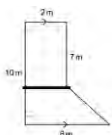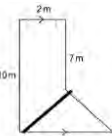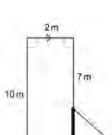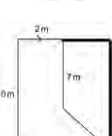# GCSE MARKING SCHEME

SUMMER 2024

**GCSE
MATHEMATICS – NUMERACY
UNIT 1 – HIGHER TIER
3310U50-1**

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.

WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2024 MARKING SCHEME

Unit 1: Higher Tier	Mark	Comments
1. (Number of adult Welsh spectators) $7200 \times \frac{110}{360} \times 6 \div (6 + 5)$	M2	M1 for any one of the following: • $7200 \times \frac{110}{360}$ (=2200) • $7200 \times 6 \div (6 + 5)$ (=3927.2727….) • $110 \times 6 \div (6 + 5)$ (=60) • 'their number of Welsh spectators' $\times 6 \div (6 + 5)$
1200	A2	A1 for any one of the following <u>correctly evaluated</u>: • $(7200 \times \frac{110}{360} =)$ 2200 • $(7200 \div 360 =)$ 20 **and** $(110 \times 6 \div 11 =)$ 60 • 'their $7200 \times \frac{110}{360}$' $\times 6 \div 11$ • 'their $7200 \times 6 \div 11$' $\times \frac{110}{360}$ • 'their $110 \times 6 \div 11$' $\times 20$ • 'their number of Welsh spectators' $\times 6 \div 11$
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 explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
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.

Unit 1: Higher Tier	Mark	Comments
2(a) (Total area of the driveway) - ½ × (10 − 7) × (2 + 6) + 2 × 7 - ½ × 3 × 8 + 2 × 7 (= 12 + 14) - ½ × 2 × (7 + 10) + ½ × 6 × (10 − 7) - ½ × 2 × 17 + ½ × 6 × 3 (= 17 + 9) - ½ × (10 − 7) × (6 − 2) + 2 × 7 + 2 × 3 - ½ × 3 × 4 + 2 × 10 (= 6 + 20) - 6 × 10 − ½ × (6 − 2) × (7 + 10) - 6 × 10 − ½ × 4 × 17 (= 60 − 34)	M2	M1 for one of the following appropriate areas: - ½ × (10 − 7) × (2 + 6) $\quad\quad$ (= 12m^2 area of trapezium) - ½ × 2 × (7 + 10) $\quad\quad$ (= 17m^2 area of trapezium) - ½ × 6 × (10 − 7) $\quad\quad$ (= 9m^2 area of a triangle) - ½ × (10 − 7) × (6 - 2) $\quad\quad$ (= 6m^2 area of the triangle) - ½ × (6 − 2) × (7 + 10) $\quad\quad$ (= 34m^2 area 'extra' trapezium)
$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ 26 (m^2)	A1	CAO
Cost in the inclusive range (£)1780 to (£)1860	B1	FT '20 ≤ their derived composite **area** ≤ 30' for a suitable cost from the scatter diagram, within a range (shown below); must be for a composite area Do not FT from the perimeter or with the missing side, 25(m) Allow an answer in a range, provided 'their range of answers' is inclusively within the stated range On FT cost in the inclusive range: Table below

Area (m^2)	Least estimated cost (£)	Greatest estimated cost (£)
20	1410	1460
21	1460	1510
22	1520	1570
23	1590	1650
24	1650	1710
25	1700	1780
26	**1780**	**1860**
27	1850	1930
28	1920	2010
29	1970	2060
30	2030	2130

Unit 1: Higher Tier	Mark	Comments
2(b) (Repair of 23m² driveway cost £) 0.4 × 1590 to 0.4 × 1650	B1	
'No' unambiguously stated or implied **AND** a <u>correctly evaluated</u> 40% cost that will be in the range (£)636 to (£)660	B1	Do not award if 'No' is based on further working, such as 60% evaluated rather than 40%

2(b) Alternative method e.g.
• *40% is (£)575 so 100% is 2.5 × 575*
                       (= £1437.50)
• *40% is (£)600 so 100% is 2.5 × 600*
                       (= £ 1500)
	B1	

'No' unambiguously stated or implied ***AND** a correctly evaluated 100%* ***AND** shows less than needed, e.g. a reading from the diagram £1590 to £1650 (22.8m² for £1600)*	*B1*	
3(a) B and H in either order	B2	B1 for either B or H selected

