <i>q</i>
				equations in p and q to find either p of q
	q = 6	A1		AG (condone if left as a fraction)
	p = -0.25	B1	5	OE
			·	
(b)	$u_4 = 5$	B1F	1	Ft on $(6 + 4p)$
	·			
(c)(i)	L = pL + q; $(L = -0.25 L + 6)$	M1	1	OE
	\boldsymbol{q}			
(ii)	$L = \frac{1}{1-p}$	m1		Rearranging
	$L = \frac{q}{1 - p}$ $L = \frac{6}{1.25} = 4.8$			6
	1 - 6 - 48	A1F	2	Ft on $\frac{6}{1-p}$
	$L = \frac{1.25}{1.25} = 4.0$	AIF	2	-
	m . 1		Λ	Dependent on previous two marks
	Total		9	

MPC2 (cont)

Q	Solution	Marks	Total	Comments
7(a)	$\left(1 + \frac{4}{x^2}\right)^3 = \left[1^3\right] + 3(1^2)\left(\frac{4}{x^2}\right) + 3(1)\left(\frac{4}{x^2}\right)^2 + \left[\left(\frac{4}{x^2}\right)^3\right]$	M1		Any valid method as far as term(s) in $1/x^2$ and term(s) in $1/x^4$
	$= [1] + \frac{12}{x^2} + \frac{48}{x^4} + \left[\frac{64}{x^6}\right]$	A1		$p = 12$ Accept $\frac{12}{x^2}$ even within a series
		A1	3	$q = 48$ Accept $\frac{48}{x^4}$ even within a series
(b)(i)	$\int \left(1 + \frac{4}{x^2}\right)^3 dx$ $= \int \left(1 + \frac{p}{x^2} + \frac{q}{x^4} + \frac{64}{x^6}\right) dx$			
	$= \int (1 + \frac{p}{x^2} + \frac{q}{x^4} + \frac{64}{x^6}) dx$	M1		Integral of an 'expansion', at least 3 terms PI by the next line
	$= x - px^{-1} - \frac{q}{3}x^{-3} - \frac{64}{5}x^{-5} (+c)$	m1 A2F,1	4	At least two powers correctly obtained Ft on c's non-zero integer values for p and q (A1F for two terms correct; can be unsimplified)
	$= x - 12x^{-1} - 16x^{-3} - \frac{64}{5}x^{-5} (+ c)$			Condone missing c but check that signs have been simplified at some stage before the award of both A marks.
(ii)	$\left(2 - \frac{p}{2} - \frac{q}{3(8)} - \frac{64}{5(32)}\right) -$			
	$\left(1 - p - \frac{q}{3} - \frac{64}{5}\right)$ $= 33.4$	M1	2	F(2) - F(1), where $F(x)$ is cand's answer or the correct answer to (b)(i).
		A1	<u>2</u>	CSO
	Total		y	

MPC2 (cont)

8(a)(i) $h = 0.5$ B1 PI $()=I(0)+2[1](\frac{1}{2})+I(1)+1(\frac{3}{2})]+I(1)+1(\frac{3}{2})]+I(1)+1(\frac{3}{2})$ M1 OE summing of areas of the four traps. $(1)=1+2[\sqrt{6}+6+6\sqrt{6}]+36$ A1 Condone I numerical slip. Accept 3sf values if not exact. Integral = 0.25 × 83.292 Integral = 0.25 × 83.292 Integral = 0.25 × 83.292 and Integral = 0.25 ×	Q	Solution	Marks	Total	Comments
Integral = $h/2$ {} {}=f(0)+2[T\frac{1}{2}]+f(1)+F\frac{3}{2}]+f(2) {!}=1+2[\sqrt{6}+6+6\sqrt{6}]+36 = 1+2[2,449.+6+14,6969]+36 = 37+2 \times 23,146=83.292 Integral = 0.25 \times 83.292 Integral = 0.25 \times 84 Integral	8(a)(i)		B1		PI
			21		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$\{\}=f(0)+2[f(\frac{1}{2})+f(1)+f(\frac{3}{2})]+f(2)$	M1		OE summing of areas of the four traps.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$\{\}=1+2[\sqrt{6}+6+6\sqrt{6}]+36$			
(ii) Relevant trapezia drawn on a copy of given graph {Approximation is an} overestimate {Approxima		= 1+2[2.449+ 6 + 14.6969] + 36	A1		
