



GCSE MARKING SCHEME

AUTUMN 2023

**GCSE
MATHEMATICS
UNIT 2 – INTERMEDIATE TIER
3300U40-1**

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.

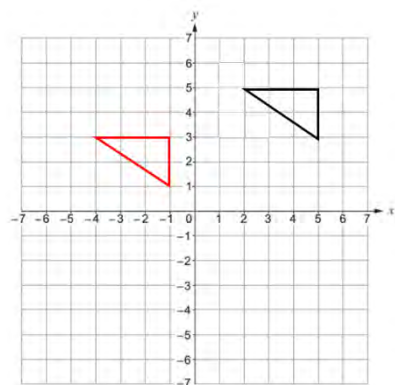
WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCSE MATHEMATICS
AUTUMN 2023 MARKING SCHEME

GCSE Mathematics Unit 2: Intermediate Tier		Mark	Comments
1. (a)	3.5 pints	B1	
1.(b)	20 miles	B1	
2.(a)	55% or 0.55 or $\frac{55}{100}$ or $\frac{11}{20}$ or equivalent	B1	Allow 55. Do not accept 0.55%.
2.(b)	$\frac{1}{2}$	B1	
3.(a)	$8a = 27.5 - 3.5$ or $8a = 24$ $a = 3$	B1 B1	Mark final answer. FT from $8a = k$. Unsupported correct answer implies B1B1. Award B1B0 for a final answer of $24 \div 8$ or $\frac{24}{8}$. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction or a decimal, either rounded or truncated. Allow B1B1 for a correct embedded answer BUT only B1B0 if contradicted by $a \neq 3$ or equivalent.
3.(b)(i)	-22.5 or $-\frac{45}{2}$ or equivalent ISW	B1	
3.(b)(ii)	A correct expression: <ul style="list-style-type: none"> $5(n - 6)$ $5n - 30$ $5 \times (n - 6)$ $(n - 6) \times 5$ 	B2	Mark final answer for B2. Must include brackets or be fully simplified for B2. Allow $(n - 6)5$ for B2. Award B1 for sight of one of the following: <ul style="list-style-type: none"> $n - 6 \times 5$ $5 \times n - 6$ a correct expression with incorrect final answer, e.g. $5(n - 6) = 5n - 6$. Award B0 for unsupported <ul style="list-style-type: none"> $n - 30$ $5n - 6$.

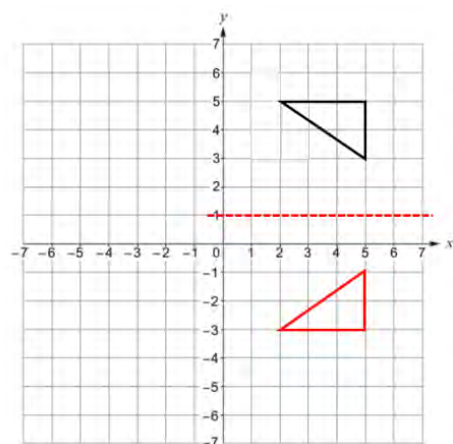
4.	9·2	B2	<p>Answer line takes precedence. Award B2 for all three clues satisfied.</p> <p>Award B1 for one of the following on the answer line:</p> <ul style="list-style-type: none"> • 6·9 • 11·5 • 84·64 • $9 \cdot 2^2$ <p>Award B2 if answer line is blank but a final answer of 9·2 is clearly embedded (e.g. $9 \cdot 2^2$) in the working space.</p> <p>Award B1 if a final answer of 9·2 is contradicted on the answer line (e.g. $9 \cdot 2^2 = 84 \cdot 64$ in working space, but 84·64 is written on the answer line).</p>
5.(a)	120	B2	<p>120 must come from correct working. Unsupported 120 is awarded B2.</p> <p>Award B1 for one of the following:</p> <ul style="list-style-type: none"> • sight of $117(\cdot 0631\dots)$ rounded or truncated. • an answer of 120 from $117 \cdot \dots$
5.(b)	141·2	B2	<p>141·2 must come from correct working. Unsupported 141·2 is awarded B2.</p> <p>Award B1 for one of the following:</p> <ul style="list-style-type: none"> • $141(\cdot 183\dots)$ rounded or truncated • $\frac{74\sqrt{91}}{5}$ • an answer of 141·2 correctly rounded from 141·1..... or 141·2.....
6.	(Hours worked on Friday =) 4·5 (hours)	B2	<p>Answer space takes precedence. Mark final answer. Accept $4\frac{1}{2}$ (hours).</p> <p>Award B1 for sight of one of the following:</p> <ul style="list-style-type: none"> • Correct time given but not in hours (e.g 4 hours 30 mins, 270 minutes) • 9 (hours for M,T,W) from correct working • method to arrive at hours for full day (e.g. $4x = 36$) • method to arrive at hours for half day (e.g. $8y = 36$) • 4·5 seen but then incorrect workings seen (e.g 4 hours 50 minutes, 4 hours 30).