3(b)(i) $\frac{42-30}{30}$ (× 100) or $\frac{42}{30}$ (× 100) – 1 (× 100)	M1	Or full reverse method, e.g.
		• 20% of £30 is 30 ÷ 5 = £6,
		  with either 6 × 2 = (£)12 or 6 × 7 = (£)42
		• 10% of £30 is 30 ÷ 10 = £3,
		  with either 3 × 4 = (£)12 or 3 × 14 = (£)42

40 (%)	A1	Allow an answer of £40 from correct working If no marks, award SC1 for an answer of 140(%)

3(b)(ii) (Percentage profit is) $\frac{9 \times 42-10 \times 30}{10 \times 30}$ (× 100)
 	
     or $\frac{9 \times 12-30}{10 \times 30}$ (× 100)
 	
     or $\frac{9 \times 42}{10 \times 30}$ (× 100) – 1 (× 100)
 	
     or $\frac{378}{300}$ (× 100) – 1 (× 100)
 	
     or 1.26 (× 100) – 1 (× 100)
                    or equivalent
	M2	Allow a reverse method of finding percentages of 300 used, these percentages must be correct and when added (or subtracted) <u>could</u> lead to an answer of 26% e.g.
		(2 × 10% =) 20% of 300 is 60 and 6% of 300 is 18
		
		M1 for any one of the following:
		• (difference between sales and costs)
		    9 × 42 – 10 × 30 (= 378 – 300)
		• (sales) (£) 378 AND (cost) (£) 300
		• (difference between sales and costs) (£) 78

26 (%) **AND** states 'profit'	A2	Mark final answer
		A1 for any one of the following:
		• 26(%)
		• $\frac{78}{300}$ (× 100) or equivalent
		• $\frac{378}{300}$ × 100 = 126 (%)
		• $\frac{378}{300}$ = 1.26
		• <u>('their 9×42' – 10 × 30)</u> × 100 correctly evaluated
		            10 × 30
		  and given as a percentage, allow if an error in the decimal part of their answer

3(b)(iii) 8	B1	

Unit 1: Higher Tier	Mark	Comments
4(a)(i) 200 – 80 or 90 + 30 120 (customers)	M1 A1	
4(a)(ii) 32 seconds	B1	
4(a)(iii) $\frac{200-170}{200}$ or $\frac{30}{200}$ or $\frac{15}{100}$ $\frac{3}{20}$	M1 A1	Award M1 for 0.15 or 15% Only ignore further working if written as 0.15 or 15% If no marks, award SC1 for an answer of $\frac{17}{20}$ (from 40 seconds or less)
4(b)(i) 36	B1	
4(b)(ii) 46 – 20 26	M1 A1	Allow 20 – 46
4(c) 'No' unambiguously stated or implied AND a reason, e.g. 'upper quartile is higher this year' '75% reading higher this year' 'interval was 37 (or 38) to 50 seconds last year, this year it is 46 to 50 seconds'	E1	Do not ignore incorrect values for the upper quartiles given, E0 if 'upper quartile' or '75%' stated with incorrect upper quartile readings Allow 'No' with a reason, e.g. '(last year) 38, (this year) 46' '(last year) 37.(…), (this year) 46' Do not accept, e.g. 'range greater this year' 'lower quartile is lower this year' 'median higher this year' 'customers still waiting at 50 seconds'

