



GCSE MARKING SCHEME

AUTUMN 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.

<p>2(a)(i) (Calories in cake(s)) $84 \times 600 \div 100$ ($\div 4$) OR (Mass per cake) $84 \div 4$ (= 21)g <u>AND</u> (Calories per 1g of cake) $600 \div 100$ (= 6 calories) (Calories in 1 cake 21×6 =) 126 (calories) (% of required calories) $\frac{126}{2400} (\times 100)$ or $0.0525 (\times 100)$ or $\frac{5.25}{100}$ 5.25(%)</p>	<p>M1 A2 M1 A1</p>	<p>A1 for any one of the following: <ul style="list-style-type: none"> (calories in 4 cakes 84×6 =) 504 (calories) an answer from premature approximation of $100 \div 21$ in the range 4.76 to 4.8 giving an answer in the range 125 to 126.050..(calories) <p>FT 'their derived calories' provided <ul style="list-style-type: none"> calories information was used in 'their calculation of calories, <u>and</u> 'their derived calories' \neq 600 e.g. 600 calories (in 100 g), or 6 calories (in 1 g), or similar used in a calculation to derive a number of calories</p> <p>ISW further rounding or truncation Allow 5(%), 5.2(%) or 5.3(%) from correct working If no marks, award SC1 for $(600 \times 84 \div 4 =)$ 12 600</p> </p>
<p>2(a)(i) <u>Alternative method only when working is seen as a single calculation</u> $\frac{600}{2400} \times \frac{84}{100} \times \frac{1}{4} (\times 100)$ or equivalent Two correct stages of simplifying or calculation 5.25 (%)</p>	<p>M3 A1 A1</p>	<p>M2 for $\frac{600}{2400} \times \frac{84}{100} (\times 100)$ or equivalent FT from M2 FT from M2 for an answer of 21(%)</p>
<p>Organisation and communication Writing</p>	<p>OC1 W1</p>	<p>For OC1, candidates will be expected to: <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: <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. </p> </p>
<p>2(a)(ii) $84 \times 515 \div (1360 + 2725 + 515 + 4)$ or $84 \times 515 \div 4604$ 9.4 (g)</p>	<p>M1 A2</p>	<p>A1 for 9.3(96... g) not from premature approximation or $\frac{10815}{1151}$ or 9.40 (g)</p>

<p>2(b)(i) Any one of the following complete methods for the number of minutes to burn off energy in 1 banana:</p> <ul style="list-style-type: none"> • $92 \div (690 \div 60)$ • $60 \times (92 \div 690)$ • $60 \div (690 \div 92)$ <p style="text-align: right;">8 (minutes)</p>	<p>M2</p> <p>A1</p>	<p>May be seen in stages</p> <p>M1 for any one of the following:</p> <ul style="list-style-type: none"> • $690 \div 60$ (= 11.5) • $92 \div 690$ ($= \frac{2}{15} = 0.1333\dots$) • $690 \div 92$ (= 7.5) <p>CAO. Answer space takes precedence</p>
<p>2(b)(ii) $9 \times 38 \div 60$</p> <p style="text-align: right;">5.7 (km)</p>	<p>M2</p> <p>A1</p>	<p>M1 for sight of any one of the following:</p> <ul style="list-style-type: none"> • 9×38 (= 342) • $38 \div 60$ (= 0.6333....) • $9 \div 60$ (= 0.15) <p>CAO, allow 5700m Answer space takes precedence Do not accept 5700 (km) in the answer space</p>
<p>3(a) (Length of the flagpole below the rod =)</p> <p>$3.8 \times \sin 55^\circ$ or $3.8 \times \cos (90^\circ - 55^\circ)$ or $380 \times \sin 55^\circ$ or $380 \times \cos (90^\circ - 55^\circ)$</p> <p style="text-align: right;">3.11(2...m) or 311(.2.. cm)</p> <p>(Total length $1.5 + 3.11 =$) 4.61 (m) or 461 (cm)</p>	<p>M2</p> <p>A1</p> <p>A1</p>	<p>Or alternative full method</p> <p>M1 for correct working without isolating 'length'</p> <p>$\sin 55^\circ = \frac{\text{length}}{3.8}$ or $\cos (90^\circ - 55^\circ) = \frac{\text{length}}{3.8}$ or $\sin 55^\circ = \frac{\text{length}}{380}$ or $\cos (90^\circ - 55^\circ) = \frac{\text{length}}{380}$</p> <p>Allow 3.1 (m) or 310 (cm)</p> <p>Must be to the nearest cm FT provided at least M1 previously awarded, i.e. for 1.5 + 'their 3(.)11' correctly evaluated, to nearest cm, and 'their 3.11' is to at least 2 decimal places</p> <p>If units are given they must be correct</p>
<p>3(b)(i) $120 \times 64 \div 80$ or 64×1.5 or 120×0.8 or $120 \div 1.25$ or $64 \div \frac{2}{3}$ or equivalent</p> <p style="text-align: right;">96 (cm)</p>	<p>M1</p> <p>A1</p>	<p>Answer space takes precedence</p>
<p>3(b)(ii) $75 \times 80 \div 120$ or $75 \div 1.5$ or $75 \times \frac{2}{3}$ or $80 \div 1.6$ or 80×0.625 or $64 \times 75 \div 96$ or equivalent</p> <p style="text-align: right;">50 (cm)</p>	<p>M1</p> <p>A1</p>	<p>FT from (b)(i) $64 \times 75 \div$ 'their 96' or equivalent</p> <p>Answer space takes precedence</p>

