GCSE MARKING SCHEME

SUMMER 2024

GCSE
MATHEMATICS
UNIT 1 – HIGHER TIER
3300U50-1

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About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

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WJEC GCSE MATHEMATICS

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A1</td><td>May be seen in stages.
Award M1 for appropriate calculation seen.
Award A1 for the correct estimate for the calculation seen.
An unsupported answer is M0A0.</td></tr>
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Unit 1: Higher Tier	Mark	Comments
1.(c) $4\frac{1}{2}$ or 4·5 or $\frac{9}{2}$	B3	Mark final answer. Award B2 for an unsimplified evaluation as a single fraction or mixed number e.g. • $4\frac{7}{14}$ • $3\frac{21}{14}$ • $\frac{63}{14}$ • $\frac{441}{98}$ or equivalent • 4 + ½. FT for one of the following: • adding 'their improper fractions' (which incorporate the entire numbers) provided fractions have a common denominator (one numerator must be correct) and answer given in a (proper or improper) simplified form • 3 + 'their fractions' evaluated correctly and in a simplified form, provided fractions have a common denominator (one numerator must be correct) • 'their 3' + 1·5 (or equivalent) in a simplified form • a + ½ (or equivalent in its simplified form) evaluated provided ½ has come from two fractions with a common denominator (e.g. $\frac{10}{14}+\frac{11}{14}=\frac{21}{14}=1\frac{7}{14}+3=3\frac{1}{2}$). Award B1 for sight of two fractions with a common denominator (allow an error in one numerator) e.g. • (1) $\frac{10}{14}$ + (2) $\frac{11}{14}$ • $\frac{24}{14}+\frac{39}{14}$ • $\frac{168}{98}+\frac{273}{98}$ or equivalent. An unsupported answer of $4\frac{1}{2}$ or 4·5 or $\frac{9}{2}$ is awarded B3.

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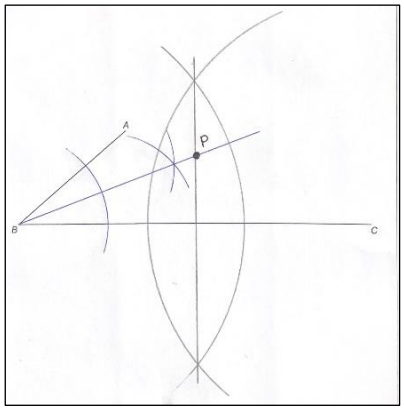
Unit 1: Higher Tier	Mark	Comments
2. (Area of triangle *ABC* or area of cross-section =) $\frac{9 \times 10}{2}$	M1	
$= 45\ (cm^2)$	A1	May be seen in later working.
(Volume of prism =) 45×20	M1	FT 'their area of cross section'.
$= 900\ (cm^3)$	A1	CAO An unsupported answer of 900 (cm^3) is awarded M1A1M1A1.
2. Alternative method *(Volume of prism =)* $\frac{9 \times 10 \times 20}{2}$	*M2*	
$= 900\ (cm^3)$	*A2*	*CAO* *A1 for sight of 1800/2 or 9 × 100 or 90 × 10 or 45 × 20 or equivalent (i.e. **one** step left to carry out)*
2. Organisation and Communication.	OC1	For OC1, candidates will be expected to: • represent 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
3. Correct construction of bisector of angle ABC.	B1	Correct construction arcs (initial and secondary) and a line joining B to the point of intersection of the arcs must be seen or an alternative valid method.
Correct construction of perpendicular bisector of BC.	B1	Two correct pairs of intersecting construction arcs and a line joining both of these points of intersection must be seen.
Correct position of point P  	B1	CAO. Award B1 for the correct point of intersection and not labelled *P*, provided no other incorrect points are indicated. (May be awarded from previous B0B0.)

