GCSE MARKING SCHEME

SUMMER 2023

GCSE
MATHEMATICS
UNIT 2 – INTERMEDIATE TIER
3300U40-1

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INTRODUCTION

This marking scheme was used by WJEC for the 2023 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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WJEC GCSE MATHEMATICS

SUMMER 2023 MARK SCHEME

Unit 2: Intermediate Tier	Mark	Comments
1.(a) (x =) 360 – (115 + 97 + 42) or equivalent. = 106	M1 A1	Check diagram for answer. Note: 360 – 254 Note: Award M1A1 for a correct embedded answer BUT only M1A0 if contradicted by $x \neq 106$.
1.(b) $y = \frac{180 - 78}{2}$ = 51	M1 A1	Check diagram for answer. Note: $\frac{102}{2}$ Award M1 for sight of 78 + y + y = 180. Note: Award M1A1 for a correct embedded answer BUT only M1A0 if contradicted by $y \neq 51$.
2.(a) $\frac{1}{6}$	B1	
2.(b) 31 43 47	B2	Answer space takes precedence. Award B2 for all three primes. Accept in any order. Award B1 for two correct primes. If no answers given on answer spaces, and numbers given are circled/clearly indicated, award B1 for one of the following: • two correct primes provided no more than 3 numbers selected • all 3 primes and 1 incorrect number if 4 numbers selected.
2.(c) (n =) 4	B1	Note: Award B1 for a correct embedded answer e.g. $3^4 = 81$, BUT B0 if contradicted by $n \neq 4$.
3. Isaac **36** Nadia **12** Dewi **24**	 B1 B1 B1	Answer space takes precedence. CAO FT ⅓ of 'their Isaac'. Allow truncation or rounding where a whole number does not result on FT. FT 2 × 'their Nadia'. Allow truncation or rounding where a whole number does not result on FT. If no answers are given on answer space, ages must explicitly be identified as a final answer for a possible B1B1B1.
4.(a) −2 (+)4	B2	Award B1 for one of the following: • −2 • 'their −2' + 6 evaluated correctly provided 'their –2' is negative.

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<table>
<tr><td>4.(b) 0·7 or equivalent</td><td>B2</td><td>Mark final answer.
Award B2 for unsupported 0·7 or not from incorrect working.
Award B1 for one of the following:
• sight of (+)27·9 (not (+)27·9g and not –27·9(g))
• sight of −27·2 (not −27·2h)
• 0·7 (with additional letters)
• a final answer of 55·1 (27·9 implied).</td></tr>
<tr><td>5.(a) Correctly drawn pie chart within tolerance AND correctly labelled

Red = 72(°) (allow 70° to 74°)
Green = 108(°) (allow 106° to 110°)</td><td>B3</td><td>Award B2 for one of the following:
• correctly drawn pie chart within tolerance but not labelled or incorrectly labelled
• pie chart drawn within tolerance but not a straight line
• pie chart drawn not starting from the centre (but with end point within tolerance)
• sight of red = 72(°)
• sight of green = 108(°).

Award B1 for sight of one of the following:
• 72(°)
• 108(°)
• (red=) $\frac{2}{10}$ × 360 or equivalent
• (red=) $\frac{2}{5}$ × 180 or equivalent
• (green=) $\frac{3}{10}$ × 360 or equivalent
• (green=) $\frac{3}{5}$ × 180 or equivalent
• ‘their derived 72’ and ‘their derived 108’ drawn correctly, provided that ‘their 72’ + ‘their 108’ = 180 and identified as red and green, and not 90°.</td></tr>
<tr><td>5.(b) D A C B</td><td>B2</td><td>Award B2 for writing the correct fractions in order
$\frac{1}{7}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{2}$

Award B1 for one of the following:
• sight of correct fractions
• BCAD (reversed order)
<table><tr><th>DCB in order</th><th>DAC in order</th><th>DAB in order</th><th>ACB in order</th></tr><tr><td>ADCB
DCAB
DCBA
DCB</td><td>BDAC
DBAC
DABC
DAC</td><td>CDAB
DCAB
DABC
DABC</td><td>ADCB
ACDB
ACBD
ACB</td></tr></table>
Do not accept repeated letters.</td></tr>
</table>

