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# Mark Scheme (Results)

Summer 2017

Pearson Edexcel International GCSE  
In Mathematics B (4MB0) Paper 01R

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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.
- Types of mark
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- Abbreviations
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - awrt – answer which rounds to
  - eeo – each error or omission

- No working  
If no working is shown then correct answers normally score full marks  
If no working is shown then incorrect (even though nearly correct) answers score no marks.
- With working  
If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.  
**If it is clear from the working that the “correct” answer has** been obtained from incorrect working, award 0 marks.  
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.  
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.  
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.  
If there is no answer on the answer line then check the working for an obvious answer.
- Ignoring subsequent work  
It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.  
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.  
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.
- Parts of questions  
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

Q	Working	Answer	Mark	Notes
1	(a)	57900	1	B1
	(b)	0.05	1	B1
				<b>Total 2 marks</b>
2	3200000 or $32 \times 10^5$		2	M1
		$3.2 \times 10^6$		A1
				<b>Total 2 marks</b>
3	$(3x =)7 - 2$		2	M1
		$\frac{5}{3}$ (oe)		A1 $1\frac{2}{3}$ , 1.6, 1.6̄, awrt 1.67 <b>NB do not allow 1.66</b>
				<b>Total 2 marks</b>
4	$\frac{14}{30} \times 360$ (oe)		2	M1 full method required
		168		A1
				<b>Total 2 marks</b>
5	$\pm \frac{96-90}{96}$ or $\pm \frac{6}{96}$ or $\frac{90}{96} \times 100$		3	M1
	$\pm \frac{96-90}{96} \times 100$ or $100 - \frac{90}{96} \times 100$			M1 DEP
		$6\frac{1}{4}$ (oe)		A1 6.25, $\frac{25}{4}$
	NB -6.25 score M1M1A0			<b>Total 3 marks</b>

<b>6</b>	(a) (i)		$x \geq -5$	2	B1
	(ii)		$x < 6$		B1
	(b)	Single Line -5		1	B1 FT their inequalities allow $-5 [ \text{-----} ) 6$
					<b>Total 3 marks</b>

<b>7</b>	$\Delta = 5 \times -2 - 4 \times -3 (= 2)$			3	M1
	$\frac{1}{\Delta} \begin{pmatrix} -2 & 3 \\ -4 & 5 \end{pmatrix}$				M1 (Indep) allow $\Delta=1$
			$\begin{pmatrix} -1 & 1\frac{1}{2} \\ -2 & 2\frac{1}{2} \end{pmatrix} \text{(oe)}$		A1 Accept $\frac{1}{2} \begin{pmatrix} -2 & 3 \\ -4 & 5 \end{pmatrix}$
					<b>Total 3 marks</b>

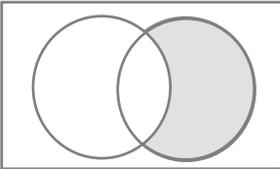
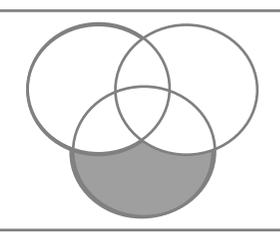
<b>8</b>	$2\sqrt{3} - 2\sqrt{2} + \sqrt{6} \times \sqrt{3} - \sqrt{6} \times \sqrt{2}$ or $2\sqrt{3} - 2\sqrt{2} + \sqrt{18} - \sqrt{12}$			3	M1 Correctly expand brackets. Allow one sign error.
	$\sqrt{18} = 3\sqrt{2}$ and $\sqrt{12} = 2\sqrt{3}$ or $\sqrt{6} \times \sqrt{3} = 3\sqrt{2}$ and $\sqrt{6} \times \sqrt{2} = 2\sqrt{3}$				M1 May be embedded within working (DEP)
	$2\sqrt{3} - 2\sqrt{2} + 3\sqrt{2} - 2\sqrt{3}$		$\sqrt{2}$		A1 dep on M2 cso
NB Answers derived from decimal expansions score M0M0A0					<b>Total 3 marks</b>

<b>9</b>	tangent drawn at (2, 2)		3	M1	Must only touch curve at (2,2)
	$\frac{y \text{ increment}}{x \text{ increment}}$			M1(DEP)	Attempt to find gradient for their tangent.
		3		A1	dep on tangent drawn ft their tangent providing $2.5 \leq \text{gradient} \leq 4$
<b>Total 3 marks</b>					

<b>10</b>	Shaded area = $(2r)^2 - \pi r^2$ , $0.858 r^2$ or better. OR $\frac{\pi(r^2)}{4(r^2)} \times 100$		3	M1	
	$\frac{4r^2 - \pi r^2}{4r^2} \times 100\%$ OR $100 - \frac{\pi(r^2)}{4(r^2)} \times 100$			M1 DEP	
		21.5		A1	awrt 21.4 or 21.5
<b>Total 3 marks</b>					

