



GCSE MARKING SCHEME

SUMMER 2024

**GCSE
MATHEMATICS – NUMERACY
UNIT 2 – HIGHER TIER
3310U60-1**

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

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Unit 2: Higher Tier	Mark	Comments
1(a)(i) 18 to 24 hours	B1	
1(a)(ii) 97	B1	
1(a)(iii) 13	B1	
1(a)(iv) States or unambiguously implies 'No' with a reason, e.g. 'no people in group 0 to 6 hours'	E1	<p>Allow 'No' with e.g. 'the point before 6 hours is at zero'</p> <p>Do not allow 'Can't tell' with e.g. 'it is grouped data'</p> <p>Do not accept "No' with e.g. 'it is grouped data' (unless explaining why)</p> <p>'there is no point at 6'</p> <p>'6 hours has a frequency of 0'</p> <p>'it does not match a group of people'</p> <p>'the first point is at 0 and the second one is at 20'</p> <p>'the first plot is at 20'</p> <p>'the first plot is at 9 hours'</p> <p>'the first plot above 0 is at 9 hours'</p> <p>'there is no information at 6 hours, it starts at 9 hours'</p> <p>'the shortest time is 9 hours'</p>
<p>1(b) Sight of 22.5, 25.5, 29.5 and 31.5 (mm)</p> <p>22.5 + 25.5 + 29.5 + 31.5 or 22+25+29+31 + 4 × 0.5 or equivalent</p> <p align="right">109 (mm)</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Award B1 for sight of 4×0.5 in an appropriate calculation</p> <p>Allow 0.4999(...) for 0.5, must clearly be a recurring 9 digit</p> <p>If B0, FT provided unambiguously chosen: $22 < \text{'their 22.5'} \leq 23$, $25 < \text{'their 25.5'} \leq 26$, $29 < \text{'their 29.5'} \leq 30$, and $31 < \text{'their 31.5'} \leq 32$,</p> <p>CAO. Ignore incorrect units given</p> <p>Ignore any working for least possible thickness also given, e.g. $21.5 + 22.5 + 28.5 + 30.5 = 105$</p>

Unit 2: Higher Tier	Mark	Comments
<p>2(a) <u>Method not directly working with a stated or omitted number of hours difference</u></p> $0.324 \times 8 \times (10 \text{ or } 12) \times 7 \times 80 \div 1000$ $0.324 \times 8 \times (12 \text{ or } 10) \times 7 \times 80 \div 1000$ <p style="text-align: center;">with the intention to subtract</p> <p>(Saving is 17.418... – 14.515...=) (£) 2.90</p>	<p>M3</p> <p>m1</p> <p>A1</p>	<p>Methods may be shown in stages or be embedded <u>Use this method if 2 separate numbers of hours are used, which may not be correct, i.e. ≠12 and ≠10, with or without indication of subtraction</u></p> <p>Penalise every additional spurious term by reducing the count of correct terms by 1*</p> <p>Allow '× 32.4' for '× 0.324' M2 for any 4 or 5 correct terms* M1 for any 3 correct terms*</p> <p>Must be an indication of the intention to subtract, in either order FT from 5 (or 6) consistent correct terms for use of</p> <ul style="list-style-type: none"> the other value 10 or 12 respectively 'their number of hours' are 13 and 11 (incorrect) <p>Award m0 if inconsistent, i.e. not an equal number of consistent correct terms* between the expressions. Mark 'their better stated calculation' first if both are given</p> <p>CAO All working must be checked, do not award 5 marks for £2.90 from incorrect working.</p>
<p>2(a) <u>Alternative method:</u> <u>Method directly working with a stated or omitted number of hours difference</u></p> $0.324 \times 8 \times 2 \times 7 \times 80 \div 1000$ <p>(Saving is) (£) 2.90</p>	<p>M4</p> <p>A1</p>	<p><i>Methods may be shown in stages or be embedded</i> <u>Use this method if a single number of hours is used, which may not be correct, i.e. ≠2, or if the number of hours is omitted</u></p> <p><i>Do not allow 2 hours as a correct term from incorrect working, e.g. 13 – 11 = 2</i></p> <p><i>Penalise every additional spurious term by reducing the count of correct terms by 1*</i></p> <p>Allow '× 32.4' for '× 0.324' M3 for any 5 correct terms* M2 for any 4 correct terms* M1 for any 3 correct terms*</p> <p>CAO All working must be checked, do not award 5 marks for £2.90 from incorrect working.</p>
<p>Organisation and communication</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p><i>Organised to include labels, e.g.</i> Number of hours Total number of kWh Cost per day Cost per week</p> </div> <p>Writing</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p><i>Units to include, e.g.</i> kW kWh £</p> </div>	<p>OC1</p> <p>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 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 <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.

