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Mark Scheme (Results)

January 2012

GCE Mathematics
Core Mathematics 2 (6664)

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SOME GENERAL PRINCIPLES FOR C2 MARKING
(But the particular mark scheme always takes precedence)

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

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 (but refer to the mark scheme first… the application of this principle may vary).
Where the formula is not quoted, the method mark can be gained by implication from correct working with values, but will be lost if there is any mistake in the working.

Equation of a straight line
Apply the following conditions to the M mark for the equation of a line through (a,b):
If the *a* and *b* are the wrong way round the M mark can still be given if a correct formula is seen, (e.g. $y-y_1=m(x-x_1)$) otherwise M0.
If (*a*, *b*) is substituted into $y=mx+c$ to find *c*, the M mark is for attempting this.

Answers without working
The rubric says that these may gain no 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. Most candidates do show working, but there are occasional awkward cases and if the mark scheme does not cover this, please contact your team leader for advice.

Misreads
A misread must be consistent for the whole question to be interpreted as such.
These are not common. In clear cases, please deduct the first 2 A (or B) marks which would have been lost by following the scheme. (Note that 2 marks is the maximum misread penalty, but that misreads which alter the nature or difficulty of the question cannot be treated so generously and it will usually be necessary here to follow the scheme as written).
Sometimes following the scheme as written is more generous to the candidate than applying the misread rule, so in this case use the scheme as written.
If in doubt, send the response to Review.

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 and can be used if you are using the annotation facility on ePEN.

   - 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. 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. If you are using the annotation facility on ePEN, indicate this action by 'MR' in the body of the script.

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. Marks for each question are scored by clicking in the marking grids that appear below each student response on ePEN. The maximum mark allocation for each question/part question(item) is set out in the marking grid and you should allocate a score of '0' or '1' for each mark, or "trait", as shown:

	0	1
aM		•
aA	•	
bM1		•
bA1	•	
bB	•	
bM2		•
bA2		•

9. Be careful when scoring a response that is either all correct or all incorrect. It is very easy to click down the '0' column when it was meant to be '1' and all correct.

January 2012
C2 6664
Mark Scheme

Question number	Scheme	Marks
1 (a)	Uses $360\times\left(\frac{7}{8}\right)^{19}$, to obtain 28.5	M1, A1 (2)
(b)	Uses $S=\dfrac{360(1-(\frac{7}{8})^{20})}{1-\frac{7}{8}}$, or $S=\dfrac{360((\frac{7}{8})^{20}-1)}{\frac{7}{8}-1}$ to obtain 2680	M1, A1 (2)
(c)	Uses $S=\dfrac{360}{1-\frac{7}{8}}$, to obtain 2880	M1, A1cao (2) **6**
Notes	**(a) M1:** Correct use of formula with power = 19 **A1:** Accept 28.47, or 28.474 or indeed 28.47446075 **(b) M1:** Correct use of formula with $n = 20$ **A1:** Accept 2681, 2680.7, 2680.68 or 2680.679 or indeed 2680.678775 (N.B. 2680.67 or 2680.0 is **A0**) **(c) M1:** Correct use of formula **A1:** Accept 2880 only	
Alternative method	**Alternative to (a)** Gives **all 20 terms** 315, 275.6(25), 241.17(1875), … (1st 3 accurate)	M1
	All correct and last term as above **A1:** Accept 28.5, 28.47, or 28.474 or indeed 28.47446075	A1
	Alternative to (b) Gives **all 20 terms** 315, 275.6(25), 241.17(1875), … (1st 3 accurate) and adds	M1
	Sum correct **A1:** Accept 2680, 2681, 2680.7, 2680.68 or 2680.679 or indeed 2680.678775	A1

Question number	Scheme	Marks
2	The equation of the circle is $(x+1)^2+(y-7)^2=(r^2)$ The radius of the circle is $\sqrt{(-1)^2+7^2}=\sqrt{50}$ or $5\sqrt{2}$ or $r^2=50$ So $(x+1)^2+(y-7)^2=50$ or equivalent	M1 A1 M1 A1 (4) **4**
Notes	**M1** is for this expression on left hand side– allow *errors in sign* of 1 and 7. **A1** correct signs (just LHS) **M1** is for Pythagoras or substitution into equation of circle to give r or r^2 Giving this value as diameter is **M0** **A1**, cao for cartesian equation with numerical values but allow $(\sqrt{50})^2$ or $(5\sqrt{2})^2$ or any exact equivalent A correct answer implies a correct method – so answer given with no working earns all four marks for this question.	
Alternative method	Equation of circle is $x^2+y^2\pm 2x\pm 14y+c=0$ Equation of circle is $x^2+y^2+2x-14y+c=0$ Uses (0,0) to give $c=0$, **or** finds $r=\sqrt{(-1)^2+7^2}=\sqrt{50}$ or $5\sqrt{2}$ or $r^2=50$ So $x^2+y^2+2x-14y=0$ or equivalent	M1 A1 M1 A1