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Unit 1: Higher Tier	Mark	Comments
4. Sight of $7(x + 8)$ or equivalent **AND** Sight of $3(x + 1)$ or equivalent. $7(x + 8) + 3(x + 1) = 89$ or equivalent. $7x + 56 + 3x + 3 = 89$ $10x = 30$ $x = 3$	 B1 B1 B1 B1 B1	Check diagram for answers Brackets must be seen unless implied in later correct working. FT 'their expressions' provided of equivalent difficulty. Equating the sum of their two area expressions to 89. Correct expansion in an equation. FT only from $ax \pm b \pm cx \pm d = k$, provided working with area. FT from any equation of the form $fx = g$. Answer must be > –1 on FT. Accept an answer rounded, truncated or as an improper fraction (if not whole number) on FT. Mark final answer. If the first B0 or B1 awarded, then award an additional SC2 for $x = 3$ clearly identified as a final answer if no correct equation shown. Award full marks if $x = 3$ given and correct equation shown. If an incorrect equation shown and correct answer on FT given (with or without workings shown), award the final B0B1B1 marks.
4. <u>Alternative method</u> *Sight of $7(x + 8 + 3)$ or equivalent* ***AND*** *Sight of $3(7 – 1 – x)$ or equivalent.* *$7(x + 8 + 3) – 3(7 – 1 – x) = 89$ or equivalent.* *$7x + 77 – 18 + 3x = 89$* *$10x = 30$* *$x = 3$*	 *B1* *B1* *B1* *B1*	*Check diagram for answers.* *Brackets must be seen unless implied in later correct working.* *FT 'their expressions' provided of equivalent difficulty.* *Equating the difference of their two area expressions to 89.* *Correct expansion in an equation.* *FT only from $ax \pm b \pm cx \pm d = k$, provided working with area.* *FT from any equation of the form $fx = g$.* *Answer must be > –1 on FT.* *Accept an answer rounded, truncated or as an improper fraction (if not whole number) on FT.* *Mark final answer.* *If the first B0 or B1 awarded, then award an additional SC2 for $x = 3$ clearly identified as a final answer if no correct equation shown.* *Award full marks if $x = 3$ given and correct equation shown.* *If an incorrect equation shown and correct answer on FT given (with or without workings shown), award the final B0B1B1 marks.*

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Unit 1: Higher Tier	Mark	Comments
5. (LCM of 10 and 18 =) 90 or equivalent, e.g. 2×3×3×5 or 2 × 9 × 5. .	B2	B1 for any other common multiple identified e.g 180, 270 etc.
(HCF of 30 and 72 =) 6 or equivalent, e.g. 2×3.	B2	B1 for any other common factor identified i.e. 2, 3. Do not accept 1.
n = 15	B1	B2 B2 B0 for 90/6. FT only if at least one B2 gained. If at least one B2 awarded for correct products seen but incorrectly evaluated LCM or HCF, then B0 is awarded as the final mark. e.g. award B2 B2 B0 for 2 × 3 × 3 × 5 = 90 and 2 × 3 = 5, n = 90/5 = 18 award B1 B2 B0 for LCM = 180 and 2 × 3 = 5, n = 180/5 = 36. Accept an answer rounded, truncated or as an improper fraction if n is not an integer. If no marks awarded, award one of the following: • SC2 for a final answer of $\frac{2}{360}$ or $\frac{1}{180}$ equivalent (from reversing LCM and HCF) • SC2 for a final answer of $\frac{6}{90}$ or $\frac{1}{15}$ equivalent (answers reversed). • SC1 for sight of LCM = 2 **AND** HCF = 360 (from reversing LCM and HCF). An unsupported 15 is awarded B2B2B1.
6.(a) $\frac{5}{8}$ on 'Bus B' branch.	B1	Numerator and denominator must be integers. Allow any equivalent to $\frac{5}{8}$ e.g. 0·625. Do not allow 0·63.
$\frac{1}{2}$ or $\frac{4}{8}$ or 0·5 on **all** 'seat branches'.	B1	Allow any equivalent to $\frac{1}{2}$.
6.(b) $\frac{5}{8} \times \frac{1}{2}$ or equivalent	M1	FT 'their $\frac{5}{8}$' × 'their $\frac{1}{2}$' provided both values < 1.
$= \frac{5}{16}$ or $\frac{20}{64}$ or $\frac{25}{80}$ or equivalent. ISW	A1	Do not allow rounded or truncated answers if decimal given. Numerator and denominator must be integers.
7.(a) $5{\cdot}7 \times 10^{-3}$	B1	
7.(b) 4×10^{6}	B2	Mark final answer. Award B1 for one of the following: • sight of 4 000 000 • equivalent correct value but not in standard form e.g. $0{\cdot}4 \times 10^{7}$.