Unit 2: Higher Tier	Mark	Comments
2(b) Height = $\tan 68^\circ \times 3.3$ or height = $\frac{\sin 68^\circ \times 3.3}{\sin(90 - 68)^\circ}$ 8.167... (m) or 8.17 (m) or 8.2 (m)	M2 A1	Or alternative correct full method, isolating height M1 for $\tan 68^\circ = \text{height} / 3.3$ or $\frac{\text{height}}{\sin 68^\circ} = \frac{3.3}{\sin(90 - 68)^\circ}$ or equivalent Allow 8(m), 8.1(m) 8.16(m) from correct working
3(a) Midpoints 1, 4, 7, 11, 16 $1 \times 8 + 4 \times 12 + 7 \times 20 + 11 \times 4 + 16 \times 6$ $(= 8 + 48 + 140 + 44 + 96)$ $(= 336)$ $\div 50$ 6.72 or 6.7 (walks)	B1 M1 m1 A1	FT 'their midpoints' provided at least 4 lie within the appropriate group, including bounds throughout Use of lower bounds gives 276 Use of upper bounds gives 396 Allow rounded to 7 (walks) from appropriate working Use of lower bounds gives 5.5(2 walks) or 6 (walks) Use of upper bounds gives 7.9(2 walks) or 8 (walks)
3(b) 06(:)53 or 6(:)53 a.m.	B1	Allow 06(:)53 a.m. or 6(:)53 Do not accept (0)6(:)53 p.m.

Unit 2: Higher Tier	Mark	Comments
3(c) $(\text{Height})^2 = 7.6^2 - (18.8 - 12.6)^2$ or $(\text{Height})^2 = 7.6^2 - 6.2^2$ or $\cos^{-1}\left(\frac{18.8-12.6}{7.6}\right) = 35(.3345\dots)^\circ$ and $\sin 35(.33\dots)^\circ = \frac{\text{Height}}{7.6}$ or $\tan 35(.33\dots)^\circ = \frac{\text{Height}}{6.2}$	M2	M1 for sight of 18.8 – 12.6 with <ul style="list-style-type: none"> any attempt to use Pythagoras' Theorem (including summing rather than subtraction) $\cos^{-1}\left(\frac{18.8-12.6}{7.6}\right) = 35(.3345\dots)^\circ$ and an attempt to use sine or tan
$\text{Height}^2 = 19.32$ or $(\text{Height} =) \sqrt{19.32}$ or $(\text{Height} =) 7.6 \times \sin 35(.33\dots)^\circ$ or $(\text{Height} =) 6.2 \times \tan 35(.33\dots)^\circ$	A1	
$(\text{Height} =) 4.39(54\dots \text{ m})$ or $4.4(\text{m})$	A1	Do not allow 4.3(m) from premature rounding of 35.3345...° May be implied in further working Provided at least M2 previously awarded, FT from $\sqrt{\text{their } 19.32}$ provided < 7.6 (m)
$(\text{Volume of concrete}) \frac{1}{2} \times (12.6 + 18.8) \times 4.4 \times 50$ or $\frac{1}{2} \times 31.4 \times 4.4 \times 50$ or $\frac{1}{2} \times (18.8 - 12.6) \times 4.4 \times 50 + 12.6 \times 4.4 \times 50$ or $\frac{1}{2} \times 6.2 \times 4.4 \times 50 + 12.6 \times 4.4 \times 50$	M2	FT 'their derived 4.4' provided <ul style="list-style-type: none"> 'their derived 4.4' < 7.6 'their derived 4.4' ≠ 6.2 'their derived 4.4' ≠ 'their 18.8 – 12.6' May be seen in stages, e.g. with '× 50' in further working
$(\text{Volume of concrete})$ Answer in the range 3450 (m ³) to 3455 (m ³)	A1	M1 for any one of the following: (Area of cross-section) <ul style="list-style-type: none"> $\frac{1}{2} \times (12.6 + 18.8) \times 4.4$ (= 69.08 or 69.1m²) $\frac{1}{2} \times (18.8 - 12.6) \times 4.4 + 12.6 \times 4.4$ (= 13.64m² + 55.44m²) (Volume cuboid) <ul style="list-style-type: none"> $12.6 \times 4.4 \times 50$ (= 55.44 × 50 = 2772 m³) (Volume triangular prism) <ul style="list-style-type: none"> $\frac{1}{2} \times (18.8 - 12.6) \times 4.4 \times 50$ (= 13.64 × 50 = 682 m³) FT from previous M2 only and 'their derived 4.4' from an attempt to use Pythagoras' Theorem or cosine followed by sine On FT from M2, allow a similar range from rounding or truncation If previous M0 A0, award SC1 for an answer of 4867 (m ³) from 'their 4.4' = 6.2