4(a)(i) States 80 (and) 100 (seconds) AND indicates 'Yes'	B1	Allow written as 100 and 80 Answer space takes precedence
4(a)(ii)I. $(80 - 75 =)$ 5 (seconds)	B1	Not from incorrect working Answer space takes precedence
4(a)(ii)II. Answer in the inclusive range 12 to 14 (seconds)	B2	Allow in this range only provided it not from incorrect working Answer space takes precedence B1 for sight of $92 - 60 (-20)$ to $94 - 60 (-20)$ or $32 (-20)$ to $34 (-20)$
4(b) 96 (seconds)	B3	Answer space takes precedence B2 for sight of or indication of 64 (squirrels), B1 any one of the following: <ul style="list-style-type: none"> • for sight of or indication of 16 (squirrels) • (use of 16 squirrels) answer of 52 (seconds) B0 for 64 seconds from incorrect working, 20% of 120 = 24, with time 64 seconds B0 for 96 seconds from incorrect working, 80% of 120 = 96, with time 96 seconds

<p>4(c) $(24 \div 21\,500) \times 1\,000\,000$ (squirrels per km²)</p> <p>1116(.27...) (squirrels per km²) AND Conclusion indicated or unambiguously implied 'Oak'</p>	<p>M2</p> <p>A1</p>	<p>Accept using estimation: $(24 \div 20\,000) \times 1\,000\,000$</p> <p>M1 for any one of the following, including if embedded:</p> <ul style="list-style-type: none"> • $24 \div 21\,500$ (= 0.001116... squirrels per m²) • (estimate) $24 \div 20\,000$ (= 0.0012 squirrels per m²) • $1\,000\,000 \div 21\,500$ (= 46.5....) • (estimate) $1\,000\,000 \div 20\,000$ (= 50) <p>Accept 1200 from estimating, i.e. $(24 \div 20\,000) \times 1\,000\,000 = 1200$ (squirrels per km²)</p> <p>If no marks, award SC1 for appropriate sight of a calculation of <u>$24 \div$ 'a number with only non-zero digits 215'</u>, provided not embedded in further working apart from multiplication or division by powers of 10</p>
<p>4(c) <u>Alternative method:</u> (If oak, number of squirrels likely in Maesgwyn Forest) $21\,500 \times 1200 \div 1\,000\,000$</p> <p>25.8 (squirrels) AND 'Oak' indicated as conclusion</p>	<p>M2</p> <p>A1</p>	<p>Allow M2 for (If chestnut) $21\,500 \times 100 \div 1\,000\,000$ (= 2.15) or (if pine) $21\,500 \times 45 \div 1\,000\,000$ (= 0.9675)</p> <p>M1 for any one of the following, including if embedded:</p> <ul style="list-style-type: none"> • (if oak) $21\,500 \times 1200$ (= 25 800 000) • (If chestnut) $21\,500 \times 100$ (= 2 150 000) • (if pine) $21\,500 \times 45$ (= 967 500) • $21\,500 \div 1\,000\,000$ (= 0.0215) • $20\,000 \div 1\,000\,000$ (= 0.02) <p>Allow from correct working either 2.15 (squirrels for Chestnut so must be) Oak, or 0.9675 or 1 (squirrels for Pine so must be) Oak</p> <p>If no marks, award SC1 for appropriate sight of any 1 of the following calculations:</p> <ul style="list-style-type: none"> • <u>'a number with only non-zero digits 215' \times 1200</u> • <u>'a number with only non-zero digits 215' \times 45</u> <p>provided not embedded in further working apart from multiplication or division by powers of 10</p>

