GCSE MARKING SCHEME

SUMMER 2023

GCSE
MATHEMATICS
UNIT 1 – INTERMEDIATE TIER
3300U30-1

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.

WJEC GCSE MATHEMATICS

SUMMER 2023 MARK SCHEME

Unit 1: Intermediate Tier	Mark	Comments
1. Showing 40% and (9%) and 30% OR $\frac{40}{100}$ and $\frac{9}{100}$ and $\frac{30}{100}$ OR 0·4 and 0·09 and (0·3) OR three correct calculations for a common amount.	B2	Award B2 for one of the following: • all correct % ($\frac{40}{100}$ or $\frac{30}{100}$ must be shown as 40% or 30%) • all correct fractions with a **common denominator** (could include decimals as numerators and denominators) • all correct decimals • correct work using a common amount • a valid combination that allows full comparison (e.g. 2/5 = 0·4 and 0·3 = 30%). Award B1 for one of the following: • one correct conversion (percentage or decimal) • two correct fractions with a common denominator • two correct calculations for a common amount.
9% 0·3 $\frac{2}{5}$ in order	B1	Allow any unambiguous indication (e.g. 'converted' values.) Correct answer with no incorrect conversions seen gains the final B1. If incorrect conversions seen, then **strict FT** of 'their work' only if B1 gained. Correct answer, with no other marks awarded, gains final B1 only.
2. Length = 20 (cm) Width = 4 (cm)	B2	Answer space takes precedence. Must be in the correct order for B2. Award B1 for one of the following as a final answer or final attempt: • length × width = 80 (e.g. length = 4 AND width = 20 or length = 16 AND width = 5) • 80 ÷ width = length e.g 80 ÷ 5 = 16 or 80 ÷ 20 = 4 or 80 ÷ 10 = 8 • length = 5 × width e.g length = 16 AND width = 3·2 or 3 × 5 = 15 If no answers are given on answer space: • Length = 20 (cm) and Width = 4 (cm) must be explicitly identified as a final answer for B2.
3.(a)(i) $(x =)$ 24	B1	Mark final answer. Allow B1 for a correct embedded answer BUT B0 if contradicted by $x \neq 24$.

<table>
<tr><td>3.(a)(ii)
$3x = 27$
$(x =)$ 9</td><td>B1
B1</td><td>Mark final answer.

FT from $3x = k$.
Unsupported answer of 9 is awarded B1B1.
$x = \frac{27}{3}$ is awarded B1B0.
If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction (e.g. if $3x = 7$, then $x = \frac{7}{3}$ is awarded B0B1, but $x = 7 \div 3$ is awarded B0B0).

Allow B1B1 for a correct embedded answer BUT B1B0 if contradicted by $x \neq 9$.</td></tr>
<tr><td>3.(b)
$8f - 13g$</td><td>B2</td><td>Mark final answer.
Must be an expression for B2.
Award B1 for one of the following:
• sight of $(+)8f$
• sight of $-13g$ (do not allow …..– $-13g$)
• $8f + -13g$.</td></tr>
<tr><td>4.(a) 11 lb</td><td>B1</td><td></td></tr>
<tr><td>4.(b) 175 pints</td><td>B1</td><td></td></tr>
<tr><td>5.

$2(n - 7)$ or equivalent e.g. $2n - 14$.</td><td>B3</td><td>Answer space takes precedence.

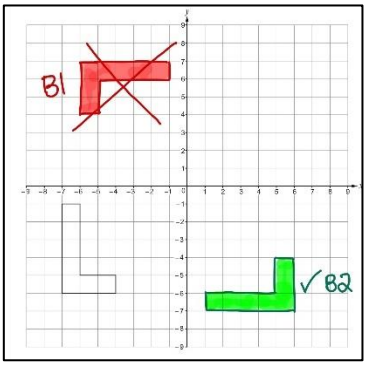
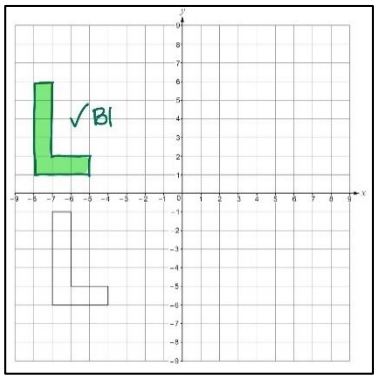
For B3, accept as a final answer of:
• $2 \times (n - 7)$
• $(n - 7)2$
• $(n - 7) \times 2$.
Award B2 if incorrect subsequent working for one of the above.