Unit 2: Higher Tier	Mark	Comments
4(b)(ii) 368 187 456 (km ²)	B3	<p>ISW Allow appropriate rounding from correct working, such as 368 187 500 or 368 000 000 or 370 000 000</p> <p>B2 for any one of the following:</p> <ul style="list-style-type: none"> • $8 \times 460\,234\,320 \div 10$ • $7 \times 460\,234\,320 \div 10 + 460\,234\,320 \div 10$ • $460\,234\,320 - 2 \times 460\,234\,320 \div 10$ • $(2 \times 460\,234\,320 \div 10 =) 92\,046\,864$ • $(7 \times 460\,234\,320 \div 10 =) 322\,164\,024$ <p>B1 for any one of the following, including embedded in other working:</p> <ul style="list-style-type: none"> • $460\,234\,320 \div 10$ • $(460\,234\,320 \div 10 =) 46\,023\,432$ <p><i>If errors in calculating $1 + 7$ or $1 + 2 + 7$ are seen, then award B2 or B1 as appropriate e.g.</i></p> <ul style="list-style-type: none"> • $1 + 7 = 9, 9 \times 460\,234\,320 \div 10$ B2 • $9 \times 460\,234\,320 \div 10$ B1 <p style="text-align: right;"><i>(embedded $460\,234\,320 \div 10$)</i></p>

Unit 2: Higher Tier	Mark	Comments
<p>5(a) (Number of gallons used =)</p> $\frac{36}{48} + \frac{65 \times 1.24}{35} \quad \text{OR} \quad \frac{36}{48} + \frac{65 \times 1.4}{35}$ <p>(= 0.75) (= 2.6)</p> <p style="text-align: right;">= 3.35 (gallons)</p>	<p>M3</p> <p>A1</p>	<p>Allow M2 for $\frac{36}{48} + \frac{65 \times 1.24}{35}$ (= 0.75 + 2.30...) OR sight of $\frac{65 \times 1.4}{35}$ or equivalent M1 for sight of $\frac{36}{48}$ or sight of 0.75 provided not from incorrect work Allow M1 for sight of $\frac{65 \times 1.24}{35}$ OR $\frac{65 \times 84}{35}$ (=156)</p> <p>CAO Allow 3.4 (gallons) provided no incorrect work seen</p>
<p>5(b)</p> $3.35 \times 8 \div 1.75 \times 1.49$ <p style="text-align: right;">= (£)22.81 (828...) or (£)22.82</p>	<p>M2</p> <p>A1</p>	<p>FT 'their 3.35 (gallons)' from (a) Allow use of the conversion 1 litre = 1.75 to 1.76 pints</p> <p>M1 for the correct use of 3.35 with any 2 terms OR M1 for $8 \div 1.75 \times 1.49$ OR if one of the direct conversions from gallons to litres used as listed below, M1 for any one of the following:</p> <ul style="list-style-type: none"> • $3.35 \times (4.544 \text{ to } 4.572)$ • $1.49 \times (4.544 \text{ to } 4.572)$ • $3.35 \times 1.49 \times$ 'their 4.544 to 4.572' but using a value <u>just</u> outside this range e.g. 4.6 • $3.35 \div (0.2187 \text{ to } 0.22)$ • $1.49 \div (0.2187 \text{ to } 0.22)$ • $3.35 \times 1.49 \div$ 'their 0.2187 to 0.22' but using a value <u>just</u> outside this range e.g. 0.218 <p>Must be from M2 Strict FT of their correct conversion between gallons and litres. Answers will be in the range (£)22.68 to (£)22.82 Allow the conversion into litres from any of the following also</p> <p style="text-align: center;"> $\frac{1 \text{ pint} = 568 \text{ to } 572 \text{ ml}}{3.35 \times 8 \times (0.568 \text{ to } 0.572)}$ $\frac{1 \text{ gallon} = 4.544 \text{ to } 4.572 \text{ litres}}{3.35 \times (4.544 \text{ to } 4.572)}$ <u>1 litre = 0.2187 to 0.22 gallons</u> $3.35 \div (0.2187 \text{ to } 0.22)$ </p>