Unit 1: Higher Tier	Mark	Comments
5(a)(i)　　　1×10^5	B1	
5(a)(ii) A suitable calculation, including an <u>appropriate</u> approximation, e.g. $\dfrac{3\ 100\ 000}{21\ 000}$　or　$\dfrac{3\ 100\ 000}{20\ 000}$　or　$\dfrac{3\ 000\ 000}{20\ 000}$　or　$\dfrac{3\ 000\ 000}{21\ 000}$ 　　　　　　　　　　or equivalent	M2	Place value must be correct Must include an approximation M1 for the idea to divide (in the correct order), that may also include one place value error, e.g. $\dfrac{3.1\ million}{20\ 735}$,　$\dfrac{31\ 000\ 000}{20\ 000}$,　$\dfrac{3\ 100\ 000}{20\ 700}$
Answer in the range 　　　　　　142 (people/km²) to 155 (people/km²)	A1	ISW. Allow 142.8, 142.9 and 143 rounded to 140 Accept equivalents, e.g. 150 written as 1.5×10^2
5(b) Idea that 360 000 is 120% 360 000 ÷ 1.2 or equivalent 　　　　　　　　　300 000 (people)	B1 M1 A1	Accept from sight of trial to increase 'their value' by 20% provided 'their value' <360 000 Award of M1 also implies previous B1
5(c)　(Length) 6.6 ÷ (4.2 ÷ 1.4)　or　6.6 ÷ 3 　　　　　　or equivalent 　　　　　　　　　　Length 2.2 (cm) (Height) 4.2 × (9.9 ÷ 6.6)　or　4.2 × 1.5 　　　or 1.4 × (9.9 ÷ 2.2)　or equivalent 　　　　　　　　　　Height 6.3 (cm)	M1 A1 M1 A1	 FT 1.4 × (9.9 ÷ 'their derived length') Note: Length (from *9.9 – 6.6* =)　　　*3.3*(cm) M0 A0 Height　(from 1.4 × (9.9 ÷ *3.3*) =)　4.2(cm) M1 A1 (FT) Allow answers reversed in the answer space
5(c) Alternative method *(Height) 4.2 × (9.9 ÷ 6.6)　　or　4.2 × 1.5 or equivalent* 　　　　　　　　　*Height 6.3 (cm)* *(Length) 6.6 ÷ (4.2 ÷ 1.4)　or　6.6 ÷ 3* 　　*or　9.9 ÷ (6.3 ÷ 1.4)　or equivalent* 　　　　　　　　　*Length 2.2 (cm)*	M1 A1 M1 A1	 *FT 9.9 ÷ ('their derived height' ÷ 1.4)* *Allow answers reversed in the answer space*

Unit 1: Higher Tier	Mark	Comments

6(a)(i)
(Total volume =)
 	
$\dfrac{2}{3} \times \pi \times 6^3 \quad + \quad \pi \times 3^2 \times 9$ or equivalent
 	
    (= 144π)   (= 81π)
 	
                = 225π (mm^3)
	
	M2
	
	A2
		Allow values of π from 3.14 to 3.142 for M marks only
		
		M1 for $\dfrac{2 \times \pi \times 6^3}{3}$ (+ ….)
		
		Allow M1 for $\dfrac{4 \times \pi \times 6^3}{3} + \pi \times 3^2 \times 9$ or equivalent
		
		CAO
		A1 for sight of 144π OR
		A1 for an answer of 369π (from use of $4/3 \times \pi \times 6^3$) OR
		A1 for a fully correct method but with an answer of 225 (omitting π)
		
		If no marks awarded,
		SC2 for an answer of 1476π from <u>consistent</u> use of diameters as their radii
		OR
		SC1 for $\dfrac{2}{3} \times \pi \times 12^3 + \pi \times 6^2 \times 9$ or equivalent
		
		OR
		SC1 for $\left(\dfrac{1}{3} \times \pi \times 6^3 + \pi \times 3^2 \times 9 = \right)$ 153π

6(a)(ii) (Reduction in volume =) 9π (mm^3) (Fractional reduction =) $\dfrac{9(\pi)}{225(\pi)}$ or $\dfrac{1}{25}$ or equivalent	B1 B1	from $\pi \times 3^2 \times (9 - 8)$ OR $\pi \times 3^2 \times 9 - \pi \times 3^2 \times 8$ or 81π − 72π Implies previous B1 ISW FT 'their 225π' and 'their $\pi \times 3^2 \times 9 - \pi \times 3^2 \times 8$' and both are multiples of π If no marks awarded, SC1 for a numerator of 'their 225π' − 9π, which may be embedded in a final answer of e.g. 216/225 or 24/25 if correct work seen in part (a)(i) Must be from a reduction of 9π in their volume. ISW

6(b) Complete method
e.g. 100x = 16.111…, 1000x = 161.111… AND an attempt to subtract both sides
    $\dfrac{145}{900}$ or $\dfrac{1595}{9900}$ or $\dfrac{16095}{99900}$ or equivalent
 	
                    $\dfrac{29}{180}$
	M1
	
	A1
	
	A1
		
		Allow A1 for
		e.g. (10x – x =) 1.45/9, (100x – x =) 15.95/99 etc
		
		FT from M1A0 provided at least 1 stage of simplification required

Unit 1: Higher Tier	Mark	Comments
7(a)(i) Correct method to calculate a frequency density for any 2 groups Frequency densities of 4, 1.6, 1.2, 0.2	M1 A2	 A1 for any 2 correct frequency densities
7(a)(ii) Fully correct histogram drawn	 B2	FT their frequency densities throughout provided they fit on the given scale B1 for at least 3 correct bars drawn