Question number	Scheme	Marks
3 (a).	$(1+\frac{x}{4})^8 = 1+2x+..,\ \ ......$	B1
	$+\dfrac{8\times7}{2}(\frac{x}{4})^2+\dfrac{8\times7\times6}{2\times3}(\frac{x}{4})^3,$	M1 A1
	$= \quad +\frac{7}{4}x^2+\frac{7}{8}x^3$ or $= \quad +1.75x^2+0.875x^3$	A1 (4)
(b)	States or implies that $x = 0.1$	B1
	Substitutes their value of x (provided it is <1) into series obtained in (a)	M1
	i.e. 1 + 0.2 + 0.0175 + 0.000875, = 1.2184	A1 cao (3) **7**
Alternative for (b) **Special case**	Starts again and expands $(1+0.025)^8$ to $1+\ 8\times0.025\ +\dfrac{8\times7}{2}(0.025)^2+\dfrac{8\times7\times6}{2\times3}(0.025)^3,\ \ = 1.2184$ (Or 1 + 1/5 + 7/400 + 7/8000 = 1.2184)	B1,M1,A1
Notes	**(a) B1** must be simplified The **method** mark **(M1)** is awarded for an attempt at Binomial to get the third and/or fourth term – need correct binomial coefficient combined with correct power of *x*. Ignore bracket errors or errors in powers of 4. Accept any notation for $^8C_2$ and $^8C_3$, e.g. $\binom{8}{2}$ and $\binom{8}{3}$ (unsimplified) or 28 and 56 from Pascal's triangle. (The terms may be listed without + signs) First **A1** is for two completely correct unsimplified terms **A1** needs the fully simplified $\frac{7}{4}x^2$ *and* $\frac{7}{8}x^3$. **(b) B1 –** states or uses x =0.1 or $\frac{x}{4}=\frac{1}{40}$ **M1** for substituting their value of x ($0 < x < 1$) into expansion (e.g. 0.1 (correct) or 0.01, 0.00625 or even 0.025 but **not** 1 nor 1.025 which would earn **M0**) **A1** Should be answer printed cao (not answers which round to) and should follow correct work. **Answer with no working at all** is B0, M0, A0 States 0.1 then just writes down answer is B1 M0A0	

Question number	Scheme	Marks
4. (a)	$\log_3 3x^2 = \log_3 3 + \log_3 x^2$ or $\log y - \log x^2 = \log 3$ or $\log y - \log 3 = \log x^2$	B1
	$\log_3 x^2 = 2\log_3 x$	B1
	Using $\log_3 3 = 1$	B1 (3)
(b)	$3x^2 = 28x - 9$	M1
	Solves $3x^2 - 28x + 9 = 0$ to give $x = \frac{1}{3}$ or $x = 9$	M1 A1 (3) **6**
Notes (a)	**B1** for correct use of addition rule (or correct use of subtraction rule) **B1:** replacing $\log x^2$ by $2\log x$ – **not** $\log 3x^2$ by $2\log 3x$ this is **B0** **These first two B marks are often earned in the first line of working** **B1**. for replacing $\log 3$ by 1 (or use of $3^1 = 3$) If candidate has been awarded 3 marks and their proof includes an error or omission of reference to $\log y$ withhold the last mark. So just B1 B1 B0 These marks must be awarded for **work in part (a)** only	
(b)	**M1** for removing logs to get an equation in x– statement in scheme is sufficient. This needs to be accurate without any errors seen in part (b). **M1** for attempting to solve three term quadratic to give $x =$ (see notes on marking quadratics) **A1** for the two correct answers – this depends on second M mark only. Candidates often begin again in part (b) and do not use part (a). If such candidates make errors in log work in part (b) they score first **M0**. The second **M** and the **A** are earned as before. It is possible to get M0M1A1 or M0M1A0.	
Alternative to (b) using y	Eliminates x to give $3y^2 - 730y + 243 = 0$ with no errors is M1 Solves quadratic to find y, then uses values to find x M1 A1 as before **See extra sheet with examples illustrating the scheme.**	