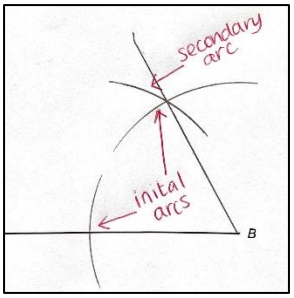
Award B2 for sight of one of the following:
<table><tr><th>missing brackets</th><th>error in Samir's age</th></tr><tr><td>• $2 \times n - 7$
• $n - 7 \times 2$</td><td>• $2(n + 7)$
• $2 \times (n + 7)$
• $(n + 7)2$
• $(n + 7) \times 2$
• $2(7 - n)$
• $2 \times (7 - n)$
• $(7 - n)2$
• $(7 - n) \times 2$
• $2n + 14$
• $14 - 2n$</td></tr></table>
Award B1 for sight of one of the following:
• $n - 7$
• $2 \times n + 7$
• $n + 7 \times 2$
• $2 \times 7 - n$
• $7 - n \times 2$
• $2n - 7$
• $n - 14$
• $n - 72$.

Allow use of a different letter for n.</td></tr>
</table>

6.(a) 28	B1	Allow B1 for a correct embedded answer (e.g. 28 ÷ 4 = 7 BUT B0 if contradicted by total ≠ 28). Allow the sequence 7,14,21,28 for B1, but only if no further numbers are shown.
6.(b) Four numbers (in any order) with a total of 28 and range of 6 e.g. **3 7 9 9** **3 8 8 9** **4 7 7 10** **4 6 8 10** **4 5 9 10** **4 4 10 10** **5 5 7 11** **5 6 6 11**	B2	Numbers may be seen in any order. Accept answers using fractions and decimals. FT 'their total' from 6(a). Award B1 for **four** numbers with one of the following: • total = 28 • total = 'their total' from 6(a) • range = 6.
7. a = 63(°) b = 117(°) c = 117(°)	 B1 B1 B1	Answer line takes precedence. Check diagram for answers if no answers written on answer lines. FT 'their b'.
8. Identifying 12 possible combinations Identifying the 3 correct combinations that give a score of 6 or more (**2** and **4**, **3** and **3**, **3** and **4**) (Probability of '6 or more' =) $\frac{3}{12}$ or equivalent ISW (but note comment for M1 below) (Number of winning scores =) $\frac{3}{12}$ × 60 or equivalent = 15	B1 B1 B1 M1 A1	Award B1 for convincing identification of the 12 combinations, for example: • simply stating 12 • (3 × 4 =) 12 • showing all combinations 1+1, 1+2, etc. • all 12 'totals' • (2,3,3,4,4,4,5,5,5,6,6,7) shown with no extras • completed sample space drawn (3 by 4). **Strict FT** only if a list of all possible scores previously stated. A fraction with a denominator of 12 implies the first B1. Unsupported $\frac{3}{12}$ or equivalent implies previous B1B1. Probability may be implied in later working (e.g. 60 ÷ 12 = 5, 5 × 3 = 15). FT if a clear numerator and denominator can be identified from previous work. e.g. Possible scores 2, 3, 4 ,5, 6, 7 (B0) 2 scores of 6 or more (B1 FT) Probability = $\frac{2}{6}$ (B1 FT) FT 'their $\frac{3}{12}$' If 'their $\frac{3}{12}$' incorrectly simplified and used then award B0 previously. Must not come from incorrect working. Award M1 A0 for a final answer of ($\frac{3}{12}$ =) $\frac{15}{60}$ Note: using 'a winning score of 6' instead of 'a winning score of 6 or more' can be awarded a maximum of B1B0B1M1A1.

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.
9.(a) $\frac{48}{400}$ (× 100) or equivalent = 12(%)	M1 A1	M1 for sight of 0·12. Note: other complete valid methods to look out for include: • 48 ÷ 4 • 10% + 1% + 1% (= 40 + 4 + 4) • (48 out of 400 =) 12 out of 100 = 12(%)
9.(b) Use of $\frac{45}{9}$ or equivalent (£)40 AND (£)5	M1 A1	Sight of an appropriate 5 (or 40) implies M1. Accept in either order.
9.(c) (1 −) $\frac{1}{8}$ = $\frac{7}{8}$	B1 B1	Award B1 for sight of $\frac{1}{8}$ or 0·125 or 1 ÷ 8. FT from 1 – $\frac{m}{n}$ where $\frac{m}{n}$ clearly shown as 'their $\frac{1}{8}$' provided it is written as a fraction and not $\frac{1}{2}$ Mark final answer. A final answer of 0·875 is awarded B1B0.
9(c) Alternative method $\frac{8-1}{8}$ *or* $\frac{2^3-1}{2^3}$ = $\frac{7}{8}$	*B1* *B1*	*For consistent correct use of $2^3 = 8$* *FT for 'their consistent value of 2^3'* *e.g. $\frac{6-1}{6}$ = $\frac{5}{6}$ gains B0B1.* *Mark final answer.* *A final answer of 0·875 is awarded B1B0.*
10. $\frac{3}{4}$ × 512 OR 512 – $\frac{1}{4}$ × 512 or equivalent = 384 $\frac{3}{4}$ × 384 OR 384 – $\frac{1}{4}$ × 384 or equivalent (OUTPUT =) 288 ISW	M1 A1 M1 A1	Award M1 for full method for calculating the OUTPUT.(Note: 512 – 128). Award M1 for full method for calculating the OUTPUT.(Note: 384 – 96). FT 'their 384' if greater than 300. FT if 'their 288' < 300, or further evaluation correctly carried out until their output < 300. If no marks gained allow SC1 for sight of 128. Award M2 for $\frac{9}{16}$ × 512 with answer of 288 is awarded A2.