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Unit 1: Higher Tier	Mark	Comments
8. (Average speed =) $\frac{x+36}{1+2}$ = 42 or equivalent. OR (Total distance =) $x + 36 = 3 \times 42$ or equivalent. $(x =)\ 90$ ISW	M2 A1	Must be a complete and correct method for M2. Award M1 for sight of one of the following: • $\frac{x+36}{1+2}$ • $\frac{x+36}{3}$ • $\frac{x+36}{180}$ (mins) • 3×42 • an appropriate 126. CAO. An unsupported answer of 90 is awarded M2A1. If no marks, award SC1 for a final answer of $x = 48$ (from working with 2 hours).
9. Sight of $2x + 3y = 13$ AND $8x - 3y = 22$ Method to eliminate one variable e.g. (equal coefficients **AND)** appropriate intention to add or subtract or use a method of substitution. First variable found $x = 3{\cdot}5$ or $y = 2$ or equivalent Second variable found (Perimeter of triangle = 3·5 + 3·5 + 2 =) 9 (cm)	B1 M1 A1 A1 B1	Award B1 for sight of $(2x + 3y) + (8x - 3y) = 13 + 22$. May be implied in later working. FT 'their equations' if of equivalent difficulty. If equating coefficients, allow one error in one term (not the term with equal coefficients). Sight of $10x = 35$ implies B1M1. CAO. Award A1 for $2x = 7$. FT substitution of their '1st variable' if M1 gained. Accept an answer rounded, truncated or as an improper fraction (if not whole number) on FT, provided > 0. FT 'their derived x and y', provided an algebraic method is used and both > 0. If the first B0 or B1 awarded, then award an additional SC1 for one of the following: • sight of $x = 3{\cdot}5$ AND $y = 2$ (if M0 awarded) • an unsupported answer of 9 (cm).