Question number	Scheme	Marks
5 (a)	$f(-2) = -8 + 4a - 2b + 3 = 7$	M1
	so $2a - b = 6$ *	A1 (2)
(b)	$f(1) = 1 + a + b + 3 = 4$	M1 A1
	Solve two linear equations to give $a = 2$ and $b = -2$	M1 A1 (4)
		6
Notes	(a) **M1** : Attempts f(± 2) = 7 or attempts long division as far as putting remainder equal to 7 **(**There may be sign slips) **A1** is for correct equation with remainder = 7 and for the printed answer with no errors and no wrong working between the two (b) **M1** : Attempts f(± 1) = 4 or attempts long division as far as putting remainder equal to 4 **A1** is for correct equation with remainder = 4 and powers calculated correctly **M1 :** Solving simultaneous equations (may be implied by correct answers). This mark may be awarded for attempts at elimination or substitution leading to values for both a and b. Errors are penalised in the accuracy mark. **A1** is cao for values of a and b and explicit values are needed. Special case: Misreads and puts remainder as 7 again in (b). This may earn M1A0M1A0 in part (b) and will result in a maximum mark of 4/6	
Long Divisions	$x^2 + (a-2)x + (b-2a+4)$ $(x+2)\overline{)\,x^3 + ax^2 + bx + 3}$ $x^3 + 2x^2$ ……………………………… and reach their "3 - 2b + 4a - 8" = 7 M1 $x^2 + (a+1)x + (b+a+1)$ $(x-1)\overline{)\,x^3 + ax^2 + bx + 3}$ $x^3 - x^2$ …………………… and reach their "3 + b + a + 1" = 4 M1 A marks as before	

Question number	Scheme	Marks
6: (a)	<table><tr><td>x</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3</td><td>3.5</td><td>4</td></tr><tr><td>y</td><td>16.5</td><td>7.361</td><td>**4**</td><td>**2.31**</td><td>1.278</td><td>0.556</td><td>0</td></tr></table>	B1, B1 (2)
(b)	$\frac{1}{2}\times 0.5, \quad \{(16.5+0)+2(7.361+4+2.31+1.278+0.556)\}$ = 11.88 (or answers listed below in note)	B1, M1A1ft A1 (4)
(c)	$\int_1^4 \frac{16}{x^2}-\frac{x}{2}+1\,dx = \left[-\frac{16}{x}-\frac{x^2}{4}+x\right]_1^4$ $=[-4-4+4]-[-16-\frac{1}{4}+1]$ $= 11\frac{1}{4}$ or equivalent	M1 A1 A1 dM1 A1 (5) **11**
Notes	(a) **B1** for 4 or any correct equivalent e.g. 4.000 **B1** for 2.31 or 2.310 (b) **B1:** Need 0.25 or ½ of 0.5 **M1:** requires first bracket to contain first y value plus last y value (0 may be omitted or be at end) **and** second bracket to include no additional y values from those in the scheme. They may however omit one value as a slip. N.B. Special Case - Bracketing mistake $\frac{1}{2}\times 0.5(16.5+0)+2(7.361+4+2.31+1.278+0.556)$ scores **B1 M1 A0 A0** unless the final answer implies that the calculation has been done correctly (then full marks) A1ft: This should be correct but ft their 4 and 2.31 **A1**: Accept 11.8775 or 11.878 or 11.88 only (c) **M1** Attempt to integrate ie power increased by 1 or 1 becomes x , **A1** two correct terms, next **A1** all three correct unsimplified (ignore +c) (Allow $-16x^{-1}-0.25x^2+1x$ or equivalent) d**M1 (This cannot be earned if previous M mark has not been awarded)** Uses limits 4 and 1 in their integrated expression and subtracts (either way round) **A1** 11.25 or 11 ¼ or 45/4 or equivalent (penalise negative final answer here)	
Alternative Method for (b)	Separate trapezia may be used : B1 for 0.25, M1 for $\frac{1}{2}h(a+b)$ used 5 or 6 times (and A1ft all correct for their "4" and "2.31") final A1 for 11.88 etc. as before	
	In part (b) Need to use trapezium rule – answer only (with no working) is 0/4 -any doubts send to review In part (c) need to see integration	