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6. $\frac{45}{1{\cdot}25}$ or equivalent	M2	May be seen in stages. Must be a complete and correct method e.g. $\frac{45}{75} \times 60$ or $\frac{45}{5} \times 4$ (working with 15 mins) Award M1 for sight of one of the following: • $\frac{45}{\text{1 hour 15 mins}}$ • $\frac{45}{1{\cdot}15}$ • 39·13(0…) • $\frac{45}{75}$ • 0·6
36 (mph)	A1	CAO.
7. 360 ÷ 15 or equivalent	M1	
= 24(°)	A1	Mark final answer. If no marks awarded, award SC1 for one of the following: • a final answer of 156° • sight of 24° (if final answer is not 24°).
8. (Volume of cuboid = 4 × 5 × 20 =) 400 (cm^3)	B1	Award B0 if 400 has come from incorrect working or if subsequent working is seen (e.g. finding the total surface area or 4 × 5 × 20 = 400, 400 × 2 = 800).
(Volume of cube = 3 × 3 × 3 =) 27 (cm^3)	B1	
(Number of cubes =) $\frac{4 \times 5 \times 20}{3 \times 3 \times 3}$ or equivalent	M1	FT 'their 400' ÷ 'their 27', provided 'their 27' ≠ 3 and that **B1 has previously been awarded or 4 × 5 × 20 and 3 × 3 × 3 seen.**
= 14·8(…..)	A1	May be implied in the final answer.
(Number of complete cubes =) 14	B1	FT only if truncation required. If $\frac{4 \times 5 \times 20}{3 \times 3 \times 3}$ = 14 (complete cubes) is seen, then award B1 B1 M1 A1 B1.
8. Organisation and Communication.	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Accuracy of writing.	W1	For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc

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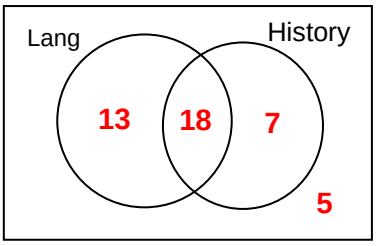
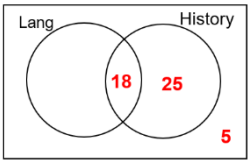
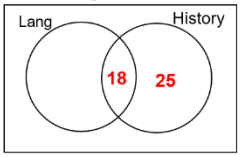
9.(a)(i)	235(°)	B1	
9.(a)(ii)	055(°)	B1	B0 for 55(°).
9.(b)	P and S	B1	Ignore any sketches (correct or incorrect). Accept in any order. Allow (00)5(°) and 355(°).
10.(a)	 5 AND 18 in correct position. Total of 25 for *History.* Overall total of 43	 B1 B1 B1	Diagram takes precedence. If 'notches/tallies' are used, penalise −1 once. Award B0 for one of the following: • any other number written in the same section • 4 and 1 written for 5. FT 'their 7' + 'their 18', provided both sections are non-zero and no section is blank. FT 'their 13' + 'their 18'+ 'their 7' + 'their 5' provided all sections are non-zero and no section is blank. Note: The following answers are awarded  B1B0B0  B0B0B0
10.(b)	$\frac{31}{43}$ or equivalent. ISW	B2	For B2 or B1, the numerator and denominator must both be whole numbers. For B2, accept: • 72·0(9…)% or 0·720(9…). • 72·1% or 0·721 • 72% or 0·72 from correct working. FT $\frac{\text{'their 13' + 'their 18'}}{43}$ provided neither section is blank. Award B1 for one of the following: • a numerator of 31 in a fraction < 1 • FT 'their 13' + 'their 18', provided neither section is blank, as a numerator in a fraction < 1 • a denominator of 43 in a fraction < 1. An answer of $\frac{31}{43}$ gains B2 regardless of 'their Venn diagram'. Penalise incorrect notation (e.g. '31 in 43') −1.

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11.(a) $7 + 5x - 10 = 3x + 8$ or equivalent. $2x = 11$ OR $-11 = -2x$ $x = \frac{11}{2}$ or 5·5 or equivalent.	 B1 B1 B1	FT until 2nd error. Bracket must be expanded or correct division by 5 e.g $x - 2 = \frac{3x}{5} + \frac{1}{5}$ (but not $x - 2 = \frac{3x + 1}{5}$) Or equivalent Correctly simplifying the equation to a single x term and number term (e.g. $2x - 11 = 0$). Mark final answer. Correct answer implies B1B1B1. Do not allow $-x = \frac{-11}{2}$ or $x = \frac{-11}{-2}$ A final answer of '11 ÷ 2' is B1B1B0. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction. Allow any decimal answer to be rounded or truncated to 1 or more decimal place. Allow B1B1B1 for a correct embedded answer BUT only B1B1B0 if contradicted by $x \neq \frac{11}{2}$ or equivalent. Note: $12x - 24 = 3x + 8$ B0 $9x = 32$ B1 (FT) $x = \frac{32}{9}$ or $3{\cdot}5(55\ldots)$ or $3{\cdot}6$. B1 (FT) If no marks awarded, award SC1 for sight of one of the following: • $5x - 10$ • $12x - 24$.
11.(b) $2f = 13 - h$ or $h - 13 = -2f$ $f = \frac{13 - h}{2}$ or $\frac{h - 13}{-2} = f$ or equivalent	B1 B1	Or equivalent. Or equivalent. Must not come from incorrect working. Mark final answer. FT only from $\pm 2f = \pm 13 \pm h$. Unsupported $f = \frac{\pm 13 \pm h}{\pm 2}$ implies B0B1 unless B2. Award B1B0 for $-f = \frac{h - 13}{2}$ or equivalent. **If no marks**, award SC1 for a final answer of either: • $f = (13 - h) \div 2$ with or without brackets • $f = (h - 13) \div -2$ with or without brackets • $\frac{13 - h}{2}$ ('f =' missing). • $\frac{h - 13}{-2}$ ('f =' missing).
11.(c) $5(3x - 7y)$	B1	Mark final answer. Allow $-5(-3x + 7y)$ or $5(3x + -7y)$.

