Mark Scheme (Results)

January 2019

Pearson Edexcel International GCSE
Mathematics B (4MB1)
Paper 01R

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January 2019
Publications Code 4MB1_01R_1901_MS

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.

  If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

  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 part.

Question	Working	Answer	Mark	Notes
1	$\frac{15}{300}\times 100$ oe	5	M1 2	M1 A1
2 (a)		6	1	B1
(b)		2	1	B1
3	180 + 57 or 360 – (180 – 57) oe	237	M1 2	M1 A1
4		$\begin{pmatrix} 4 & 1 \\ -3 & 9 \end{pmatrix}$	2	B2 fully correct. Award B1 for 2 or 3 correct entries.
5	$\frac{9}{4}\times\frac{8}{3}$ oe e.g. $\frac{27}{12}\times\frac{32}{12}$	6	M1 2	M1 for correct improper fractions with intention to multiply A1 dep on M1 – M1 only for $\frac{9}{4}\times\frac{8}{3}$ = 6
6		$14x + 3x^{-2}$	2	B2 oe B1 for $14x$ or $+ 3x^{-2}$ oe
7(i)		16, −4	2	B1, B1 accept 2^4, -2^2
(ii)		Correct explanation	1	B1 eg divided the previous term by −4 or +/− alternates and it goes down by 2^2 each time – must see either ‘divide/multiply’ (oe)

Question	Working	Answer	Mark	Notes
8	4×11.5 (=46) or 3×9 (=27) $(4 \times 11.5 + 3 \times 9) \div 7$	 10.4	 3	M1 M1 (“46” + “27”) ÷ 7 A1
9	$-2x - 4x \geq -20 - 17$ oe $x \leq \frac{37}{6}$ or $x \leq$ “−37” ÷ “6”	 6	 3	M1 for collecting terms in x and number terms on either side of a correct inequality – allow one slip M1 – must be of the form $x \leq$ positive value A1 dep on accurate working
10	$x + x + 135 = 180$ ($x = 22.5$) oe 360 ÷ “22.5” M2 for $\frac{180(n-2)}{n} - \frac{360}{n} = 135$ (M1 for a single slip)	 16	 3	M1 M2 for $2 \times (360 \div 45)$ M1 A1 **SC B1** for $\frac{180(n-2)}{n} = 135$ leading to n = 8 or $x + 135 = 180$ then $360 / 45 = 8$
11	$9 \div (3 + 5 + 7)$ (=0.6) or $7 \div (3 + 5 + 7)$ “0.6” × 7 or “0.4666…” × 9	 4.2	 3	M1 M1 M2 for $\frac{7}{15} \times 9$ **or** M1 for a correct method to find one of the smaller pieces (1.8, 3) A1

Question	Working	Answer	Mark	Notes
12 (a)		0.000 000 96	1	B1
(b)				M1 for 0.25×10^{206} or 2.5×10^{n} where $n \neq 205$
		2.5×10^{205}	2	A1
13	$\sqrt{121\times5}-\sqrt{16\times5}$ or $605 = 11 \times 11 \times 5$ and $80 = 4 \times 4 \times 5$ or $2 \times 2 \times 2 \times 2 \times 5$			M1
	$11\sqrt{5}-4\sqrt{5}$ $(=7\sqrt{5})$			M1dep
		$\sqrt{245}$	3	A1dep on first M1 [allow n = 245]
	SC B1 $\sqrt{605}-\sqrt{80}=11\sqrt{5}-4\sqrt{5}=7\sqrt{5}=\sqrt{245}$			
14	$5x^2 + 9x - 7$ (=0)			M1 for correctly rearranging
	$\frac{-9\pm\sqrt{9^2-4\times5\times-7}}{2\times5}$			B1 NB: this is an independent B mark and can be earned from previous incorrect working for correct substitution into formula
		0.587, −2.39	3	A1 dep on M1

Question	Working	Answer	Mark	Notes
15	arc of circle centred on C, radius 5.5 cm Arcs on AD and AB equal distance from A and used to form arc for bisector Bisector of BAD drawn through correct intersecting arcs **SC B3** if no arc drawn centred on C but P located correctly by drawling line from C to the bisector of BAD	P correctly located	4	M1 M1 M1 A1 dep on M3 being awarded
16	$t = \frac{k}{a^2}$ $14 = \frac{k}{5^2}$ or k = 350 $224 = \frac{350}{a^2}$	1.25	4	M1 M1 assumes previous M1 M1 or $5 \times \frac{1}{4}$ A1 oe

Question	Working	Answer	Mark	Notes
17	$10^3 : 3^3$ (1000 : 27) **or** $20^3 : 6^3$ (8000 : 216) oe 1459.5 ÷ (1000 – 27) (=1.5) **or** 1459.5 ÷ (8000−216) (=0.1875) oe "1.5" × 27 **or** 0.1875 × 216 oe	40.5	4	M1 correct ratio for volume M1 correct calculation for SF needed to find volume of **B or** M2 for $1000x - 27x = 1459.5$ or $\frac{8000v_B}{216} - v_B = 1459.5$ or $\left(\frac{6}{20}\right)^3 = \frac{v_B}{v_B+1459.5}$ M1 A1
18 (a)		2,3,4,6,8,9,10, 12,14,15	1	B1 – no repeated values
(b)(i)		6,12	1	B1
(ii)		13	1	B1ft from (b)(i)
(c)		1,3,5,7,9,11, 13,15	1	B1
19	e.g. 30x +6y = 51 (+)30x− 6y = 78 → 60x = 129 30x + 6y = 51 (−)30x − 6y = 78 → 12y = −27 e.g. 10 × 2.15 + 2y = 17	x = 2.15, y = − 2.25	4	M1 first stage of method to eliminate one variable – allow one error only in multiplication – with intention to add or subtract as appropriate A1 for x = 2.15 or y = −2.25 M1 (dep on M1) method to find second variable. A1 for both 2.15oe and −2.25 oe dep on at least M1