Question number	Scheme	Marks
7 (a)	$r\theta = 6\times 0.95, = 5.7$ (cm)	M1, A1 (2)
(b)	$\frac{1}{2}r^2\theta = \frac{1}{2}\times 6^2\times 0.95, = 17.1\ \left(\text{cm}^2\right)$	M1, A1 (2)
(c)	Let $AD = x$ then $\dfrac{x}{\sin 0.95} = \dfrac{6}{\sin 1.24}$ so $x = 5.16$ * OR $x = 3 / \cos 0.95$ OR so $x = 3/ \sin 0.62$ so $x = 5.16$ * OR $x^2 = 6^2 + x^2 - 12x\cos 0.95$ leading to $x =$, so $x = 5.16$ *	M1 A1 (2)
(d)	Perimeter = '5.7'+5.16 +6 – 5.16= "11.7" **or 6 + their 5.7**	M1A1 ft (2)
(e)	Area of triangle $ABD = \frac{1}{2}\times 6\times 5.16\times \sin 0.95 = 12.6$ or $\frac{1}{2}\times 6\times 3\times \tan 0.95 = 12.6$ (½ base x height) or $\frac{1}{2}\times 5.16\times 5.16\times \sin 1.24 = 12.6$ So Area of R = '17.1' – '12.6' = 4.5	M1 A1 M1 A1 (4) **12**
Notes	(a) **M1:** Needs θ in radians for this formula. Could convert to degrees and use degrees formula. **A1:** Does not need units (b) **M1:** Needs θ in radians for this formula. Could convert to degrees and use degrees formula. **A1:** Does not need units (c) **M1:** Needs complete correct trig method to achieve $x =$ May have worked in degrees, using 54.4 degrees and 71.1 degrees Using angles of triangle sum to 360degrees is not correct method so is M0 **A1:** accept answers which round to 5.16 (NB This is given answer) If the answer 5.16 is **assumed** and **verified** award M1A0 for correct work (d) **M1:** Accept answer only as implying method, or just 6 + 5.7 **A1 :** can be scored even following wrong answer to part (c) (e) **M1:** needs complete method for area of triangle ABD not ABC **A1:** Accept awrt 12.6 (If area of triangle is not evaluated or is given as 12.5 (truncated) this mark may be implied by 4.5 later) **M1:** Uses area of R = area of sector – area of triangle ABD (not ABC) **A1:** Answers wrt 4.5	
Alternative For part (e)	Finds area of segment **and** area of triangle BDC by correct methods **M1** Obtains 2.4585 **and** 2.0498 – accept answers wrt 2.5, 2.1 **A1** Uses area of segment + area of triangle BDC ,to obtain 4.5 (not 4.6) **M1, A1** **NB Just finding area of segment is M0**	

Question number	Scheme	Marks
8 (a)	$kr^2 + cxy = 4$ or $kr^2 + c[(x+y)^2 - x^2 - y^2] = 4$	M1
	$\frac{1}{4}\pi x^2 + 2xy = 4$	A1
	$y = \dfrac{4 - \frac{1}{4}\pi x^2}{2x} = \dfrac{16 - \pi x^2}{8x}$ *	B1 cso (3)
(b)	$P = 2x + cy + k\,\pi r$ where c = 2 or 4 and k = ¼ or ½	M1
	$P = \dfrac{\pi x}{2} + 2x + 4\left(\dfrac{4 - \frac{1}{4}\pi x^2}{2x}\right)$ or $P = \dfrac{\pi x}{2} + 2x + 4\left(\dfrac{16 - \pi x^2}{8x}\right)$ o.e.	A1
	$P = \dfrac{\pi x}{2} + 2x + \dfrac{8}{x} - \dfrac{\pi x}{2}$ so $P = \dfrac{8}{x} + 2x$ *	A1 (3)
(c)	$\left(\dfrac{dP}{dx} = \right) - \dfrac{8}{x^2} + 2$	M1 A1
	$-\dfrac{8}{x^2} + 2 = 0 \Rightarrow x^2 = ..$	M1
	and so $x = 2$ o.e. (ignore extra answer x = -2)	A1
	$P = 4 + 4 = 8$ (m)	B1 (5)
(d)	$y = \dfrac{4 - \pi}{4}$, (and so width) = 21 (cm)	M1, A1 (2) **13**
Notes	(a) **M1**: Putting sum of one or two xy terms and one kr^2 term equal to 4 (**k and c may be wrong) **A1:** For any correct form of this equation with x for radius (may be unsimplified) **B1 :** Making y the subject of their formula to give this printed answer with no errors (b) **M1** : Uses Perimeter formula of the form $2x + cy + k\,\pi r$ where c = 2 or 4 and k = ¼ or ½ **A1:** Correct unsimplified formula with y substituted as shown, i.e. $c = 4$, k = ½ , $r = x$ and $y = \dfrac{16 - \pi x^2}{8x}$ or $y = \left(\dfrac{4 - \frac{1}{4}\pi x^2}{2x}\right)$ **A1:** obtains printed answer with at least one line of correct simplification or expansion before giving printed answer or stating result has been shown or equivalent (c) **M1:** At least one power of x decreased by 1 (Allow $2x$ becomes 2) **A1:** accept any equivalent correct answer **M1:** Setting $\dfrac{dP}{dx}$=0 and finding a value for correct power of x for candidate **A1 :** For x = 2. (This mark may be given for equivalent and may be implied by correct P) **B1:** 8 (cao) N.B. This may be awarded if seen in part (d) (d) **M1 :** Substitute x value found in (c) into equation for y from (a) (or substitute x and P into equation for P from (b)) and evaluate (may see 0.2146 and correct answer implies M1 or need to see substitution if x value was wrong.) **A1** is for 21 or 21cm or 0.21m as this is to nearest cm	