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12.(a) P(Bronze) = 0·2 **AND** P (No Prize) = 0·6 or equivalent	B2	The values in the table takes precedence. Award B1 for one of the following: • P(Bronze) = 0·2 (must be clearly identified) • P(No Prize) = 0·6 • P(Bronze) + P(No Prize) = 0·8 • P(Bronze) = ⅓ P(No Prize) provided both <1.
12.(b) 15 ÷ 0·02 × 0·18 or 15 × 9 or equivalent = 135	M1 A1	Must be for a complete method e.g. • 15 ÷ 2 = 7·5 7·5 × 18 = 135 • 750 – (450 + 150 + 15) • 0·02 : 0·18 15 : 135 (e.g 0·18 × 750, or 15 × 9) Award M1 A1 for a final answer of 15 : 135. Sight of 135 as a numerator in a fraction < 1 implies M1A0.
13. One correct evaluation $2 \le x \le 3$ 2 correct evaluations $2{\cdot}55 \le x \le 2{\cdot}75$, **(one evaluation < 0, one evaluation > 0)** 2 correct evaluations $2{\cdot}55 \le x \le 2{\cdot}65$, **(one evaluation < 0, one evaluation > 0)** $x = 2{\cdot}6$	 B1 B1 M1 A1	*Correct evaluation regarded as enough to identify if negative or positive.* *If evaluations not seen accept 'too high' or 'too low'.* *Look out for equating* $x^3 - 8x = -3$ x — $x^3 - 8x + 3$ 2 — –5 2·1 — –4·539 — 2·55 — −0·818…. 2·2 — – 3·952 — 2·61 — −0·1004… 2·3 — −3·233 — 2·62 — 0·0247… 2·4 — −2·376 — 2.63 — 0·1514… 2·5 — −1·375 — 2.64 — 0·2797… **2·6 — −0·224 — 2·65 — 0·409…** **2·7 — 1·083** — 2·75 — 1·796.. 2·8 — 2·552 2·9 — 4·189 3 — 6 Unsupported $x = 2{\cdot}6$ is awarded B0B0M0A0. An answer of $x = 2{\cdot}6$ can only be awarded M1A1, following sight of 2 correct evaluations $2{\cdot}55 \le x \le 2{\cdot}65$ (**one evaluation** < 0, **one evaluation** > 0).
14.(a) 1·2	B2	Mark final answer. Award B1 for one of the following: • sight of 1·1(5519…..). • an answer of 1·20. Do not award B2 or B1 for answers obtained from incorrect work (e.g. rounding and/or estimating).
14.(b) 0·043	B2	Mark final answer. Award B1 for sight of one of the following: • $\frac{1}{23}$ • 1 ÷ 23 • 0·0434(…) • 0·0435 • 0·04.
14.(c)(i) 12	B1	
14.(c)(ii) 5	B1	

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15.(a) (x =) $\sin^{-1}\dfrac{7{\cdot}7}{11{\cdot}3}$ or $\sin^{-1}\dfrac{7{\cdot}7 \times \sin 90}{11{\cdot}3}$ or equivalent Allow an answer between 42·8 and 43(°) ISW	M2 A1	Check diagram for answers Award M1 for one of the following: • $\sin x = \dfrac{7{\cdot}7}{11{\cdot}3}$ (= 0·68(1..)) • $\dfrac{\sin x}{7{\cdot}7} = \dfrac{\sin 90}{11{\cdot}3}$ or equivalent Allow correct angles given in radians or gradians:

Method	Radians	Gradians
$\sin^{-1}\dfrac{7{\cdot}7}{11{\cdot}3}$	0·7496…	47·727….
$\sin^{-1}\dfrac{7{\cdot}7 \times \sin 90}{11{\cdot}3}$	0·655…	47·001

15.(a) *Alternative method* ***Correct** use of a 'two-step' method.* Allow an answer between 42·8 and 43(°) ISW	*M2* *A1*	*A partial trigonometric method is M0.* *Allow 42·8(…°)* *Allow correct angles given in radians or gradians.*

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15.(b) *DBE* = (90 – 43) = 47(°) OR *BED* = 43(°)	B1	Check diagram for answers. **Strict FT** for *DBE* = 90 – 'their x' or *BED* = 'their x', provided 'their x' ≠ 45°. Note: *DBE* must be acute for B1. May be implied in further work.
Valid method to find the length *DE* *DE* = 13·1 × tan 47 $DE = \frac{13{\cdot}1}{\tan 43}$ $DE = \frac{13{\cdot}1 \times \sin 47}{\sin 43}$	M2	If B1 already awarded for 'their angle *DBE*' but then 'their angle *BED*' is incorrect and 'their *BED*' is then used (or vice versa) for either M2 or M1, then award B0 previously. Or award M2 for correct use of a 'two-step' method (e.g. 'Pythagoras and similar triangles' or 'Pythagoras and correct trigonometric relationship'). FT 'their angle *DBE*' or 'their angle *BED*' provided not 0°, 45°, 90° or 180°. Award M1 for one of the following: • $\tan 47 = \frac{DE}{13{\cdot}1}$ • $\tan 43 = \frac{13{\cdot}1}{DE}$ • $\frac{DE}{\sin 47} = \frac{13{\cdot}1}{\sin 43}$ or equivalent For all M2 or M1 scenarios, FT their clearly stated or shown angle *BED* or *DBE* where appropriate. For $\frac{13{\cdot}1 \times \sin 47}{\sin 43}$ FT their clearly stated or shown angles *BED* and *DBE* **only** if *BED* + *DBE* = 90°.
DE in the range 14·04 to 14·1 (cm) ISW	A1	Allow 14 from correct workings. FT from M2 only and provided that angle is acute and leads to a positive answer. Award B1M2A0 for any of the following unsupported answers:

Method	Radians	Gradians
13·1 × tan 47	-1·63 to 1…	11·92 to 12
$\frac{13{\cdot}1}{\tan 43}$	-8·743 to -5·36	16·35 to 16·5
$\frac{13{\cdot}1 \times \sin 47}{\sin 43}$	-1·95 to 1·08	14·1 to 14·21

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16.(a) $\times 0{\cdot}95^4$	B1	
16.(b) Sight of 0·83 OR 83% $\frac{3569}{0{\cdot}83}$ or $\frac{3569}{83} \times 100$ or equivalent $= 4300$	B1 M1 A1	Allow (100 –17 =) 83 FT 'their 1 – 0·17' provided <1 or 'their 100% – 17%' provided < 100%. Award B1M1A1 for an embedded answer (e.g. $0{\cdot}83 \times 4300 = 3569$ or $\frac{3569}{4300} \times 100 = 83$), BUT only B1M1A0 if contradicted by stating original amount ≠ 4300. Unsupported 4300 is awarded B1M1A1.
17. Method to eliminate one variable e.g. equal coefficients **AND** <u>appropriate intention to</u> add or subtract or use a method of substitution. First variable found $x = 4{\cdot}3$ or $y = 2{\cdot}6$ or equivalent Substitute to find the 2nd variable. Second variable found	M1 A1 m1 A1	Allow one error in one term (not the term with equal coefficients). CAO Award A0 for expressing the final answers in a form such as $y = \frac{33{\cdot}8}{13}$. FT substitution of their '1st variable' if M1 gained. No marks for 'trial and improvement'. No marks for an unsupported answer.
18. $\frac{\pi \times r^2}{2} = 77$ or equivalent $r^2 = 49(\cdot 0\ldots)$ or $r^2 = \frac{154}{\pi}$ $r = 7(\cdot 0\ldots)$ (Area of trapezium =) $\frac{2 \times 7(\cdot 0\ldots) + 22}{2} \times 7(\cdot 0\ldots)$ or equivalent $= 126{\cdot}0(\ldots)(\text{cm}^2)$	M1 m1 A1 M1 A1	Check diagram for answers. Sight of 49(·0…) implies M1m1. FT 'their r^2' provided M1 awarded. 7 must not be from incorrect working. FT 'their derived or stated r'. Accept 126·1 or 126 (cm^2) Mark final answer.

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