given graph $\{Approximation is an\}$ overestimate $\{A1\}$ 2 Dep. on 4 trapezia with each of their upper vertices lying on the curve $\{b)(i)$ Stretch (I) in x -direction (II) M1 Noed (I) and one of (II), (III) M0 if more than one transformation $\{cscale factor\}$ $\frac{1}{3}$ (III) A1 2 PI Take logs of both sides of $a^r = b$, PI by $correct$ value(s) later or $3x = \log_6 84$ Use of $\log_{10} 6^{3x} = 3x \log_6 6 \log_{10} 84$ m1 Use of $\log_6 6^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 6^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 Use of $\log_6 8^{3x} = 3x \log_6 6 \log_6 84$ w1 (b)(ii). Condone $> 3dp$ w1 (c) $f(x) = 6^{x-1} - 2$ B2 B1 for either $6^{x-1} + 2$ or for $6^{x+1} - 2$ Total 14 9(a) $2x = 48$ B1 PI by $x = 24^\circ$ Accept equivalents for $x = 24^\circ$, 66° , 204° , 246° A1 A1 CAO; need all four, no extras in given interval (b) $\frac{\sin \theta}{\cos \theta} = \tan \theta$ M1 Stated or used $\frac{\sin \theta}{\cos \theta} = \tan \theta = 1.5$ A1 $\frac{\theta}{\cos \theta} = 56.3^\circ + 180^\circ = 236.3^\circ$ A1 Condone $> 1dp$ Ft on c 's PV+180° dep only on the M1 provided no 'extra' solutions in the given interval.		Integral = $0.25 \times 83.292 = 20.8$ (3sf)	A1	4	CAO; must be 20.8
	(ii)		M1		
(scale factor) $\frac{1}{3}$ (III) Al 2 (ii) $6^{3x} = 84$		{Approximation is an}overestimate	A1	2	
(ii) $6^{3x} = 84$	(b)(i)	Stretch (I) in <i>x</i> -direction (II)	M1		` ' ' ` ' ' ' '
$\log_{10} 6^{3x} = \log_{10} 84$ $3x \log_{10} 6 = \log_{10} 84$ $x = \frac{\lg 84}{3\lg 6}$ $(c) f(x) = 6^{x-1} - 2$ 14 $9(a) 2x = 48$ $2x = 180 - 48$ $2x = 360 + 48$ $x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ $(b) \frac{\sin \theta}{\cos \theta} = \tan \theta$ $2\sin \theta - 3\cos \theta = 0 \Rightarrow \tan \theta = 1.5$ $\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$ 1 M1 $3x \log_{10} 6 = \log_{10} 84$ $x = \frac{\lg 84}{3\lg 6}$ $x = 0.82429 = 0.824 \text{ (to 3dp)}$ $A1 = 1$ $4 \text{ Use of } \log 6^{3x} = 3x \log 6 \text{ OE}$ or $3x = \log_{0} 84$ seen $3x = \log_{0} 84 \text{ seen}$ $4 \text{ Use of } \log 6^{3x} = 3x \log 6 \text{ OE}$ or $3x = \log_{0} 84$ seen $4 \text{ Use of } \log 6^{3x} = 3x \log 6 \text{ OE}$ or $3x = \log_{0} 84$ seen $4 \text{ Must see that } \log \text{ have been used before any of the last 3 marks are awarded in (b)(ii). Condone > 3dp 14 \text{ PI by } x = 24^{\circ} 4 \text{ Accept equivalents for } x 4 \text{ Accept equivalents for } x 4 \text{ Accept equivalents for } x 4 \text{ CAO; need all four, no extras in given interval} 5 \text{ Stated or used} 6 \text{ Condone > 1dp} 6 \text{ Ft on c's PV+180^{\circ} dep only on the M1} 6 \text{ provided no 'extra' solutions in the given interval.}$		(scale factor) $\frac{1}{3}$ (III)	A1	2	
	(ii)	$6^{3x} = 84$	M1		PI
$x = \frac{\lg 84}{3\lg 6}$ $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ A1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B2,1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.82429 = 0.824 \text{ (to 3dp)}$ B1 $x = 0.8249 = 0.8249$ A1 $x = 0.8249 = 0.8249$ A1 $x = 0.8249 = 0.8249$ A2 $x = 180 - 48$ A2 $x = 360 + 48$ A1 $x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ A1 $x = 24^{\circ}, 66^{\circ}, 204^{\circ}, $		$\log_{10} 6^{3x} = \log_{10} 84$	M1		· · ·
x = 0.82429 = 0.824 (to 3dp) A1 $A1$ $A1$ $A1$ $A1$ $A1$ $A1$ $A1$		$3x\log_{10} 6 = \log_{10} 84$	m1		
x = 0.82429 = 0.824 (to 3dp) A1 $A1$ $A1$ $A1$ $A1$ $A1$ $A1$ $A1$		$x = \frac{\lg 84}{3\lg 6}$			
