Mark Scheme (Results)

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Pearson Edexcel International GCSE
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
  - 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
International GCSE Maths Apart from question 15 (where the mark scheme states otherwise) the correct answer, unless obtained from an incorrect method, should be taken to imply a correct method.				
1 a		0.042	1	B1
b		0.0417	1	B1 (a) and (b) wrong way around: B1 ft B0
				Total 2 marks

2	$\dfrac{385}{1.54}$		2	M1
		£250		A1
				Total 2 marks

3	$(2-7\times4)$ and $(2-7\times8)$ seen **OR** -26 and -54 seen **OR** Difference between nth and $(n+1)$th term is ±7 so that between 4 terms is 4 x (±7)		2	M1
		28 (or -28)		A1
				Total 2 marks

4	$832 = 2^6 \times 13$		2	M1
	OR $\quad \sqrt{16 \times 52}$			
	OR $\quad \sqrt{4 \times 4 \times 4 \times 13}$			
	OR $\quad \sqrt{16 \times \dfrac{832}{16}}$			
	OR $\quad 8\sqrt{13}$			
	OR $\quad n = \left(\dfrac{\sqrt{832}}{4}\right)^2$ (oe)			
		$4\sqrt{52}$		A1 Accept $n = 52$ for A1 No working seen scores M0 A0
				Total 2 marks

5	$\mathbf{x} = 4\begin{pmatrix} 2 \\ 3 \end{pmatrix} - 3\begin{pmatrix} 6 \\ -2 \end{pmatrix}$ (no errors, oe)		2	M1
		$\mathbf{x} = \begin{pmatrix} -10 \\ 18 \end{pmatrix}$		A1 $-x = \begin{pmatrix} 10 \\ -18 \end{pmatrix}$ earns M1 A0
				Total 2 marks

6	$\dfrac{450}{120} \times 100$ **OR** $\dfrac{6}{5}x = 450$ (o.e.) **OR** $x + \dfrac{20}{100}x = 450$		2	M1	
		£375		A1	
					Total 2 marks

7	$\dfrac{12}{360} \times 2\pi \times 25$ (oe)		2	M1	
		awrt 5.2 (cm), $\dfrac{5}{3}\pi$		A1	
					Total 2 marks

8	$3 - 17 < 2x + 5x$ OR $-14 < 7x$ OR $-5x - 2x < 17 - 3$ (All (oe)		2	B1	Use of equality instead of inequality sign scores M1 A0
		$x > -2$		A1	Allow ISW if correct inequality seen
					Total 2 marks

9		$AX \times 3 = (5+4) \times 4$ (oe)		2	M1	If cand has $(AB+3) \times 3 = (5+4) \times 4$, earns M1 when they write $AX =$ "AB" $+ 3$ i.e. the cand must have a complete method for AX
			$AX = 12$ cm (cao)		A1	
						Total 2 marks

10		$(2n - 4) \times 90 = 1980$ (oe) OR $(n-2) \times 180 = 1980$ (oe) OR $\dfrac{1980}{180} + 2$ $(=11 + 2)$		2	M1	
			n = 13		A1	
						Total 2 marks

11	a		$A \cap B \cap C$	1	B1	Do not accept n($A \cap B \cap C$)
	b		$C \cap (A \cup B)'$ or $(A \cup B)' \cap C$ or $C \cap A' \cap B'$	1	B1	
	c		$A \cap B \cap C'$ or $(A \cap C') \cap (B \cap C')$ or $(A \cap B) \cap C'$	1	B1	Accept $(A \cap B) \cap (A \cap B \cap C)'$
						Total 3 marks

12	Price per kg on Monday £$\frac{2.2}{2.5}$ = £0.88 OR price per kg on Friday £$\frac{2.1}{3}$ = £0.70		3	M1	reference to the day not necessary, fractions do not need to be simplified
	$\frac{"0.88"- "0.70"}{"0.88"}$ (oe)			M1	(DEP)
		$\pm\frac{18}{88}, \pm\frac{9}{44}$		A1	
					Total 3 marks

13	$\dfrac{1}{6} \times \dfrac{2}{6}$ OR Sample space diagram (allow 1 error) OR Any two of (2, 4), (2, 4), (4, 2), (4, 2)		3	M1
	$2 \times \left("\dfrac{1}{6} \times \dfrac{2}{6}" \right)$ OR Recognition that there are 4 ways of getting 6 out of 36 outcomes (eg " $\dfrac{4}{36}$ " as probability) OR All 4			M1 (DEP)
		$\dfrac{1}{9}$ (oe), awrt 0.111		A1
				Total 3 marks

14	a		$B = \{p, r, q, s\}$	1	B1
	b		$C = \{p, t, q, s\}$	1	B1
	c		$\{r, \ t\}$ OR r and t	1	B1
					Total 3 marks

15	a		$\begin{pmatrix} 1 & -19 \\ -13 & 23 \end{pmatrix}$	2	B2 (-1ee)	
	b		$\begin{pmatrix} -7 & 1 & -11 \\ 17 & 4 & 19 \end{pmatrix}$	2	B2 (-1ee)	
					Total 4 marks	