<p>5. Strategy of attempting to use the cosine rule followed by sine rule (Length of pipe from new house 1 =)</p> $\sqrt{8.1^2 + 10.6^2 - 2 \times 8.1 \times 10.6 \times \cos 73}$ <p style="text-align: right;">(=$\sqrt{127.763 \dots}$)</p> <p style="text-align: right;">= 11.3(032...) (m)</p> <p>(Length of pipe from new house 2 =)</p> $\frac{11.3(032\dots)}{\sin 54} \times \sin 80$ <p style="text-align: right;">= 13.75(...) or 13.76 or 13.8 (m)</p>	<p>S1</p> <p>M2</p> <p>A1</p> <p>M2</p> <p>A1</p>	<p>M1 for $8.1^2 + 10.6^2 - 2 \times 8.1 \times 10.6 \times \cos 73$</p> <p>CAO</p> <p>Or full alternative method FT 'their derived 11.3(032...)' M1 for $\frac{\text{length} = 11.3(032\dots)}{\sin 80}$ or equivalent $\frac{\sin 54}{\sin 80}$</p> <p>Allow 13.7 (m) from correct working Must come from M2</p>
--	---	---

<p>7(a) (AER =) $(1 + 0.0026)^{12} - 1$ or equivalent</p> <p style="text-align: center;">= 3.16(500...) or 3.17 or 3.2 (%)</p>	<p>M1</p> <p>A1</p>	<p>e.g.</p> $\left(1 + \frac{12 \times 0.0026}{12}\right)^{12} - 1 \text{ or } \left(1 + \frac{0.0312}{12}\right)^{12} - 1$
<p>7(b) $AER = \left(1 + \frac{2.48 \div 100}{4}\right)^4 - 1 =$</p> <p style="text-align: center;">(= 0.025(03...) or 2.5(03...) (%))</p> <p>(Amount in account after 10 years =)</p> $3000 \times (1 + 0.025(03...))^{10}$ <p style="text-align: center;">= (£)3841.43(752...) or (£)3841.44</p> <p>(Percentage increase =)</p> $\frac{3841.43(752...) - 3000}{3000} (\times 100)$ <p>or</p> $\frac{3841.43(752...) - 1}{3000} (\times 100)$ <p style="text-align: center;">= 28(.04) to 28.05 (%)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>The -1 may be implied in further working</p> <p>FT 'their derived 0.025(03...)' provided it comes from the AER formula with $1 < n \leq 12$</p> <p>CAO. Must come from M1M1 Accept (£)3840.25 from the use of the multiplier 1.025 provided M1M1 previously awarded</p> <p>FT 'their 3841.43(752...)' provided at least one M1 previously awarded</p> <p>An amount in the account after 10 years of (£)3840.25 leads to 28(.008) (%)</p> <p>If no marks awarded, SC1 for an answer of 27.7(58...) or 27.8% from use of $\frac{3000 \times (1.0248)^{10} - 3000}{3000} \times 100$ or $((1.0248)^{10} - 1) \times 100$ or equivalent</p>
<p>7(b) <i>Alternative method 1:</i></p> <p>(Quarterly rate =) $\frac{2.48}{4}$ (%) or $\frac{2.48 \div 100}{4}$</p> <p style="text-align: center;">(= 0.62%) or 0.0062)</p> <p>(Amount in account after 10 years =)</p> $3000 \times \left(1 + \frac{2.48 \div 100}{4}\right)^{10 \times 4} \text{ or } 3000 \times 1.0062^{40}$ <p style="text-align: center;">= (£)3841.43(752...) or (£)3841.44</p> <p>(Percentage increase =)</p> $\frac{3841.43(752...) - 3000}{3000} (\times 100)$ <p>or</p> $\frac{3841.43(752...) - 1}{3000} (\times 100)$ <p style="text-align: center;">= 28(.04) to 28.05 (%)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>May be implied in further working</p> <p>FT 'their 0.0062' provided it comes from $2.48(\div 100) / n$ provided $1 < n \leq 12$ Allow $3000 \times \left(1 + \frac{2.48 \div 100}{n}\right)^{10 \times n}$ provided their value of n has been used consistently and $1 < n \leq 12$</p> <p>CAO. Must come from M1M1</p> <p>FT 'their 3841.43(752...)' provided at least one M1 previously awarded</p>