11.(a)		B2	Award B2 for the correct rotation drawn with no other shapes drawn on the grid. Award B1 for a 90° correct clockwise rotation with either: • no other shapes drawn on the grid • the correct rotation (no others).
11.(b)(i)		B1	
11.(b)(ii)	$\begin{pmatrix}1\\-7\end{pmatrix}$	B1	Award B0 for • $\begin{matrix}1\\-7\end{matrix}$ (missing brackets) • $\begin{pmatrix}-7\\1\end{pmatrix}$ • (1,−7) • $\frac{1}{-7}$ with or without brackets. • $-\begin{pmatrix}-1\\7\end{pmatrix}$.
12.(a)	For a single method that produces 2 prime factors from the set {3, 3, 3, 5, 5} before the 2nd error. 3, 3, 3, 5, 5 $3^3 \times 5^2$	M1 A1 B1	Must be a method that involves only division. Check for errors in the method before checking the 2 prime factors from the set. (Note 675 = 5 × 135 675 = 3 × 225 135 = 5 × 27 135 = 3 × 45) CAO. For sight of the five correct factors (Ignore 1s) Do not FT non-primes. FT 'their primes' provided at least one index form used with at least a square. Allow $(3^3)(5^2)$ and $3^3.5^2$ and 3^35^2 Do not allow $3^3,5^2$ Inclusion of 1 as a factor gets B0.
12.(b)	10	B1	Do not accept 2 × 5.
13.(a)(i)	m^7	B1	
13.(a)(ii)	m^{10}	B1	
13.(b)	$7n-3$	B2	Mark final answer. B1 for sight of $7n$. Allow notation of $n7$ or $7\times n$ or $n\times 7$ for $7n$. Allow N for n, but penalise –1 for use of a different letter.

13.(c)	7, 8 and 9	B2	Answer line takes precedence. Award B2 for all three integers and no extras. Award B1 for one of the following indicated as a final answer: • 7, 8, 9 and only **one** other incorrect value • for two correct with no incorrect value • 7 to 9 • 7, 7·5, 8, 8·5, 9 • sight of $6.5 < n < 9.5$ or equivalent • 14,16,18 • 14,15,16,17,18. Allow B2 for correct embedded answers of 7, 8 and 9 (e.g. sight of only $2 \times 7 = 14$, $2 \times 8 = 16$, $2 \times 9 = 18$ with no other calculations) BUT only B1 if contradicted on answer line (e.g. 14, 16, 18 for the example above).
14.(a)	Correct construction of 60°	B1	Must be at point *B*. Correct construction arcs (two or three) must be seen (initial and secondary). B0 if 60° and 30° drawn. Ignore additional lines provided intended 60° is clear (e.g any triangle, including equilateral *ABC*). For example: 
14.(b)	Correct construction of 90°	B1	Must be at point *R* above or below *LM*. Correct construction arcs (initial and secondary) **must** be seen.
14.(c)	All correct construction arcs shown	M1	Arc, centre P, intersecting *XY* at two points. (*X* may be one of the points with no arc seen at point *X*) [Note to markers: These arcs may be identified by the fact that they will 'cross the line *XY* at an acute angle'. Arcs 'crossing the line at 90°' is evidence of an inappropriate method.] **AND** Intersecting arcs (equal radii) using the above two points as centres. Ignore line extended above *XY* for M1.
	Line drawn	A1	Ignore line extended above *XY* for M1A1.
14.(c)	*Alternative method* *(Using the properties of a kite.)* *All correct construction arcs shown.*	*M1*	*Intersecting arcs whose centres are **any** two points on the line XY and respective radii equal in length to the distance from the points to the point P.* *[Note to markers: The arcs will always intersect at a point that is a 'reflection of point P' in the line XY.]*
	Line drawn	*A1*	