7. (a) Correct translation



B1

7. (b) Correct reflection in $y = 1$.




B2

Award B1 for one of the following:

- correct reflection in $x = 1$
- sight of the line $y = 1$ unambiguously indicated.

<p>8. (Length of A = $35 \text{ cm} \div 5 \times 2 =$) 14 (cm) (Total length of B and C = $35 - 14 =$) 21 (cm) (Length of B =) $21 \div (1 + 6)$ OR (Length of C =) $21 \div (1 + 6) \times 6$ (Length of B =) 3 (cm) AND (Length of C =) 18 (cm)</p>	<p>B1 B1 M1 A1</p>	<p>Check diagram for answers. Not from incorrect working. FT 35 – ‘their 14’. Not from incorrect working. Strict FT ‘their 21’ (including 35 and 14) $\div 7$ Sight of 3 or 18 implies M. FT ‘their 21’ $\div 7 \times 6$. Penalise -1 only once if their A, B or C labelled incorrectly.</p>
<p><u>8. Alternative method</u> (Total length of B and C = $35 \text{ cm} \div 5 \times 3 =$) 21 (cm) (Length of A = $35 - 21 =$) 14 (cm) (Length of B =) $21 \div (1 + 6)$ OR (Length of C =) $21 \div (1 + 6) \times 6$ (Length of B =) 3 (cm) AND (Length of C =) 18 (cm)</p>	<p>B1 B1 M1 A1</p>	<p>Check diagram for answers. Not from incorrect working. Not from incorrect working. FT 35 – ‘their 21’ Strict FT ‘their 14’ (including 35 and 14) $\div 7$ Sight of 3 or 18 implies M1 FT ‘their 21’ $\div 7 \times 6$. Penalise -1 only once if their A, B or C labelled incorrectly.</p>
<p>Organisation and Communication.</p> <p>Accuracy of writing.</p>	<p>OC1 W1</p>	<p>For OC1, candidates will be expected to:</p> <ul style="list-style-type: none"> • 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 <p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> • 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) $x = 2$ drawn	P1	Award P0 if other lines are drawn unless $x = 2$ is unambiguously indicated. Ignore the line $y = 8$ drawn from (0,8) to the given line. Their line must be drawn must at least 5 small squares in length.
9. (b) (2 , 8)	B1	FT correct intersection of 'their drawn straight line $x = 2$ ' and the given line.
10.  10% $£92(.00)$ 36×0.135 or equivalent $£4.86$	B1 B1 M1 A1	Numbers shown in the boxes take precedence. If answer boxes are left blank allow unambiguous indication of their three answers. FT $9.2 \div \text{'their } 0.1 \text{' (i.e. 'their } 10\% \text{'})}$. Allow $36 \times \frac{13.5}{100}$ or equivalent for M1.
11. (Radius of smaller circle =) 4 (cm) AND (Radius of larger circle = $4 + 2 =$) 6 (cm) (Width of rectangle = $8 + 2 + 2$ or $6 + 6 =$) 12 (cm) AND (Length of rectangle = $8 + 2 + 2 + 8$ or $6 + 6 + 8 =$) 20 (cm) (Shaded area =) $20 \times 12 - \pi \times 4^2 - \pi \times 6^2$ or $(12 \times 12) - \pi \times 6^2 + (12 \times 8) - \pi \times 4^2$ Accept answers in the range 76.6 to 76.72 (cm ²) or $240 - 52\pi$ (cm ²)	B1 B1 M2 A1	Check diagram for answers. May be seen or implied in later working. May be seen or implied in later working. Implies previous B1. FT $2 \times \text{'their } 6 \text{'}$. FT $8 + 2 \times \text{'their } 6 \text{'}$. FT 'their 12(cm)' and 'their 20(cm)' for a possible M2 and possible A1. FT 'their 4(cm)' and 'their 6(cm)' for a possible M2 A0. If a 12×12 square and 12×8 rectangle used, the previous B1 is implied. Award M1A0 for sight of any of the following (FT 'their 12(cm)', 'their 20(cm)', 'their 4(cm)' and 'their 6(cm)'): • (Area of the smaller circle =) $\pi \times 4^2 (= 50.265... \text{cm}^2)$ • (Area of the larger circle =) $\pi \times 6^2 (= 113.097.. \text{cm}^2)$ • (Shaded area =) $20 \times 12 - \pi \times x^2 - \pi \times y^2$ Allow 77 (cm ²) from correct working.