<p>7(b) <u>Alternative method 2:</u></p> $AER = \left(1 + \frac{2.48 \div 100}{4}\right)^4 - 1 =$ <p style="text-align: center;">(= 0.025(03...) or 2.5(03...) (%))</p> <p>(Percentage increase =) $(1 + 0.025(03...))^{10} - 1$</p> <p style="text-align: right;">= 28(.04) to 28.05 (%)</p>	<p>M1</p> <p>M3</p> <p>A1</p>	<p>The -1 may be implied in further working</p> <p>FT 'their 0.025(03...)' provided it comes from $\left(1 + \frac{2.48 \div 100}{n}\right)^n - 1$ where n has been used consistently and $1 < n \leq 12$ M2 for $(1 + 0.025(03...))^{10}$</p> <p>CAO. Must come from M1M3</p>
<p>7(b) <u>Alternative method 3:</u></p> <p>(Quarterly rate =) $\frac{2.48}{4}$ (%) or $\frac{2.48 \div 100}{4}$</p> <p style="text-align: center;">(= 0.62(%) or 0.0062)</p> <p>(Percentage increase =) $(1 + 0.0062)^{10 \times 4} - 1$</p> <p style="text-align: right;">= 28(.04) to 28.05 (%)</p>	<p>M1</p> <p>M3</p> <p>A1</p>	<p>FT 'their 0.0062' provided it comes from $2.48(\div 100) / n$ provided $1 < n \leq 12$ Allow $\left(1 + \frac{2.48 \div 100}{n}\right)^{10 \times n} - 1$ provided their value of n has been used consistently and $1 < n \leq 12$ M2 for $(1 + 0.0062)^{10 \times 4}$</p> <p>CAO</p>

<p>8(b) $M = 125r^3(46 - 3\pi)$ or $M = 5750r^3 - 375\pi r^3$ or $M = 4571.75r^3$ to $4572.5r^3$</p>	<p>B2</p>	<p>Mark final answer B1 for $r^3 = \frac{M}{125(46 - 3\pi)}$ or $r^3 = \frac{M}{5750 - 375\pi}$ or $r^3 = \frac{M}{4571.75 \text{ to } 4572.5}$ or B1 for $125r^3(46 - 3\pi)$ or $5750r^3 - 375\pi r^3$ or $4571.75r^3$ to $4572.5r^3$ (omitting M =)</p>
<p>8(c) $60 \times (\text{number made}) \div (148 + 185 + 115 + 87)$ or $60 \times (\text{number made}) \div 535$</p> <p>(List of unrounded answers) 16.5(98...) or 16.6, 20.7(47...), 12.8(97...) or 12.9, 9.7(57...) or 9.8</p> <p>(Number in the sample =) 16, 21, 13, 10</p>	<p>M1</p> <p>A1</p> <p>A1</p>	<p>Sight of this calculation for any type of sign Allow (number of signs to be made) $\div 8 \cdot 9(166\dots)$</p> <p>OR</p> <p>A1 for final answers of 17, 21, 13, 10</p> <p>Award M1A1A1 for 16, 21, 13, 10 <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 59 or 61 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 60