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Unit 1: Higher Tier	Mark	Comments
10. $\frac{(reflex)\ A\hat{O}B}{360} \times \pi \times 6^2$ (= $\frac{132\pi}{5}$ = $26 \cdot 4\pi$) or equivalent	M1	Area of major sector. Allow $\frac{x}{360} \times \pi \times 6^2$ (= $\frac{132\pi}{5}$).
(360 – x OR reflex AÔB =) $\frac{132\pi \times 360}{5 \times \pi \times 6^2}$ (= 264)	A1	
x (= 360 – 264) = 96(°)	A1	From A0, FT 360 – 'their 264', provided M1 awarded. An unsupported answer of 96(°) is awarded M1A1A1.
10. Alternative method: *Area of minor sector = $\pi \times 6^2 - \frac{132\pi}{5}$ (= $\frac{48\pi}{5} = 9 \cdot 6\pi$)*	*B1*	*Area of minor sector.*
$\frac{x}{360} \times \pi \times 6^2 = \frac{48\pi}{5}$ or equivalent	*M1*	*FT 'their derived $\frac{48\pi}{5}$'.*
x = 96(°)	*A1*	
11. Reference to: Enlargement Scale factor –3 Centre of enlargement (–2, 4)	 B1 B1 B1	Check diagram. If B3, penalise –1 for a multi-stage transformation e.g. extra 'rotation 180°'.
12. $x = k\sqrt{w}$ OR $24 = k\sqrt{36}$	M1	Allow $x \propto \sqrt{w}$ OR $x \propto k\sqrt{w}$. Allow $x \propto 4\sqrt{w}$.
k = 4 OR $x = 4\sqrt{w}$	A1	CAO
When w = 25, x = 20	A1	Allow $y \propto \frac{c}{x}$. Allow the use of k again.
$y \propto \frac{1}{x}$ OR $y = \frac{c}{x}$ OR $8 = \frac{c}{15}$	M1	Allow $y \propto \frac{120}{x}$. Allow M1 A1 for (y =) 8 x 15 ÷ 20 or 8 x ¾
c = 120 OR $y = \frac{120}{x}$	A1	FT 'their x', provided 2nd M1 awarded.
(When x = 20, y =) 6	A1	FT 'their k'. Accept an answer rounded, truncated or as an improper fraction (if not whole number). An unsupported answer of 6 is awarded no marks.
12. Alternative method: $x = k\sqrt{w}$ OR $24 = k\sqrt{36}$	*M1*	*Allow $x \propto \sqrt{w}$ OR $x \propto k\sqrt{w}$.*
k = 4 OR $x = 4\sqrt{w}$	*A1*	*Allow $x \propto 4\sqrt{w}$.*
$y \propto \frac{1}{x}$ OR $y = \frac{c}{x}$ OR $8 = \frac{c}{15}$	*M1*	*Allow $y \propto \frac{c}{x}$. Allow the use of k again.*
c = 120 OR $y = \frac{120}{x}$	*A1*	*Allow $y \propto \frac{120}{x}$.*
$y = \frac{120}{4\sqrt{w}}$ (= $\frac{30}{\sqrt{w}}$) *or equivalent*	*m1*	*If one previous M1 awarded:* *FT 'y = 120 / their x', with 'x' given in terms of 'w'* *OR* *FT substituting $x = 4\sqrt{w}$ in 'their y', with 'y' given in terms of 'x'.*
When w = 25, y = 6	*A1*	*Accept an answer rounded, truncated or as an improper fraction (if not whole number).*

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Unit 1: Higher Tier	Mark	Comments
13. $\widehat{DAF} = x$	B1	Check diagram. Must be unambiguous.
(Reason:) Alternate segment (theorem)	E1	Dependent on B1. Allow 'opposite segments (theorem)'.
$\widehat{BAD}$ (= 180 – 114) = 66(°) [OR $\widehat{BAD}$ = 180 – 3x = 180 – 114]	B1	Check diagram. Must be unambiguously identified.
(Reason:) (Opposite angles in a) cyclic quadrilateral (add up to 180°)	E1	Dependent on clearly attempting [or stating] 180 – 114. (Sight of equation 66 + 2x + x = 180 may imply previous B marks.)
x = 38(°)	B1	FT 'their 180 – 114'. An unsupported answer of 38 is awarded B3.
13. Alternative method 1: *$A\hat{D}B$ = 2x* *(Reason:) Alternate segment (theorem)*	*B1* *E1*	*Check diagram. Must be unambiguous.* *Dependent on B1. Allow 'opposite segments (theorem)'.*
$B\hat{A}D$ (= 180 – 114) = 66(°) *[OR $B\hat{A}D$ = 180 – 3x = 180 – 114]*	*B1*	*Check diagram. Must be unambiguously identified.*
(Reason:) (Opposite angles in a) cyclic quadrilateral (add up to 180°)	*E1*	*Dependent on clearly attempting [or stating] 180 – 114.* *(Sight of equation 66 + 2x + x = 180 may imply previous B marks.)*
x = 38(°)	*B1*	*FT 'their 180 – 114'.*
13. Alternative method 2: (using additional line AC) *$A\hat{D}B$ = 2x* *(Reason:) Alternate segment (theorem)*	*B1* *E1*	*Check diagram. Must be unambiguous.* *Dependent on B1.* Allow 'opposite segments (theorem)'.
$A\hat{C}D = x$ and $A\hat{C}B$ = 2x *(Reason:) Angles in the same segment (are equal) or Angles on the same arc (are equal)*	*B1* *E1*	*Check diagram. Must be unambiguous.* *Dependent on B1* *($A\hat{C}D + A\hat{C}B = B\hat{C}D$)* *(Sight of equation 2$x$ + x = 114 may imply previous B marks.)*
x = 38(°)	*B1*	
14. $(2x – 5)(x – 6)$	B2	B1 for $(2x \ldots 5)(x \ldots 6)$ B1 for two brackets which multiply to give $2x^2 – 17x + k$ or $2x^2 + mx + 30$ SC1 for sight of the two correct factors, but not as a product.
15. (a) (i) $2\sqrt{5}$	B1	
15. (a) (ii) $6\sqrt{2}$	B1	
15. (b) q^4	B1	