12.(a) 110(°)	B1	Award B1 for an answer in the range 108(°) to 112(°).
12.(b) 335(°)	B1	Award B1 for an answer in the range 333(°) to 337(°).
13.(a) 1 10	B2	B1 for each. Table takes precedence if conflicting values given.
13.(b) At least 4 correct plots and no incorrect plot. A smooth <u>curve</u> drawn through their plots.	P1 C1	FT 'their (-2,1)' and 'their (1,10)' OR (-2,1) and (1,10) plotted. Allow $\pm \frac{1}{2}$ a small square'. FT 'their 6 plots'. OR a curve through the 4 given points AND (-2,1) and (1,10) Allow intention to pass through their plots. (± 1 small square horizontally or vertically.)
14. (a) (Area =) $\frac{7.4 + 9.1}{2} \times 5.7$ or equivalent $\times 15.6$ Allow an answer from 733 to 734 (cm ³) inclusive.	M1 m1 A1	(= 47.025) May be seen in stages. Allow M1 for correct intent <u>seen</u> . e.g. $7.4 + 9.1 \times 5.7 \div 2$ CAO <i>Note: 733.59 or 733.6 (cm³)</i>
14. (b) 733.59×19.3 $14158(.287 \text{ (g)})$ Allow an answer from 14.1 to 14.2 (kg) inclusive.	M1 A1 B1	FT 'their volume from (a)' $\times 19.3$ FT 'their 14158.287' $\div 1000$ Allow 14 from correct working. <i>Note: 14.158(287) or 14.16 or 14.2 (kg)</i>
14.(b) <u>Alternative method (converting to g first)</u> $0.0193 \text{ (kg/cm}^3\text{)}$ 733.59×0.0193 Allow an answer from 14.1 to 14.2 (kg) inclusive	B1 M1 A1	FT 'their volume from (a)' and FT 'their 0.0193' provided a place value error has been made. Allow 14 from correct working. <i>Note: 14.158(287) or 14.16 or 14.2 (kg)</i>