<p>8(d)</p> <p>Sight of base of triangle = $3h$</p> $\left(\frac{\pi \times h^2}{4} + 4h^2 + \frac{3h^2}{2}\right) \times 2 = 0.1 \quad \text{or}$ $\frac{2\pi \times h^2}{4} + 8h^2 + \frac{6h^2}{2} = 0.1 \quad \text{or}$ $(12.57 \text{ to } 12.571)h^2 = 0.1 \quad \text{or equivalent}$ $h^2 = \frac{0.1}{2\left(\frac{\pi}{4} + 5.5\right)} \quad \text{or equivalent}$ $h = 0.089 \text{ to } 0.0892 \text{ (m)} \quad \text{or equivalent}$	<p>B1</p> <p>M2</p> <p>m1</p> <p>A2</p>	<p><u>Any letter or word may be used for the height</u> Needs to be convincing. May be seen on diagram</p> <p>Ignore a place value error from an incorrect attempt to convert m^3 into cm^3 and/or m into cm for M and m marks only but A0 Allow omission of $\times 2$ for M2 or M1 and possibly m1 M1 for:</p> <ul style="list-style-type: none"> the sum of appropriate terms equated to 0.1, with no more than 1 error in the terms $\left(\frac{\pi \times h^2}{4} + 4h^2 + \frac{3h^2}{2}\right) \times 2$ or equivalent <p>FT if possible from M1 provided h^2 in every term Note: $\pi/4 + 5.5 = 6.285$ to 6.2855 $\pi/2 + 11 = 12.57$ to 12.571</p> <p>CAO Ignore an incorrect attempt to convert to cm or mm Accept 0.09 (m) from correct working</p> <p>A1 for $h = \sqrt{\frac{0.1}{2\left(\frac{\pi}{4} + 5.5\right)}}$ or $\sqrt{\frac{1}{5\pi + 110}}$ or $h = \sqrt{0.00795 \dots}$</p>
<p>8(d) <u>Alternative method:</u></p> <p>Base of trapezium = $7h$</p> $\left(\frac{\pi \times h^2}{4} + \frac{(4h+7h) \times h}{2}\right) \times 2 = 0.1 \quad \text{or}$ $\frac{2\pi \times h^2}{4} + 11h^2 = 0.1 \quad \text{or}$ $(12.57 \text{ to } 12.571)h^2 = 0.1 \quad \text{or equivalent}$ $h^2 = \frac{0.1}{\left(\frac{\pi}{2} + 11\right)} \quad \text{or equivalent}$ $h = 0.089 \text{ to } 0.0892 \text{ (m)} \quad \text{or equivalent}$	<p>B1</p> <p>M2</p> <p>m1</p> <p>A2</p>	<p><u>Any letter or word may be used for the height</u> Needs to be convincing. May be seen on diagram</p> <p>Ignore a place value error from an incorrect attempt to convert m^3 into cm^3 and/or m into cm for M and m marks only but A0 Allow omission of $\times 2$ for M2 or M1 and possibly m1 M1 for:</p> <ul style="list-style-type: none"> the sum of appropriate terms equated to 0.1, with no more than 1 error in the terms $\left(\frac{\pi \times h^2}{4} + \frac{(4h+7h) \times h}{2}\right) \times 2$ or equivalent <p>FT if possible from M1 provided h^2 in every term Note: $\pi/2 + 11 = 12.57$ to 12.571</p> <p>CAO Ignore an incorrect attempt to convert to cm or mm Accept 0.09 (m) from correct working</p> <p>A1 for $h = \sqrt{\frac{0.1}{2\left(\frac{\pi}{4} + 5.5\right)}}$ or $\sqrt{\frac{1}{5\pi + 110}}$ or $h = \sqrt{0.00795 \dots}$</p>