9(a) $2x = 48$ B1 PI by $x = 24^{\circ}$ $2x = 180 - 48$ M1 Accept equivalents for x $2x = 360 + 48$ and $2x = 360 + 180 - 48$ M1 Accept equivalents for x $x = 24^{\circ}$, 66° , 204° , 246° A1 4 CAO; need all four, no extras in given interval (b) $\frac{\sin \theta}{\cos \theta} = \tan \theta$ M1 Stated or used $2\sin \theta - 3\cos \theta = 0 \Rightarrow \tan \theta = 1.5$ A1 Condone > 1dp $\theta = 56.3^{\circ}$ A1F Ft on c's PV+180° dep only on the M1 provided no 'extra' solutions in the given interval. Total 8		x = 0.82429 = 0.824 (to 3dp)	A1	4	any of the last 3 marks are awarded in
9(a) $2x = 48$ B1 Accept equivalents for x $2x = 180 - 48$ M1 Accept equivalents for x $2x = 360 + 48$ and $2x = 360 + 180 - 48$ M1 Accept equivalents for x $x = 24^{\circ}$, 66° , 204° , 246° A1 4 CAO; need all four, no extras in given interval (b) $\frac{\sin \theta}{\cos \theta} = \tan \theta$ M1 Stated or used $2\sin \theta - 3\cos \theta = 0 \Rightarrow \tan \theta = 1.5$ A1 Condone > 1dp $\theta = 56.3^{\circ}$ A1F Ft on c's PV+180° dep only on the M1 provided no 'extra' solutions in the given interval. Total 8	(c)	$f(x) = 6^{x-1} - 2$	B2,1	2	B1 for either $6^{x-1} + 2$ or for $6^{x+1} - 2$
$2x = 180 - 48$ $2x = 360 + 48 \text{ and } 2x = 360 + 180 - 48$ $x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ $3x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ $2\sin \theta = \tan \theta$ $2\sin \theta - 3\cos \theta = 0 \Rightarrow \tan \theta = 1.5$ $\theta = 56.3^{\circ}$ $\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$ $4x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ $4x = 24^{$				14	
$2x = 360 + 48 \text{ and } 2x = 360 + 180 - 48$ $x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ Al $\frac{\sin \theta}{\cos \theta} = \tan \theta$ $2\sin \theta - 3\cos \theta = 0 \Rightarrow \tan \theta = 1.5$ $\theta = 56.3^{\circ}$ $\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$ Al $Accept equivalents for x$ $CAO; need all four, no extras in given interval$ $Stated or used$ $Condone > 1 dp$ $Ft on c's PV + 180^{\circ} dep only on the M1 provided no 'extra' solutions in the given interval.$	9(a)				
$x = 24^{\circ}, 66^{\circ}, 204^{\circ}, 246^{\circ}$ A1 $\frac{\sin \theta}{\cos \theta} = \tan \theta$ $2\sin \theta - 3\cos \theta = 0 \Rightarrow \tan \theta = 1.5$ $\theta = 56.3^{\circ}$ $\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$ A1 $A1$ $A1$ $A1$ $A1$ $A1$ $A1$ $A1$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				4	1 1
(b) $\frac{\cos \theta}{\cos \theta} = \tan \theta$					
$\theta = 56.3^{\circ}$ $\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$ A1 A1F A1F A1F A1F A1F A1F A1F A1F A1F	(b)	\longrightarrow = tan θ	M1		Stated or used
$\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$ A1F 4 Ft on c's PV+180° dep only on the M1 provided no 'extra' solutions in the given interval. Total 8					
provided no 'extra' solutions in the given interval. Total 8				4	
Total 8		$\theta = 56.3^{\circ} + 180^{\circ} = 236.3^{\circ}$	Alf	4	provided no 'extra' solutions in the given
TOTAL 75		Total		8	
		TOTAL		75	