7(b)(i) Working from the left of the graph
$\dfrac{120}{2} - 34$ or equivalent
OR (from the right)
$4 + 18 + 24 + 40 - \dfrac{120}{2}$ or equivalent
 	
     = 26 (pupils needed from the 10-20 group)
 	
(Median =) $(10 +) \dfrac{26}{40} \times 10$ or equivalent
 	
     = 16.5 (mins)
	M1
	
	A1
	
	m1
	
	A1
		Allow use of $\dfrac{120+1}{2}$ for $\dfrac{120}{2}$ for M1A0, but final m1A1 still available
		
		CAO
		
		FT 'their 26'
		
		Or 16 minutes 30 seconds

7(b)(i) *Alternative method:*
Working from the right of the graph
$\dfrac{120}{2} - 4 - 18 - 24$ *or equivalent*
OR (from the left)
$34 + 40 - \dfrac{120}{2}$
 	
     = 14 (people needed from the 10-20 group)
 	
(Median =) $(20 -) \dfrac{14}{40} \times 10$ *or equivalent*
 	
     = 16.5 (mins)
	M1
	
	A1
	
	m1
	
	A1
		Allow use of $\dfrac{120+1}{2}$ for $\dfrac{120}{2}$ for M1A0, but final m1A1 still available
		
		CAO
		
		FT 'their 14'
		
		Or 16 minutes 30 seconds

7(b)(ii) 20 (minutes)	B1	FT the upper limit of the group their median is in from (b)(i)

Unit 1: Higher Tier	Mark	Comments
8. (Area =) $\dfrac{1}{2} \times 2 \times (0 + 8 + 2(3.6 + 5.4 + 7))$ OR $\quad \dfrac{1}{2} \times 2 \times (8 + 7.2 + 10.8 + 14)$ or equivalent	M2	Ignore any additional areas for M2 or M1 M1 for 1 slip in substitution of vertical readings OR M1 for 1 of the vertical readings omitted with all others correct
$= 40$ (m)	A1	May be implied in further working e.g. the correct evaluation of the sum of the 4 areas together with an additional area FT from M1 is available provided it comes from a calculation with no vertical readings omitted
(Total time for Sian =) $\dfrac{100 - 40}{8}$ (+8) or equivalent	m1	FT 'their 40' provided M1 or M2 previously awarded
$= 15.5$ (seconds)	A1	Final answer of 7.5 (seconds) can be awarded m1A0 provided no incorrect work seen
8. *Alternative method for the first 3 marks:* $\dfrac{(0 + 3.6) \times 2}{2} + \dfrac{(3.6 + 5.4) \times 2}{2} + \dfrac{(5.4 + 7) \times 2}{2} +$ $\dfrac{(7 + 8) \times 2}{2}$ $[3.6 + 9 + 12.4 + 15]$	M2	*Ignore any additional areas for M2 or M1* *Each area may be seen as the sum of the area of a rectangle and a triangle* *M1 for the sum of these 4 areas with one error (may be repeated) in the substitution of vertical readings OR* *M1 for the sight of 4 correct areas with the intention to add them (possibly omitting one)*
$= 40$ (m)	A1	*May be implied in further working e.g. the correct evaluation of the sum of the 4 areas together with an additional area* *FT from M1 is available provided it comes from the sum of 4 areas*