16	a	arcs, centred at *A* and *B*, and intersecting above and below *AB* **OR** two sets of arcs, centred at *A* and *B*, each set having a different radii, above *AB* (or below *AB*)		2	M1	Use of the mid-point of *AB* (obtained by measuring) scores M0
			Line equidistant from *A* and *B* drawn		A1	
	b		Correctly positioned and labelled *P*	1	B1	
	c		$\angle APM = 55(\pm 1)^{\circ}$	1	B1	Angle must be **measured**, so evidence of trig scores B0.
						Total 4 marks

17	$(x+3)(5x+a)=...+(15+a)x+3a$ (oe)		4	
	$5x^2+15x+ax+3a$			M1
	$15+a = 21$ (equating coefs of x)			M1 (DEP)
		$a = 6$		A1
		$b = 18$		A1
	OR (Factor Theorem)			
	$5(-3)^2+21(-3)+b=0$ (subst. $x = -3$)			M1
		$b = 18$		A1
	$3a =$ "18" (Can be implied)			M1 (DEP)
		$a = 6$		A1
				Total 4 marks

18		Award marks for relevant angles seen on diagram. $\angle CDA = 70^o$ (Cyclic Quad.) and $\therefore \angle CAD = 60^o$ ($\angle$s of Δ)	4	B1
		$\therefore \angle ACB = 60^o$ (Alternate $\angle$s)		B1
		$\therefore \angle BAC = 10^o$ ($\angle$s of Δ)		B1 B marks are for angle values
		2 relevant reasons (eg "Cyclic Quad.", "Alternate $\angle$s" and "$\angle$s of Δ") used to find $\angle BAC = 10^o$		B1 the 4th B mark is dependent on the previous three B marks
		OR $\angle BAD = 70^o$ (Allied $\angle$s) and $\therefore \angle BCD = 110^o$ (Cyclic Quad)		B1
		$\angle ACB = 60^o$		B1
		$\therefore \angle BAC = 10^o$ ($\angle$s of Δ)		B1 Above B marks are for angle values.
		2 relevant reasons for their method $\big($ eg"Cyclic Quad.", "Allied $\angle$s" and "$\angle$s of Δ"$\big)$ used to find $\angle BAC = 10^o$		B1 the 4th B marks is dependent on the previous three B marks
				Total 4 marks

19	Rearranging st coef of x or y is the same in both eqns OR isolating x or y		4	M1	
	Subtract. or adding eqns OR subst expression for x or y to obtain y or x			M1 (DEP)	Allow a total of 1 slip in both M marks.
		$x = 3$		A1	
		$y = 1$		A1	No working seen scores M0 M0 A0 A0
					Total 4 marks

20	$24 = \dfrac{k}{2^3}$ (oe)		4	M1
		$k = 192$		A1
	$x = \sqrt[3]{\left(\dfrac{"192"}{(-3)}\right)}$			M1 (DEP)
		$x = -4$ (cao)		A1
	OR $\dfrac{2}{x} = \sqrt[3]{\dfrac{-3}{24}}$ (oe)			M1
		$\left(\dfrac{2}{x}=\right)-\dfrac{1}{2}$		A1
	$x = \dfrac{2}{-\frac{1}{2}}$ (oe)			M1 (DEP)
		$x = -4$		A1
	OR $2^3 \times 24 = -3 \times x^3$			M1
		$192 = -3 \times x^3$ (oe)		A1
	$x = \sqrt[3]{(-64)}$			M1 (DEP)
		$x = -4$ (cao)		A1
				Total 4 marks

21	a		Carma's share $= \dfrac{x}{x+4} \times 60$ apples (oe)	1	B1
	b		Banu's share $= \dfrac{3}{x+4} \times 60$ apples (oe)	1	B1
	c	$"\left(\dfrac{x}{x+4} \times 60\right)" - "\left(\dfrac{3}{x+4} \times 60\right)" = 18$ (oe)		2	M1
			x = 6 (cao)		A1
					Total 4 marks

22	a	3 : 15.6 x 100 x 1000 (oe)		2	M1
			1 : 520 000		A1
	b	$\dfrac{676 \times (100 \times 1000)^2}{("520\ 000")^2}$ One of $676 \times (100 \times 1000)^2$ OR $1 \div ("520\ 000")^2$ (oe)		3	
					M1
		Correct expression (as above) OR $\dfrac{676}{5.2^2}$			M1 (DEP)
			25 cm^2		A1
					Total 5 marks

23	$6x^2 + 2x - 15x - 5 - 4 = 0$ **OR** $\quad 6x^2 + 2x - 15x - 5 = 4$ (oe, expanding)			5	M1	
		$6x^2 - 13x - 9 = 0$			A1	
	$x_{\pm} = \dfrac{-"(-13)" \pm \sqrt{\left("(-13)"^2 - 4 \times "6" \times "(-9)"\right)}}{2 \times "6"}$ (fully correct subst. from a seen trinomial quadratic)				M1	
		$x_+ =$ awrt 2.72			A1	
		$x_- =$ awrt -0.552			A1	
						Total 5 marks