<p>15. Identifying or implying that there are 16 possible correct combinations (e.g 2×6) or products (e.g.12)</p> <p>Identifies <u>all</u> possible combinations (e.g 2×6) or products (e.g 12) that are a factor of 36 $1 \times 6 = 6,$ $1 \times 9 = 9,$ $2 \times 6 = 12$ $2 \times 9 = 18,$ $3 \times 6 = 18,$ $4 \times 9 = 36$</p> <p>(Probability factor of 36 =) $\frac{6}{16}$ or equivalent. ISW</p>	<p>B1</p> <p>B2</p> <p>B1</p>	<p>Award B1 for</p> <ul style="list-style-type: none"> • simply stating 16 • ($4 \times 4 =$)16 • completed sample space (need not be correct) • sight of $\frac{1}{4} \times \frac{1}{4}$ • sight of 16 in a denominator. <p>B2 FT ‘their 16 possible correct products’. If products not used (e.g $2 + 6 = 8$), do not award B2 or B1.</p> <p>Award B2 for clearly identifying one of the following:</p> <ul style="list-style-type: none"> • the 6 (and no more) combinations $1 \times 6, 2 \times 9$, etc that form factors of 36 that can be achieved by the two spinners • the 6 (and no more) products of factors of 36 that can be achieved by the two spinners: 6, 9, 12, 18, 18, 36 • sight of $6 \times \frac{1}{4} \times \frac{1}{4}$ or equivalent. <p>Award B1 for clearly identifying one of the following:</p> <ul style="list-style-type: none"> • at least 4 combinations that are factors of 36 • at least 4 products of factors of 36 that can be achieved by the two spinners: 6, 9, 12, 18, 36 • all of the factors of 36 (1,2,3,4,6,9,12,18,36). <p>B1 FT ‘their list’ only if at least 12 combinations or products given with at least two factors of 36 that can be achieved by the two spinners clearly identified.</p> <p>Penalise, -1, any incorrect notation e.g. ‘6 out of 16’.</p> <p>Unsupported $\frac{6}{16}$ or $\frac{3}{8}$ or equivalent gains B1 B2 B1.</p>
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<p>16.</p> <p>$(AC^2 =) 8^2 + 4 \cdot 5^2$ or equivalent</p> <p>$(AC =) \sqrt{8^2 + 4 \cdot 5^2}$ or equivalent</p> <p>9.18 (cm)</p>	<p>M1</p> <p>m1</p> <p>A2</p>	<p>Check diagram. note: $(AC^2 =) 64 + 20 \cdot 25$.</p> <p>note: $(AC =) \sqrt{84 \cdot 25}$. FT $\sqrt{}$ their $84 \cdot 25$ for m1 only provided M1 gained.</p> <p>Mark final answer for A2. CAO.</p> <p>Award A1 for one of the following:</p> <ul style="list-style-type: none"> • $9 \cdot 17(878\dots)$ rounded or truncated to at least one decimal place • $\frac{\sqrt{337}}{2}$ <p>Final answer of</p> <ul style="list-style-type: none"> • AC = $84 \cdot 25$ is M1m0A0.
<p><i>16. Alternative method to find AC using Trig</i> <i>A correct and complete method (using trigonometric relationships)</i></p> <p>$(AC =) 9 \cdot 18$ (cm)</p>	<p>M2</p> <p>A2</p>	<p>CAO.</p> <p>Mark final answer.</p> <p>Award A1 for one of the following:</p> <ul style="list-style-type: none"> • $9 \cdot 17(878\dots)$ rounded or truncated to at least one decimal place • $\frac{\sqrt{337}}{2}$