Unit 1: Higher Tier	Mark	Comments
9(a) Use of Volume = $\dfrac{\text{Mass}}{\text{Density}}$	B1	
(Maximum possible volume =) $\dfrac{155}{2.5}$	M1	FT 'their 155' provided 150 < mass $\leq$ 160 AND 'their 2.5' provided 2 $\leq$ density < 3
$= 62$ (cm³)	A1	CAO If no marks awarded, SC1 for use of 155 AND 2.5
9(b)(i) Identification of correct right-angled triangle	B1	May be implied by sight of 40 AND (12 – 2) or 10 in working
$(AD^2 =) \; 40^2 - (12-2)^2$ or $(AD^2 =) \; 40^2 - 10^2$	M1	
$AD^2 = 1500$ OR $(AD =) \sqrt{1500}$ AND $(AD =) \; 10\sqrt{15}$ (cm)	A1	Sight of $AD^2 = 1500$ OR $(AD =)\sqrt{1500}$ AND $10\sqrt{15}$ need to be seen
9(b)(ii) (Total arc length =) $\quad \dfrac{150}{360} \times 2 \times \pi \times 2$ + $\dfrac{210}{360} \times 2 \times \pi \times 12$ $\quad\quad (= 5\pi/3 \text{ or } 1^2/_3\pi) \quad\quad (= 14\pi \text{ or } 42\pi/3)$ $\quad = 15\frac{2}{3}\,\pi$ or $\dfrac{5640\pi}{360}$ or $\dfrac{47\pi}{3}$ (cm) or equivalent	M2 A2	Allow values of **π** from 3.14 to 3.142 for M marks only Or equivalent M1 for $\dfrac{150}{360} \times 2 \times \pi \times 2$ OR $\dfrac{210}{360} \times 2 \times \pi \times 12$ $\quad\quad\quad\quad\quad\quad\quad$ or equivalents CAO. Allow 15.66**π**, 15.67**π** or 15.7**π** A1 for any one of the following: • AB = 600**π**/360 or equivalent (= 5**π**/3 or 1²/₃**π**), allowing 1.66**π**, 1.67**π** or 1.7**π** • CD = 5040**π**/360 or equivalent (=14**π** or 42**π**/3) • On FT from M1 for a correct evaluation of 'their $\dfrac{150\times2\times\pi\times2}{360} + \dfrac{210\times2\times\pi\times12}{360}$' with 1 correct term, accepting similar notation possibilities as A2
(Total length of chain =) $\quad\quad 20\sqrt{15} + \dfrac{5640\pi}{360}$ (cm) or equivalent	B1	ISW Accept use of $15\frac{2}{3}\,\pi$ Allow use of 15.66**π**, 15.67**π** or 15.7**π** FT 'their 5640**π**/360' provided at least 2 marks previously awarded If no marks awarded, and from using **π** × radius in their calculations, i.e. using the method $2\times10\sqrt{15} + \dfrac{150\times\pi\times2}{360} + \dfrac{210\times\pi\times12}{360}$ SC3 for an answer of $20\sqrt{15} + \dfrac{5640\pi}{720}$ (cm) or equivalent, allowing use of 7.83(…)**π** OR SC2 for … $+ \dfrac{5640\pi}{720}$ (cm) or equivalent, allowing use of 7.83(…)**π** OR SC1 for use of $2\times10\sqrt{15} + \dfrac{150\times\pi\times2}{360} + \dfrac{210\times\pi\times12}{360}$

Unit 1: Higher Tier	Mark	Comments

10.
 	
(3 +) 12
       × $\frac{9}{12}$ or × 0.75   or equivalent
	M1	A table method altering all 3 in the same manner at the same time is M0
		
		M marks may be seen in either order
		Allow 12 − 3
		e.g. Time To fill Pumps
		       9 9/12 7
		or 63 9/12 1

× $\frac{7}{5}$ or × 1.4 or equivalent	M1	FT from M0 previously awarded
		Must be from use of 12 or (12 × 9/12 =) 9
		e.g. if this calculation is performed first
		      Time To fill Pumps
		     16.8 (Full) 5
		or 1.4 1/12 5

= 15 hours 36 minutes	A2	CAO A1 for any one of the following: • $\frac{63}{5}$ or $12\frac{3}{5}$ or 12.6 (hours) or 12 hours 36 min • $\frac{78}{5}$ or $15\frac{3}{5}$ or 15.6 (hours) • FT from M1M1 for their time + 3 hours correct to the nearest minute provided of equivalent difficulty
10. *Alternative method 1 (using pump-hours):* *Sight of* *7 × 12* *AND* *7 × 3*	*B1*	
(3 +) $\frac{7 × 12 − 7 × 3}{5}$	*M1*	
= 15 hours 36 minutes	*A2*	*CAO* *A1 for any one of the following:* • $\frac{63}{5}$ *or* $12\frac{3}{5}$ *or 12.6 (hours)* • $\frac{78}{5}$ *or* $15\frac{3}{5}$ *or 15.6 (hours)* • *FT from M1 for their time + 3 hours correct to the nearest minute provided of equivalent difficulty*
10. *Alternative method 2 (using pump-hours):* *Sight of* *7 × 12* *AND* *2 × 3*	*B1*	
$\frac{7 × 12 − 2 × 3}{5}$	*M1*	
= 15 hours 36 minutes	*A2*	*CAO* *A1 for any one of the following:* • $\frac{78}{5}$ *or* $15\frac{3}{5}$ *or 15.6 (hours)* • *FT from M1 for their time correct to the nearest minute provided of equivalent difficulty*

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