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Unit 1: Higher Tier	Mark	Comments
16. (a) (Numerator) $4y\ (y + 2x)$	B1	
(Denominator) $(y + 2x)(y - 2x)$	B2	B1 for $(y \ldots 2x)(y \ldots 2x)$
$\frac{4y}{y-2x}$ or equivalent.	B1	Mark final answer. FT provided no more than one previous error and provided simplification required.
16. (b)		FT until 2nd error for equivalent level of difficulty.
Sight of $hf^2 - m = 9f^2$	B1	Squaring Allow $3^2 f^2$ or $(3f)^2$ or $(3f)(3f)$ for $9f^2$.
$hf^2 - 9f^2 = m$ or equivalent	B1	Isolating terms in f^2. FT a formula with three or more terms AND with at least two terms in f^2.
$f^2(h - 9) = m$ or equivalent	B1	Factorising fully.
$f^2 = \frac{m}{h-9}$ OR $f^2 = \frac{-m}{9-h}$	B1	Isolating f^2.
$f = \pm\sqrt{\frac{m}{h-9}}$ OR $f = \pm\sqrt{\frac{-m}{9-h}}$	B1	Mark final answer. Allow omission of ±.
17. (P[same colour] =) $\frac{7}{11} \times \frac{6}{10} + \frac{4}{11} \times \frac{3}{10}$ or equivalent OR (P[different colours] =) $\frac{7}{11} \times \frac{4}{10} + \frac{4}{11} \times \frac{7}{10}$ or equivalent	M2	M1 for sight of one product correct.
$= \frac{54}{110}$ $(= \frac{27}{55})$ or equivalent OR $= \frac{56}{110}$ $(= \frac{28}{55})$ or equivalent	A1	Award for the answer to either probability (total). Mark final answer. Do not ignore incorrect cancelling. If both probabilities are evaluated, accept 110 written as 11 × 10.
'No' or 'Gareth is incorrect' with explanation e.g. P(different colours) = $1 - \frac{54}{110} = \frac{56}{110}$ or e.g. each probability would need to be $\frac{55}{110}$ $(= \frac{1}{2})$ for them to be equal e.g. P(same colour) = 54/110 AND P(different colours) = 56/110	E1	If M2 A0 (or M1 A0) awarded where only <u>one</u> of P[same colour] or P[different colours] is calculated, FT E1 for 'No' with a valid explanation given based on P[same colour] + P[different colours] = 1. If M2 A1 awarded where <u>both</u> P[same colour] and P[different colours] are calculated, the second probability must also be correct in order to award E1. If M2 A0 (or M1 A0) awarded where <u>both</u> P[same colour] and P[different colours] are incorrectly calculated, do not FT E1. If M0A0, award SC1 (and a possible E1) for an answer of $\frac{65}{121}$ or $\frac{56}{121}$ (method 'with replacement').

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Unit 1: Higher Tier	Mark	Comments
18. (a)(i) Horizontal translation to the right with x-intercepts at 2 and 6 (clearly labelled).	B2	B1 for one of the following: • original shape with horizontal translation to right - with missing or incorrect x-intercepts marked OR • concave curve with x-intercepts at 2 and 6
18. (a)(ii) (4, 5)	B1	FT only from a translation (of 6 units) to the left i.e. (-8,5), provided curve was drawn in part (a)(i).
18. (b) Reflection in x-axis Intercepts y-axis at (0, – 3)	B1 B1	Mark clear intention. Any clear indication. Depends on first B1.

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