17.	One correct evaluation $3 \leq x \leq 4$ 2 correct evaluations $3.75 \leq x \leq 3.95$, (one value < 80, one value > 80) 2 correct evaluations $3.75 \leq x \leq 3.85$, (one value < 80, one value > 80) $x = 3.8$	B1 B1 M1 A1	<p>Correct evaluation regarded as enough to identify if < 80 or > 80.</p> <p>If evaluations not seen accept 'too high' or 'too low'. Look out for $x^3 + 6x - 80 = 0$</p> <table><tr><td>x</td><td>$x^3 + 6x$</td><td></td><td></td></tr><tr><td>3</td><td>45</td><td></td><td></td></tr><tr><td>3.1</td><td>48.391</td><td></td><td></td></tr><tr><td>3.2</td><td>51.968</td><td></td><td></td></tr><tr><td>3.3</td><td>55.737</td><td></td><td></td></tr><tr><td>3.4</td><td>59.704</td><td></td><td></td></tr><tr><td>3.5</td><td>63.875</td><td></td><td></td></tr><tr><td>3.6</td><td>68.256</td><td>3.75</td><td>75.2343..</td></tr><tr><td>3.7</td><td>72.853</td><td>3.84</td><td>79.6631..</td></tr><tr><td>3.8</td><td>77.672</td><td>3.85</td><td>80.1666..</td></tr><tr><td>3.9</td><td>82.719</td><td>3.95</td><td>85.3298..</td></tr><tr><td>4</td><td>88</td><td></td><td></td></tr></table> <p>Unsupported $x = 3.8$ is awarded B0B0M0A0. An answer of $x = 3.8$ can only be awarded M1A1, following sight of 2 correct evaluations $3.75 \leq x \leq 3.85$ (one evaluation < 80, one evaluation > 80).</p> <p>If 3.85 is given as 80 (truncated) award M0 A0 unless 'too high' or equivalent is indicated.</p>	x	$x^3 + 6x$			3	45			3.1	48.391			3.2	51.968			3.3	55.737			3.4	59.704			3.5	63.875			3.6	68.256	3.75	75.2343..	3.7	72.853	3.84	79.6631..	3.8	77.672	3.85	80.1666..	3.9	82.719	3.95	85.3298..	4	88		
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18.	Sight of $(5x + 3)(2x - 1)$ or $2(5x + 3)(2x - 1)$ or equivalent (total area of both rectangles = $20x^2 + 2x - 6$ (cm ²))	S1 B2	<p>Intention to $(2 \times)$ width \times length. Allow $4 \times$ width \times length or equivalent for S1. May be implied in later working if B2 or B1 awarded.</p> <p>Mark final answer for B2. Allow $20x^2 + 2x - 6$ for B2.</p> <p>Award B1 for sight of one of the following:</p> <ul style="list-style-type: none">$20x^2 + 12x - 10x - 6$ with at least three terms out of the four correct (must have x^2 term)$10x^2 + 6x - 5x - 3$$2(10x^2 + x - 3)$$10x^2 + x - 3$$40x^2 + 4x - 12$. <p>If no marks, award SC1 for one of the following:</p> <ul style="list-style-type: none">$40x^2 + 24x - 20x - 12$.$20x^2 + 22x + 6$ from $2(5x + 3)(2x + 1)$$20x^2 - 2x - 6$ from $2(5x - 3)(2x + 1)$$20x^2 - 22x + 6$ from $2(5x - 3)(2x - 1)$.																																																

19.	<u>Method using angle XYZ</u> $YZ = \frac{18.6}{\tan 40(^{\circ})}$ or $\frac{18.6 \times \sin 50}{\sin 40}$ or equivalent $= 22(\cdot 166..)(\text{cm})$	M2	Check diagram for answer. Award M1 for one of the following <ul style="list-style-type: none">$\tan 40(^{\circ}) = \frac{18.6}{YZ}$$\frac{YZ}{\sin 50} = \frac{18.6}{\sin 40}$ or equivalent								
		A1	Accept an answer rounded or truncated. Award M2A0 for any of the following unsupported answers: <table><tr><td>Method</td><td>Radians</td><td>Gradians</td></tr><tr><td>$\frac{18.6}{\tan 40}$</td><td>-16.648....</td><td>25.600...</td></tr></table>	Method	Radians	Gradians	$\frac{18.6}{\tan 40}$	-16.648....	25.600...		
Method	Radians	Gradians									
$\frac{18.6}{\tan 40}$	-16.648....	25.600...									
19.	<u>Alternative using angle YXZ</u> $YZ = 18.6 \times \tan 50(^{\circ})$ $= 22(\cdot 166..)(\text{cm})$	M2	Award M1 for $\tan 50(^{\circ}) = \frac{YZ}{18.6}$								
		A1	Accept an answer rounded or truncated Award M2A0 for any of the following unsupported answers: <table><tr><td>Method</td><td>Radians</td><td>Gradians</td></tr><tr><td>$18.6 \times \tan 50$</td><td>-5.057....</td><td>18.6</td></tr></table>	Method	Radians	Gradians	$18.6 \times \tan 50$	-5.057....	18.6		
Method	Radians	Gradians									
$18.6 \times \tan 50$	-5.057....	18.6									
19.	<u>Alternative method</u> Correct use of a 'two-step' method. $22(\cdot 166..)(\text{cm})$ ISW	M2	A partial trigonometric method is M0.								
		A1	Accept an answer rounded or truncated.								
20.	<table><tr><td>Working in mm</td><td>Working in cm</td></tr><tr><td>60.5×7</td><td>6.05×7</td></tr><tr><td>OR</td><td>OR</td></tr><tr><td>$420 + 0.5 \times 7$</td><td>$42 + 0.05 \times 7$</td></tr></table> 423.5 (mm) ISW	Working in mm	Working in cm	60.5×7	6.05×7	OR	OR	$420 + 0.5 \times 7$	$42 + 0.05 \times 7$	M1	Allow $60 < \text{'their } 60.5' \leq 61$. Allow $6 \text{ cm} < \text{'their } 6.05' \text{ cm} \leq 6.1 \text{ cm}$.
Working in mm	Working in cm										
60.5×7	6.05×7										
OR	OR										
$420 + 0.5 \times 7$	$42 + 0.05 \times 7$										
		A1	Allow 42.35 cm, provided units are given and correct. CAO. If no marks, award SC1 for sight of 60.5 OR 6.05.								