15. $(AC^2 =)\ 8^2 + 6^2$ $(AC =)\ \sqrt{8^2 + 6^2}$ or equivalent $(AC =)$ 10 (cm) (Curved length =) • $\frac{6 \times 3{\cdot}14}{2}$ • $\frac{2 \times 3 \times 3{\cdot}14}{2}$ • $3 \times 3{\cdot}14$ • 3π • 9·42 or equivalent (Perimeter of shape = 8 + 10 + 9·42 =) 27·42(cm)	M1 m1 A1 B1 A1	Check diagram. Note: $(AC^2 =)\ 64 + 36$ FT from $\sqrt{'their\ 8^{2'} + 'their\ 6^{2'}}$ CAO. Final answer of AC = 100 is M1m0A0. Do not ignore subsequent working e.g. 3 × 3·14 = 9·42, then 9·42 × 2 or 9·42 ÷ 2 would gain B0. Allow 27·4(cm). Award A0 for 18 + 3π. FT 'their *AC*' **only** if M1 gained. FT 'their curved length' **only** if B0 awarded **and** for one of the following: • 3·14 used to find the circumference of a circle • area of a semicircle used. For example, M1m1A1 awarded for 10 (cm), B1 for 3 × 3·14 = 9 (cm) A0 for 8 + 10 + 9 = 27 (cm) as B1 previously awarded. Note, if a final answer of: • 33·4(2)(cm) is given (6cm also included) award M1m1A1B1A0 • 36·8(4)(cm) is given (full circumference used) award M1m1A1B0A1 • 32·1(3) (cm) is given (area semicircle used) award M1m1A1B0A1.
16. Sight of 4(hr) 35(min) AND 2(hr) 45(min) OR Sight of 275(min) AND 165(min) OR sight of 2 × 5(min) in an appropriate calculation. Valid method e.g. • 4(hr) 35(min) + 2(hr) 45(min)(=6(hr) 80(min)) 275(min) + 165(min) (= 440 (min)) • 6 (hr) 90 (min) – 10 (min) • 7 (hr) 30 (min) – 10 (min) • 4(hr) 40(min) + 2(hr) 50(min) – 10 (min) • 280 (min) + 170 (min) – 10(min) 7 (hr) 20 (min)	B1 M1 A1	Allow incorrect notation for time (e.g. 4:35 for 4(hr) 35(min)). If B0, FT provided unambiguously chosen: '4h 30m ≤ t_1 < 4h 40m' and '2h 40m ≤ t_2 < 2h 50m' OR '270m ≤ t_1 < 280m' and '160m ≤ t_2 < 170m' Allow incorrect notation for time (e.g. 4:35 for 4(hr) 35(min)). CAO. If units are given they must be correct. Award B1M1A0 for a final answer of 6hrs 80min, 6:80 or 7:20.
17.(a) P(Bus =) 1 − 0·25 − 0·45 = 0·3 AND shown on relevant branch. 0·96 shown on <u>all</u> three branches.	M1 A1 B1	 Award M1A0 for 0·3 in working space and not on diagram.
17.(b) 0·25 × 0·04 or equivalent = 0·01 or equivalent	M1 A1	 CAO

18. (Length) Area None Length Volume Length	B3	*Must use the terminology given in the question.* B3 for all 5 correct. B2 for 3 or 4 correct. B1 for 2 correct. B0 otherwise.
19.(a) $7{\cdot}6 \times 10^{-3}$	B1	
19.(b) 6×10^{5}	B1	
19.(c) $2{\cdot}8 \times 10^{4}$	B2	Mark final answer. Award B1 for one of the following: • sight of 28×10^{3} • sight of 28 000 • equivalent correct value but not in standard form • sight of 23 000 AND 5000 • 'their 28000' is written correctly in standard form, following one place value error in one of the numbers from work seen.
20.(a) (*AOY* =) 36(°) (% shaded =) $\frac{36}{360}$ (× 100) or equivalent = 10(%)	B1 M1 A1	Check diagram. FT 'their derived or stated angle *AOY*' provided not 54°. Award M0A0 for $\frac{360(°)}{36(°)} = 10$, but award M1A1 if a final answer of 10% is seen. If no marks awarded, award: • SC2 for unsupported 10% (*AOY* not shown or stated to be 36(°)) • SC1 for a final answer of 15% (from using 54(°)).
20.(b) Statement explaining that, 'The **tangent** at any point on a circle is **perpendicular** (or equivalent) to the **radius** at that point'.	E1	Accept unambiguous similar wording. e.g. 'Radius and tangent 90(°)'. Diameter could be used in place of radius. Must refer to tangent and radius by name (not simply *AY* and *OA* or description).