<b>11</b>	(a)		$Q, Z, N$ correctly labelled	1	B1
	(b)		$\{4, \sqrt{2}, -3, \frac{2}{3}\}$ four elements in correct position	2	B2
<b>Total 3 marks</b>					

12		$\begin{pmatrix} 10 & 9 \\ 13 & 9 \\ -4 & -10 \end{pmatrix}$	3	M1 Correct dimension and at least one correct entry. A1 Any three correct entries. A1 All correct.
NB for a transcription error allow at most one value changed or two values transposed.			<b>Total 3 marks</b>	

13 (a)			1	B1 Correct region shaded.
(b)			1	B1 Correct region shaded.
(c)		$(F \cup G) \cap H'$ (oe)	1	B1 Accept $(F \cap H') \cup (G \cap H')$ or $(F \cap G' \cap H') \cup (F \cap G \cap H') \cup (F' \cap G \cap H')$ Do not accept $F \cup G \cap H'$
			<b>Total 3 marks</b>	

<b>14</b>	$\frac{6}{10} \times \frac{4}{10}$ or $\frac{4}{10} \times \frac{6}{9}$ or $\frac{6}{10} \times \frac{6}{10} + \frac{4}{10} \times \frac{3}{9}$		3	M1
	$\frac{6}{10} \times \frac{4}{10} + \frac{4}{10} \times \frac{6}{9}$ or $1 - \left( \frac{6}{10} \times \frac{6}{10} + \frac{4}{10} \times \frac{3}{9} \right)$			M1 DEP
		$\frac{38}{75}$ (oe)		A1 AWRT 0.507
				<b>Total 3 marks</b>

<b>15</b>	SF = $\sqrt[3]{\frac{1350}{400}}$ ( $= \frac{3}{2}$ ) or $\sqrt[3]{\frac{400}{1350}}$ ( $= \frac{2}{3}$ ) or $\sqrt[3]{1350} : \sqrt[3]{400}$ or 3:2 (oe)		3	M1 Obtain linear scale factor. This mark not awarded unless cube root taken at some stage.
	$360 \times \left( \sqrt[3]{\frac{1350}{400}} \right)^2$ or $360 \times 2.25$ or $360 \div \left( \sqrt[3]{\frac{400}{1350}} \right)^2$ or $360 \div \frac{4}{9}$			M1(DEP)
		810		A1
				<b>Total 3 marks</b>

<b>16</b>	$\frac{(2x-1)(x+5)}{3(2x-1)(2x+1)}$ or $\frac{(2x-1)(x+5)}{(2x-1)(6x+3)}$		3	M1 factorise numerator M1 factorise denominator These marks are independent
		$\frac{x+5}{3(2x+1)}$		A1 accept $\frac{x+5}{6x+3}$
				<b>Total 3 marks</b>

<b>17</b>	(a)	$\frac{40}{32}$ or 75 or $\frac{5}{4}$ or $1\frac{1}{4}$ or 1.25		2	M1
			1 hour 15 minutes		A1
	(b)	$\frac{1.5+40+10}{22.5+75+37.5} \times 60 = \frac{51.5}{135}$ or $\frac{1.5+40+10}{0.375+1.25+0.625} = \frac{51.5}{2.25}$ (oe)		2	M1 FT 75 or 1.25 from (a)
			22.9		A1 awrt 22.9
<b>Total 4 marks</b>					

<b>18</b>	$3x + y = 7$ $3x + 21y = -39$	$21x + 7y = 49$ $x + 7y = -13$	$y = 7 - 3x$	$x = -13 - 7y$	4	M1 Two equations with equal $x$ or $y$ coefficients, or correctly isolate $x$ or $y$ .	Allow a single mistake across both M marks.
	$20y = -46$	$20x = 62$	$x + 7(7 - 3x) = -13$	$3 \times (-13 - 7y) + y = 7$		M1 DEP Correct choice to add or subtract equations, or substitute $x$ or $y$ into other equation	
				$x = 3.1$ (oe)		A1	
				$y = -2.3$ (oe)		A1	
<b>Total 4 marks</b>							

<b>19</b>	$\sin 42 = \frac{5.2}{AC}$		4	M1	Any fully correct equation containing AC
	$AC = \frac{5.2}{\sin 42}$ (= 7.77 or better)			M1 DEP	Any fully correct expression for AC
	$\tan CAD = \frac{4.5}{"7.77"}$			M1 INDEP	ft $AC > 0$ Any fully correct expression for CAD or a trig ratio of CAD.
		30.1		A1	
<b>Total 4 marks</b>					

<b>20</b>	(a)		$2x - \frac{16}{x^2}$	2	B2	B1 for $2x$ , B1 for $-\frac{16}{x^2}$ or $-16x^{-2}$
	(b)	$2x - \frac{16}{x^2} = 0$ (oe)		2	M1	$\frac{dy}{dx} = 0$ , ft their $\frac{dy}{dx}$ as long as this is not the same as y
			2		A1	CSO
<b>Total 4 marks</b>						