<p>21. Midpoints 25, 35, 45, (55), 65, 75</p> <p style="text-align: center;">Missing 10 for $50 \leq t < 60$</p> $25 \times 2 + 35 \times 8 + 45 \times 4 + 55 \times 10 + 65 \times 3 + 75 \times 5$ <p>(= $50 + 280 + 180 + 550 + 195 + 375 = 1630$)</p> <p style="text-align: right;">$\div 32$</p> <p style="text-align: center;">50.9(375) or 51 or equivalent</p> <p>ISW</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>m1</p> <p>A1</p>	<p>May be implied in later working (i.e the correct products).</p> <p>FT 'their 10' provided $\neq 0$ or 1. Allow with consistent incorrect midpoints provided at least 5 within the correct interval including 'bounds' Allow use of a instead of 10 (sight of $1080 + 55a$).</p> <p>FT $22 +$ 'their a' ($a \neq 0$). Allow use of a instead of 10.</p> <p>CAO. Must be derived from correct working.</p> <p>If no marks or first B1 only, award SC1 for one of the following:</p> <ul style="list-style-type: none"> • $(1080 \div 22 =) 49(09\dots)$ from use of $a = 0$ • $(1080 \div 32 =) 33.7(5)$ or 34 from use of $a = 0$ • $(1135 \div 23 =) 49(3\dots)$ from use of $a = 1$ • $(1135 \div 32 =) 35(46875)$ from use of $a = 1$. <p>Award B1 B0 M1 m1 A0 for</p> $\frac{1080 + 55a}{22 + a} \text{ or } \frac{1080 + 55a}{32}$ <p>or equivalent expression involving a.</p>
<p>22.</p> <p>Sight of $12x + 4y = 180$ or equivalent AND $26x + 7y = 360$ or equivalent</p> <p>Method to eliminate one variable e.g. equal coefficients AND <u>appropriate intention to add or subtract or use a method of substitution.</u></p> <p>First variable found $x = 9(^{\circ})$ or $y = 18(^{\circ})$</p> <p>Substitute to find the 2nd variable.</p> <p>Second variable found.</p>	<p>B2</p> <p>M1</p> <p>A1</p> <p>m1</p> <p>A1</p>	<p>x and y terms need to be collected for B2. If B2 not awarded, award B1 for one of the following:</p> <ul style="list-style-type: none"> • $12x + 4y = 180$ or equivalent • $13x + 5x + 8x + 7y = 360$ • $26x + 7y = 360$ or equivalent <p>FT 'their equations', provided of equivalent difficulty. Allow one error in one term (not the term with equal coefficients).</p> <p>CAO (for their equations).</p> <p>FT substitution of their '1st variable' if M1 gained.</p> <p>No marks for 'trial and improvement'. No marks for an unsupported answer.</p>