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
  - eeoo – 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.
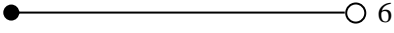
Q		Working	Answer	Mark	Notes
1	(a)		57900	1	B1
	(b)		0.05	1	B1
					Total 2 marks
2		3200000 or 32×10^5		2	M1
			3.2×10^6		A1
					Total 2 marks
3		$(3x =)7 - 2$		2	M1
			$\dfrac{5}{3}$ (oe)		A1 $1\frac{2}{3}$, $1.\dot{6}$, $1.\overline{6}$, awrt 1.67 **NB do not allow 1.66**
					Total 2 marks
4		$\dfrac{14}{30}\times360$ (oe)		2	M1 full method required
			168		A1
					Total 2 marks
5		$\pm\dfrac{96-90}{96}$ or $\pm\dfrac{6}{96}$ or $\dfrac{90}{96}\times100$		3	M1
		$\pm\dfrac{96-90}{96}\times100$ or $100-\dfrac{90}{96}\times100$			M1 DEP
			$6\frac{1}{4}$ (oe)		A1 $6.25, \dfrac{25}{4}$
		NB -6.25 score M1M1A0			**Total 3 marks**

6	(a) (i)		$x \geq -5$	2	B1	
	(ii)		$x < 6$		B1	
	(b)	Single Line -5 ●━━━━━━━○ 6		1	B1	FT their inequalities allow -5 [━━━━━━━) 6
						Total 3 marks

7		$\Delta = 5 \times -2 - 4 \times -3 \ (= 2)$		3	M1	
		$\dfrac{1}{\Delta}\begin{pmatrix} -2 & 3 \\ -4 & 5 \end{pmatrix}$			M1	(Indep) allow $\Delta=1$
			$\begin{pmatrix} -1 & 1\frac{1}{2} \\ -2 & 2\frac{1}{2} \end{pmatrix}$ (oe)		A1	Accept $\dfrac{1}{2}\begin{pmatrix} -2 & 3 \\ -4 & 5 \end{pmatrix}$
						Total 3 marks
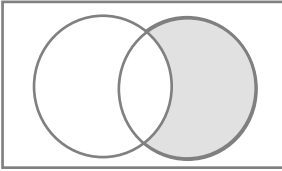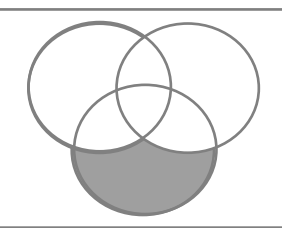
8		$2\sqrt{3} - 2\sqrt{2} + \sqrt{6} \times \sqrt{3} - \sqrt{6} \times \sqrt{2}$ or $2\sqrt{3} - 2\sqrt{2} + \sqrt{18} - \sqrt{12}$		3	M1	Correctly expand brackets. Allow one sign error.
		$\sqrt{18} = 3\sqrt{2}$ and $\sqrt{12} = 2\sqrt{3}$ or $\sqrt{6} \times \sqrt{3} = 3\sqrt{2}$ and $\sqrt{6} \times \sqrt{2} = 2\sqrt{3}$			M1 (DEP)	May be embedded within working
		$2\sqrt{3} - 2\sqrt{2} + 3\sqrt{2} - 2\sqrt{3}$	$\sqrt{2}$		A1	dep on M2 cso
		NB Answers derived from decimal expansions score M0M0A0				**Total 3 marks**

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

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

11	(a)		Q, Z, N correctly labelled	1	B1	
	(b)		$\{4, \sqrt{2}, -3, \frac{2}{3}\}$ four elements in correct position	2	B2	or B1 for two in correct position Do not allow repeated elements in different areas
						Total 3 marks

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.				**Total 3 marks**

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 $F \cup G \cap H'$
					Total 3 marks

14	$\frac{6}{10} \times \frac{4}{10}$ 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
					Total 3 marks