Question	Working	Answer	Mark	Notes
20	$\overrightarrow{AB} = \begin{pmatrix} -12 \\ y-2 \end{pmatrix} \Leftrightarrow 169 = (y-2)^2 + 144$ $y - 2 = \pm 5$ $2 + 5\ (=7)$ or $2 - 5\ (=-3)$	7 or −3	4	M1 oe eg $\sqrt{13^2 - (7 - -5)^2}$ M1 A1, A1 allow (−5, 7) and (−5, −3) – one value find geometrically scores 3 marks
21	$m = \frac{38 - -22}{3a - -a} \left(= \frac{60}{4a} = \frac{15}{a}\right)$ $-22 = \frac{15}{a} \times -a + a$ or $38 = \frac{15}{a} \times 3a + a$ oe	$a = -7$, $m = -\frac{15}{7}$	4	M1 correct substitution for gradient M1 correct substitution of gradient into formula M2 for $-66 = -3ma + 3a$ $38 = 3ma + a$ $-28 = 4a$ Allow one slip A1 A1
22		Shows proof	4	M1 BC = DC (given C is midpoint of BD) M1 ACB = ECD (opposite angle) or BAC = CED (alternate angles) or ABC = EDC (alternate angles) M1 States 3rd link – one of equal angles not already mentioned A1 Concludes proof by stating ABC and EDC are congruent due to ASA

Question	Working	Answer	Mark	Notes
23	slant height = 136 ÷ 8 (=17) height = $\sqrt{17^2 - 8^2}$ (=15) volume = $\frac{1}{3} \times \pi \times 8^2 \times 15$ (=1005.3...) **or** k = $\frac{1}{3} \times 8^2 \times 15$	320	4	M1 M1 dependent on first M mark M1 dependent on first two M marks A1

Question	Working	Answer	Mark	Notes
24	$3-\frac{x+1}{(2x-1)(x+5)}-\frac{(2x-1)^2}{(2x-1)(x+5)}=1$ oe $2=\frac{4x^2-3x+2}{(2x-1)(x+5)}$ oe $2(2x^2+9x-5)=4x^2-3x+2$	$\frac{4}{7}$	4	M1 for use of a correct common denominator (no need to collect terms) M1 or $2(2x-1)(x+5)=x+1+(2x-1)^2$ – dependent on previous M mark M1 – dependent on both previous M marks A1oe allow 0.57 or better (0.5714....)
25	$\frac{w}{20}\times\frac{w-1}{19}=\frac{1}{19}$ oe $w(w-1)=20$ oe g = 8 w = 5 $\frac{8}{20}\times\frac{5}{19}+\frac{5}{20}\times\frac{8}{19}$	$\frac{80}{380}$	5	M1 M1 M1 M1 or $2\times\frac{1}{4}\times\frac{8}{19}$ A1 oe allow 0.21 or better (0.21052...)

Question	Working	Answer	Mark	Notes
26 (a)		$20 < m \leq 25$	1	B1
(b)				M1 for 25.5 or between 25th and 26th
		$15 < m \leq 20$	2	A1
(c)				M1 for xf calculated for at least 4 class intervals where x is a consistent number in the range for at least 5 values
	$(2.5\times4+7.5\times5+12.5\times11+17.5\times8+22.5\times22) \div 50$ $(10+37.5+137.5+140+495) \div 50$			M1 for xf calculated using the correct mid-values and dividing total by 50
		16.4	3	A1
27	$0.5(2x – 5)(x + 5) \times \sin30° = 15.75$			M1
	$2x^2 + 5x – 88 = 0$			M1
	$(2x – 11)(x + 8)$ (=0) or correct use of quadratic formula			M1 independent of previous M marks
	$x = 5.5$			M1 and rejecting $x = -8$
	$AC=\sqrt{6^2 + 10.5^2 – 2 \times 6 \times 10.5 \times \cos30^\circ}$			M1
		6.09	6	A1

Question	Working	Answer	Mark	Notes
28 (a)		$5x^2y(3x-4y)$	2	B2 B1 for 2 of 5, x^2 or y factorised with correct contents of brackets for this factor, e.g. $5x^2(3xy-4y^2)$, $5y(3x^3-4x^2y)$, $x^2y(15x-20y)$, $5xy(3x^2-4xy)$
(b)	$9x^4$			M1 for correct numerator
		$\frac{x}{2}$ oe	3	A2 fully correct, A1 for numerator of x **or** denominator of 2 **or** coefficient of ½ or 0.5
(c)	$2 \times 2^3 + 3 \times 2^2 + k \times 2 - 6 \ (=0)$			M1
		-11	2	A1