<b>21</b>	$6 + 2x = 14$		4	M1	
		$x = 4$		A1	
	$3y - 3x = -27$ or $3y - 3 \times "4" = -27$			M1	
		$y = -5$		A1	
	NB award both M marks if $\begin{pmatrix} 6 + 2x \\ 3y - 3x \end{pmatrix} = \begin{pmatrix} 14 \\ -27 \end{pmatrix}$ seen.				<b>Total 4 marks</b>

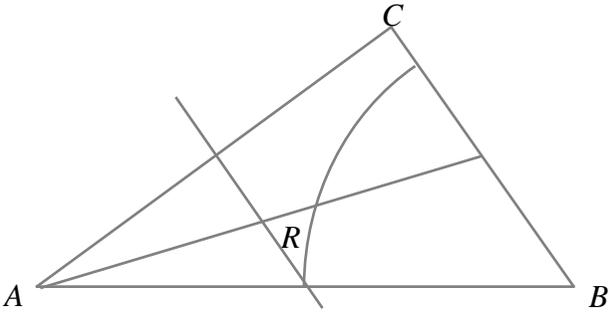
<b>22</b>	$\text{Ext}_{12} = \frac{360}{12} (=30)$	$\text{Int}_{12} = \frac{(2 \times 12 - 4)90}{12}$ (= 150)		4	M1
	$\text{Ext}_n = 54 - "30" (= 24)$	$\text{Int}_n = 360 - 54 - "150"$ (= 156)			M1 INDEP
	$n = \frac{360}{"24"}$	$\frac{(2n - 4)90}{n} = "156" \text{ (oe)}$			M1 DEP Dependent on both previous method marks
			15		A1
					<b>Total 4 marks</b>

<b>23</b>	(a)		135	1	B1
	(b)	$r^2 - 9 = 46(r + 3)$		3	M1 Allow different variable used.
		$r - 3 - 46 = 0$ or $r - 3 = 46$ or $(r - 49)(r + 3) = 0$ or $(r =) \frac{-(-46) + \sqrt{(-46)^2 - 4 \times 1 \times -147}}{2 \times 1}$			M1 (DEP)
			49		A1 49 and -3 together gain M1M1A0
		NB for factorisation in (b) allow any expression which gives 2 out of 3 correct in $r^2 - 46r - 147$ eg. $(r - 50)(r + 4)$			<b>Total 4 marks</b>

<b>24</b>	(a)	$0.2 + x + x + 0.1 + 0.18 + x + 0.1 = 1,$ $3x + 0.58 = 1 \text{ (oe)}$		2	M1
			0.14 (oe)		A1 $\frac{7}{50}$
	(b)		2	1	B1 ft for $x > 0$
	(c)	$60 \times 0.2$		2	M1
			12		A1
					<b>Total 5 marks</b>

<b>25</b>	(a)	$\frac{2 \times 2.5 + 5}{2.5 - 3} = \left(\frac{10}{-0.5}\right)$			2	M1 Fully correct substitution into function
				-20		A1
	(b)	$xy - 3y = 2x + 5$	$xy - 3x = 2y + 5$		3	M1
		$x(y - 2) = 3y + 5$	$y(x - 2) = 3x + 5$			M1 DEP
				$\frac{3x+5}{x-2}$ (oe)		A1 $3 + \frac{11}{x-2}$
<b>Total 5 marks</b>						

<b>26</b>	(a)	360 - 255 - (180 - 135) or 60 correct on diagram			2	M1 SC Answer of 300 M1A0
				60		A1
						Accept 60(°), 060(°), N60(°)E
	(b)			5	1	B1
	(c)	"60" - (180 - 135) or 180 - (360 - 255) - "60" (oe) or 15 correct on diagram			2	M1
				15		A1 Accept 15(°), 015(°), N15(°)E
<b>Total 5 marks</b>						

<b>27</b>	(a) (i)	equal intersecting arcs, centres $A$ and $C$		4	M1
			perpendicular bisector drawn		A1 Any length.
	(ii)	arc centre $A$ to intersect $AC$ and $AB$ , and equal intersecting arcs from these points of intersection			M1
			angle bisector drawn		A1 Must extend from $A$ to $BC$ .
	(b)	Arc, centre $B$ , radius 5 cm		2	M1
			region $R$ shaded		A1 FT their perpendicular bisector and angle bisector. The area must be bounded by at least both of these and the correct arc.
					<b>Total 6 marks</b>

<b>28</b>	(a) (i)	$2\pi r = \frac{216}{360} \times 2\pi \times 5x$ (oe)		4	M1
			$3x$		A1
	(ii)	$(5x)^2 = ("3x")^2 + h^2$ (oe)			M1
			$4x$		A1
	(b)	$\frac{1}{3}\pi("3x")^2 \times "4x" = \frac{375\pi}{2}$		3	M1 Condone missing brackets for this mark only
		$x^3 = \frac{375 \times 3}{2 \times 9 \times 4} \left( = \frac{125}{8} \right)$ (oe)			M1 DEP
			$2\frac{1}{2}$ (oe)		A1 $\frac{5}{2}, 2.5$
					<b>Total 7 marks</b>

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