Question number	Scheme	Marks
9 (i)	$\sin(3x-15)=\frac{1}{2}$ so $3x-15=30$ (α) and $x=15$ Need $3x-15=180-\alpha$ or $3x-15=540-\alpha$ Need $3x-15=180-\alpha$ and $3x-15=360+\alpha$ and $3x-15=540-\alpha$ $x=55$ or 175 $x=$ 55 , 135 , 175	M1 A1 M1 M1 A1 A1 (6)
Notes	**M1** Correct order of operation: inverse sine then linear algebra - not just 3*x*-15 = 30 (slips in linear algebra lose Accuracy mark) **A1** Obtains first solution 15 **M1** Uses either 180 – α or 540 – α, **M1** uses all three 180 – α and 360 + α and 540 – α **A1**, for one further correct solution 55 or 175, (depends only on second M1) **A1** – all 3 further correct solutions If more than 4 solutions in range, lose last **A1** Common slips: Just obtains 15 and 55, or 15 and 175 – usually M1A1M1M0A1A0 Just obtains 15 and 135 is usually M1A1M0M0A0A0 (It is easy to get this erroneously) Obtains 5, 45, 125 and 165 – usually M1A0M1M1A0A0 Obtains 25, 65, 145, (185) usually M1A0M1M1A0A0 Working in radians – lose last A1 earned for $\frac{\pi}{12}, \frac{11\pi}{36}, \frac{3\pi}{4}$ and $\frac{35\pi}{36}$ or numerical equivalents Mixed radians and degrees is usually Method marks only Methods involving no working should be sent to Review	
9 (ii)	At least one of $(\frac{a\pi}{10}-b)=$ 0 (or $n\pi$) $(\frac{a3\pi}{5}-b)=$ π {or $(n+1)\pi$} or in degrees or $(\frac{a11\pi}{10}-b)=$ 2π {or $(n+2)\pi$} If two of **above equations** used eliminates *a* or *b* to find one or both of these or uses period property of curve to find *a* or uses other valid method to find either *a* or *b* (May see $\frac{5\pi}{10}a=\pi$ so $a=$) Obtains $a=2$ Obtains $b=\frac{\pi}{5}$ (must be in radians)	M1 M1 A1 A1 (4)

Notes	M1: Award for $(\frac{a\pi}{10} - b) = 0$ or $\frac{a\pi}{10} = b$ BUT $\sin(\frac{a\pi}{10} - b) = 0$ is M0 M1: As described above but solving $(\frac{a\pi}{10} - b) = 0$ with $(\frac{a3\pi}{5} - b) = 0$ is M0 (It gives $a = b = 0$) Special cases: Can obtain full marks here for both correct answers with no working M1M1A1A1 For $a = 2$ only, with no working, award M0M1A1A0 For $b = \frac{\pi}{5}$ only with no working M1M0A0A1
Alternative	Some use translations and stretches to give answers. If they achieve $a=2$ they earn second method and first accuracy. If they achieve correct value for b they earn first method and second accuracy. Common error is $a = 2$ and $b = \frac{\pi}{10}$. This is usually M0M1A1A0 unless they have stated $(\frac{a\pi}{10} - b) = 0$ earlier in which case they earn first M1.

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