15	SF $= \sqrt[3]{\frac{1350}{400}} \left(= \frac{3}{2} \right)$ or $\sqrt[3]{\frac{400}{1350}} \left(= \frac{2}{3} \right)$ 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 360×2.25 or $360 \div \left(\sqrt[3]{\frac{400}{1350}} \right)^2$ or $360 \div \frac{4}{9}$			M1(DEP)	
		810		A1	
					Total 3 marks

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

17	(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	
										Total 4 marks	

18		$3x + y = 7$ $3x + 21y = -39$	$21x + 7y = 49$ $x + 7y = -13$	$y = 7-3x$	$x = -13-7y$			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		
										Total 4 marks	

19	$\sin 42 = \dfrac{5.2}{AC}$		4	M1	Any fully correct equation containing AC
	$AC = \dfrac{5.2}{\sin 42}$ (= 7.77 or better)			M1 DEP	Any fully correct expression for AC
	$\tan CAD = \dfrac{4.5}{"7.77"}$			M1 INDEP	ft $AC > 0$ Any fully correct expression for CAD or a trig ratio of CAD.
		30.1		A1	
					Total 4 marks
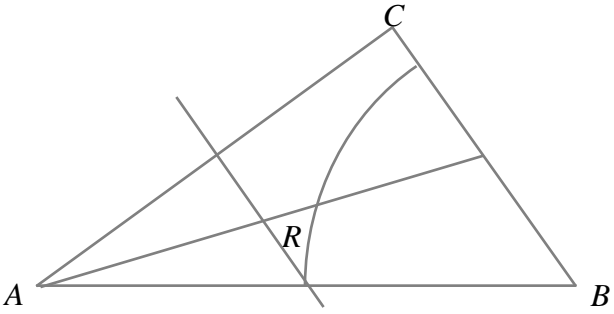
20	(a)		$2x - \dfrac{16}{x^2}$	2	B2	B1 for $2x$, B1 for $-\dfrac{16}{x^2}$ or $-16x^{-2}$
	(b)	$2x - \dfrac{16}{x^2} = 0$ (oe)		2	M1	$\dfrac{dy}{dx} = 0$, ft their $\dfrac{dy}{dx}$ as long as this is not the same as y
			2		A1	CSO
						Total 4 marks

21	$6 + 2x = 14$		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.				**Total 4 marks**

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

23	(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 $(r=)\dfrac{-(-46)+\sqrt{(-46)^2 - 4 \times 1 \times -147}}{2 \times 1}$			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. $(r-50)(r+4)$				**Total 4 marks**

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

25	(a)	$\dfrac{2 \times 2.5 + 5}{2.5 - 3} = \left(\dfrac{10}{-0.5}\right)$			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	
				$\dfrac{3x+5}{x-2}$ (oe)		A1	$3 + \dfrac{11}{x-2}$
							Total 5 marks

26	(a)	$360 - 255 - (180 - 135)$ or 60 correct on diagram			2	M1	SC Answer of 300 M1A0
				60		A1	
							Accept 60(°), 060(°), N60(^{o})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(^{o})E
							Total 5 marks

27	(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	FT their perpendicular bisector and angle bisector. The area must be bounded by at least both of these and the correct arc.
						Total 6 marks

28	(a) (i)	$2\pi r = \dfrac{216}{360} \times 2\pi \times 5x$ (oe)		4	M1	
			$3x$		A1	
	(ii)	$(5x)^2 = ("3x")^2 + h^2$ (oe)			M1	
			$4x$		A1	
	(b)	$\dfrac{1}{3}\pi("3x")^2 \times "4x" = \dfrac{375\pi}{2}$		3	M1	Condone missing brackets for this mark only
		$x^3 = \dfrac{375\times3}{2\times9\times4}\left(= \dfrac{125}{8}\right)$ (oe)			M1 DEP	
			$2\frac{1}{2}$ (oe)		A1	$\dfrac{5}{2}$, 2.5
						Total 7 marks