Unit 2: Higher Tier	Mark	Comments
<p>6(a)</p> $\frac{360 - 38}{360} \times \pi \times (54^2 - 50^2) \quad (\times 2) \quad \text{or equivalent}$ <p>(= 1168.35 to 1169.11 or 16744π/45)</p> $= 2336.7 \text{ to } 2338.21 \quad \text{or} \quad 33488\pi/45 \quad (\text{mm}^3)$ <p>(Number of C-clips =)</p> $\frac{1\,500\,000}{2336.7 \text{ to } 2338.21}$ $= 641 \text{ (C-clips)}$	<p>M2</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Accept use of values of π from 3.14 to 3.142</p> <p>Note: Accept $(54^2 - 50^2)$ written as $(54 + 50) \times (54 - 50)$</p> <p>M1 for one of the following:</p> <ul style="list-style-type: none"> $\frac{360 - 38}{360} \times \pi \times 54^2 \quad (\times 2) \quad (= 8189.7 \text{ to } 8195)$ (=13041π/5) $\frac{360 - 38}{360} \times \pi \times 50^2 \quad (\times 2) \quad (= 7021.3 \text{ to } 7026)$ (= 20125π/9) $\frac{38 \times \pi \times (54^2 - 50^2)}{360} \quad (\times 2) \quad (= 137.8 \text{ to } 138)$ (= 1976π/45) <p>CAO</p> <p>If no marks yet awarded, SC1 for any one of the following</p> <ul style="list-style-type: none"> $\frac{360 - 38}{360} \times \pi \times (27^2 - 25^2) \quad (\times 2) \quad (= 292 \text{ to } 292.3)$ (= 4186π/45) $\pi \times (54^2 - 50^2) \times 2 \quad (= 2612 \text{ to } 2614.15 \text{ or } 832\pi)$ <p>FT 'their 2336.7 to 2338.21' provided at least 1 mark previously awarded</p> <p>Only FT from M2M1 or M1M1 previously awarded On FT, should be an integer obtained from the truncation of their answer</p>
<p>6(a) <u>Alternative method for the first 3 marks:</u></p> $\frac{360 - 38}{360} \times \frac{(2 \times \pi \times 54 + 2 \times \pi \times 50)}{2} \times (54 - 50) \quad (\times 2)$ $= 2336.7 \text{ to } 2338.21 \quad (\text{mm}^3)$	<p>M2</p> <p>A1</p>	<p>Accept use of values of π from 3.14 to 3.142</p> <p>M1 for one of the following:</p> <ul style="list-style-type: none"> $\frac{360 - 38}{360} \times (2 \times \pi \times 54 + 2 \times \pi \times 50) \times (54 - 50) \times 2$ (= 4673.4 to 4676.42 or 66976π/45) $\frac{360 - 38}{360} \times \frac{(\pi \times 54 + \pi \times 50)}{2} \times (54 - 50)$ (= 584.1 to 584.6 or 8372π/45) $\frac{38 \times (2 \times \pi \times 54 + 2 \times \pi \times 50)}{360} \times (54 - 50) \quad (\times 2)$ (= 137.8 to 138 or 1976π/45) <p>CAO</p> <p>If no marks yet awarded, SC1 for any one of the following:</p> <ul style="list-style-type: none"> $\frac{360 - 38}{360} \times \frac{(2 \times \pi \times 27 + 2 \times \pi \times 25)}{2} \times (27 - 25)$ (= 292 to 292.3 or 4186π/45) $\frac{(2 \times \pi \times 54 + 2 \times \pi \times 50)}{2} \times (54 - 50) \times 2$ (= 2612 to 2614.15 or 832π)