24	a	2.4×10^n		2	M1	
			2.4×10^{135}		A1	
	b	$(8.0 - 0.12) \times 10^n$		2	M1	
			7.88×10^{102}		A1	1.88×10^n scores M1 A0
	c	$\dfrac{1.2}{8} \times 10^n \qquad 1.5 \times 10^n, \quad \dfrac{3}{2} \times 10^n$		2	M1	
			1.5×10^{-2}		A1	
						Total 6 marks

25	a	$\left(v = \dfrac{\mathrm{d}s}{\mathrm{d}t} = \right) 18t^2 - 4t^3$ (1 term correct)		2	M1
			fully correct		A1
	b	$"18t^2 - 4t^3" = 0$		4	M1
			$\therefore t = 4.5$ (oe)		A1
		$\therefore s = 6"(4.5)"^3 - "(4.5)"^4$			M1 (DEP)
			$\therefore s = 136.69$ → **awrt 137**		A1
					Total 6 marks

26	a		Three correct lines for the lorry	1	B1
	b		Correct line for the car	1	B1
	c	$\dfrac{90}{1.25}$ (oe)		2	M1
			72 km/ h		A1
	d		44km ($\pm 2km$ = $\pm 1ss$)	1	B1 ft
					Total 5 marks
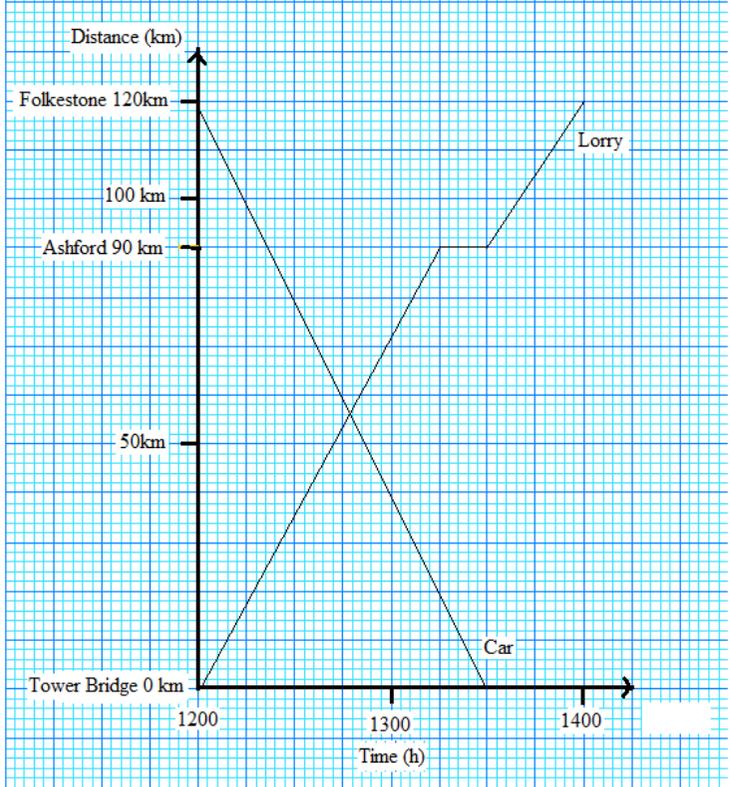
27	a		$40 < L \le 65$	1	B1
	b	Using 3 correct mid class values in 3 correct product		3	M1
		$\dfrac{9\times"15"+8\times"35"+10\times"52.5"+14\times"75"}{41}$ $\left(=\dfrac{135+280+525+1050}{41}=\dfrac{1990}{41}=48.5365...\right)$ (Fully correct)			M1 (DEP)
			49		A1
	c	Given, column for $0 < L \le 30$ is 3 units high, so a scaling factor is 10 (oe)	$30 < L \le 40$: FD=8 units	3	B1
			$40 < L \le 65$: FD=4 units		B1
			$65 < L \le 85$: FD = 7 units		B1
					Total 7 marks

28	a	$\tan 20 = \dfrac{3}{BC}$		6	M1	
		$BC = 8.242 \rightarrow \mathbf{8.24}$			A1	
	b	Finding an angle needed for finding a necessary side for finding AD. $\angle BAC = 30^o$ OR $\angle ABC = 60^o$ OR $\angle AED = 70^o$ (accept angles on diagram)			M1	
		Using the angle to find the necessary side $\sin"30" = \cos"60" = \dfrac{"8.242"}{AB}$ $(AB = 16.4849)$ OR $AC = "8.24" \times \tan 60$ $(14.276....)$ and $AE = 14.276... - 3$ $(11.276...)$			M1 (DEP)	
		Expressing for AD using the necessary side. $\tan 50 = \dfrac{"16.4849"}{AD}$ OR $\dfrac{\sin 50}{"11.276"} = \dfrac{\sin 70}{AD}$			M1 (DEP)	
			$AD = $ $13.832 \rightarrow \mathbf{13.8}$		A1	Penalise incorrect rounding once only
						Total 6 marks