Unit 2: Higher Tier	Mark	Comments
<p>6(b)</p> $1500 \times \frac{\text{(number of a type of fastener made)}}{149\,000}$ <p>(List of unrounded answers) 231.5(436...), 110.7(382...), 704.6(979...), 453(.0201...)</p> <p>(Number in sample =) 231, 111, 705, 453</p>	<p>M1</p> <p>A1</p> <p>A1</p>	<p>Sight of this calculation for any type of fastener Allow e.g. (C-clips) $\frac{15.4(\dots)}{100} \times 1500$</p> <p>OR</p> <p>A1 for 232, 111, 705, 453 Implies the award of M1</p> <p>Award M1A1A1 for 231, 111, 705, 453 <u>provided no incorrect work seen</u></p> <p>If M1A0 awarded, A1 on FT from their unrounded answers for equivalent difficulty i.e. provided:</p> <ul style="list-style-type: none"> • their correctly rounded answers sum to 1499 or 1501 AND • the correct numbers in the sample are given from their unrounded answers, including any decisions regarding rounding up or down AND • the numbers in the sample add to 1500

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<p>7(c) (Area factor =) $1 - 0.19$ OR $\frac{1}{1 - 0.19}$ (= 0.81) (= 1.2345...)</p> <p>(Scale factor =) $\sqrt{1 - 0.19}$ OR $\sqrt{\frac{1}{1 - 0.19}}$ (= 0.9) (= 1.1(1...))</p> <p>(Length of Tanvi's map =) $\sqrt{1 - 0.19} \times 33$ OR $33 \div \sqrt{\frac{1}{1 - 0.19}}$ = 29.7 (cm)</p>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p>	<p>Or percentage, fraction or ratio equivalent to 0.81 or 1.2345... May be implied in further possibly incorrect working e.g. 33×0.81, $33 \times (1 - 0.19)$, $33 - 33 \times 0.19$ (=26.73)</p> <p>Accept a scale factor of 10:9 or 9:10 or equivalents</p> <p>CAO Accept an answer of 30 (cm) from correct working</p> <p>If no marks awarded, SC1 for any one of the following:</p> <ul style="list-style-type: none"> • $33 \times \sqrt{0.19}$ (= 14.3(843...cm)) • $33 \div \sqrt{1.19}$ (= 30.2(510...cm))
<p>7(d) Tangent drawn at time 20 minutes</p> <p>Idea of increase in y \div increase in x</p> <p>Correctly evaluated gradient for their tangent (between 0.04 and 0.1)</p> <p>$\frac{\text{'their gradient'} \times 60}{1.6}$ or $\frac{\text{'their gradient'} \times 5 \times 60}{8}$ or equivalent</p> <p>Correctly evaluated speed in mph for 'their gradient' (between 1.5 and 3.75 mph)</p>	<p>M1</p> <p>m1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>An appropriate tangent resulting in a gradient between 0.04 and 0.1</p> <p>Differences need to be attempted for both Allow m1A0 if one difference has been incorrectly calculated An attempt may have been made to convert into miles and/or hours</p> <p>Dependent on M1m1 awarded Allow their correctly evaluated gradient to be a fraction that may include a decimal e.g. 1.3/20 May be embedded within further work Mark final answer</p> <p>FT 'their gradient' provided it's an increase in y \div increase in x from an attempt made at drawing a tangent at time 20 minutes Do not award if previous incorrect attempt/s made at converting one or both differences into miles and/or hours</p> <p>Accept appropriate rounding</p>

Unit 2: Higher Tier	Mark	Comments
8(a) 5000×1.006^{18} $= (\pounds) 5568.44(1446)$	M1 A1	If no marks awarded, SC1 for $(5000 \times 1.006^{17} =) (\pounds)5535.23(0\dots)$ or $(\pounds)5535.23$
8(b) $(1 + x)^2 - 1 = 0.04$ or equivalent $1 + x = \sqrt{1.04}$ or equivalent $x = 0.01(980\dots)$ (Interest rate every 6 months =) 1.98 (%)	M1 m1 A1 A1	Allow a place value error in the 0.04 for at most M1m1A0A0 Accept any letter used for x CAO
8(b) <u>Alternative method:</u> <i>i is the nominal annual rate</i> $\left(1 + \frac{i}{2}\right)^2 - 1 = 0.04$ or equivalent $1 + \frac{i}{2} = \sqrt{1.04}$ or equivalent $i = 0.03(960\dots)$ or $3.96(0\dots)\%$ (Interest rate every 6 months =) 1.98 (%)	M1 m1 A1 A1	Allow a place value error in the 0.04 for at most M1m1A0A0 Accept any letter used for i May be implied in further working If their final answer comes from $\sqrt{1.04} - 1$ AND $0.03(960\dots)$ or $3.96(\dots)\%$ not seen, then award this A1 for $0.01(980\dots)$ or $1.98(03\dots)(\%)$ rounded or truncated CAO