GCSE MARKING SCHEME

AUTUMN 2023

GCSE
MATHEMATICS – NUMERACY
UNIT 2 – INTERMEDIATE TIER
3310U40-1

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 – NUMERACY

AUTUMN 2022 MARKING SCHEME

GCSE Numeracy **Unit 2: Intermediate Tier**	Mark	Comments
1. Number of units 730	B1	Answer spaces take precedence throughout
Charge for units 730 × (0.)19	M1	For use of 730 or a **strict** FT 'their 730' from the first entry in the bill Award for sight of digits 1387(0)
(£) 138.7(0)	A1	Must be in pounds
Standing charge (3 × £6.50 =) (£) 19.5(0)	B1	
Total charges (£) 158.2(0)	B1	Must be in pounds FT 'their 138.7(0)' + 'their 19.50' correctly evaluated, i.e. the sum of their 2 previous entries FT if total charges was previously given in the standing charge box, provided 'their cost of units' + 19.50 is correctly evaluated
VAT at 5% (£) 7.91	B1	Must be in pounds FT 5% of 'their 158.2(0)' correctly evaluated
Amount to pay (£) 166.11	B1	FT provided • B1 for total charges and B1 for VAT are both previously awarded, or • is correctly evaluated 'their total charges' × 1.05 On FT throughout, allow rounded or truncated to a penny.
2(a) 5 × 42 – (40 + 37 + 39 + 48) or 210 – 164 or equivalent OR 40 + 37 + 39 + 48 + ….. = 5 × 42 or 164 + … = 210	M2	May be shown in stages Allow missing brackets as the intention to subtract M1 for sight of any one of the following: • 5 × 42 or 210 (mm) • the idea that (40 + 37 + 39 + 48 + x) ÷ 5 = **42**, where x may be a gap, variable or a trial
(Friday) 46 (mm)	A1	CAO. Do not award from incorrect working Answer space takes precedence Do not allow an embedded answer
2(a) Alternative methods *(Difference from mean) 42 + 2 + 5 + 3 – 6* *OR* *(Contributions to the mean each day)* *5 × (42 – $\frac{40}{5}$ – $\frac{37}{5}$ – $\frac{39}{5}$ – $\frac{48}{5}$) or equivalent* *(= 5 × 9.2)*	*M2*	*M1 for 42 – $\frac{40}{5}$ – $\frac{37}{5}$ – $\frac{39}{5}$ – $\frac{48}{5}$*
(Friday) 46 (mm)	*A1*	*CAO. Answer space takes precedence*

2(b) $5 \times 42 \div 7$ or $210 \div 7$	M1	Allow 'their 46' from (a) has been truncated or rounded, FT any of the following: • 'their 5×42' $\div 7$ • ('their $40 + 37 + 39 + 48$' + 'their 46') $\div 7$ • $(164 +$ 'their 46'$) \div 7$
30 (mm)	A1	Answer space takes precedence On FT, accept rounded or truncated answers provided working is shown
3. (Volume of the ornament is) $\frac{1}{3} \times 15 \times 15 \times 30$ or $\frac{1}{3} \times 6750$ or $6750 - \frac{2}{3} \times 6750$ or equivalent	M2	Allow also any of the following: • $0.33(3\ldots) \times 15 \times 15 \times 30$ • $6750 - 0.66(6..) \times 6750$ • $6750 - 0.67 \times 6750$ M1 for sight of any of the following, or equivalents: • (Volume of the box is) $15 \times 15 \times 30$ (= 6750 cm^3) • $0.3 \times 15 \times 15 \times 30$ (= 2025 cm^3) • $\frac{2}{3} \times 15 \times 15 \times 30$ (= 4500 cm^3) • $0.6 \times 15 \times 15 \times 30$ (= 4050 cm^3) • $0.66 \times 15 \times 15 \times 30$ (= 4455 cm^3) • $0.67 \times 15 \times 15 \times 30$ (= 4522.5 cm^3) • $0.7 \times 15 \times 15 \times 30$ (= 4725 cm^3)
2250 (cm^3)	A2	CAO. Must be indicated and not ambiguously embedded A1 for any of the following: • $(15 \times 15 \times 30 =)$ 6750 (cm^3) May be embedded in an inappropriate calculation • 'their $15 \times 15 \times 30$' $\div 3$ correctly evaluated • $(0.3(33..) \times 15 \times 15 \times 30)$ 2025 (cm^3) $\leq$ 'their answer < 2250 (cm^3) • $(\frac{2}{3} \times 6750 =)$ 4500 (cm^3) • $(0.6 \times 15 \times 15 \times 30$ to $0.7 \times 15 \times 15 \times 30)$ 4050 (cm^3) $\leq$ 'their answer $\leq$ 4725 (cm^3) • sight of a correct product with only 1 stage of calculation to evaluate, e.g. o 225×10 o 5×450 o 15×150 o 75×30
3. 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.

4(a) (Sale price) 45 – 0.18 × 45 or 45 × (1 – 0.18) or 45 – 8.1(0) or 45 × 0.82 (£)36.9(0)	M1 A1	 May be seen or implied in further working
(Maggie's mum pays) 8 × 36.9(0) ÷ (8 + 1) or 36.9(0) – 36.9(0) ÷ (8 + 1) 8 × 4.1(0) or 36.9(0) – 4.1(0) (£)32.8(0)	M1 A1	FT 'their £36.90' On FT allow rounded or truncated to a penny
4(a) Alternative method *(Maggie's mum's share of original price)* *8 × 45 ÷ (8 + 1) or 45 – 45 ÷ (8 + 1)* *(£) 40*	*M1* *A1*	 *May be seen or implied in further working*
(Maggie's mum pays) *40 – 0.18 × 40 or 40 × (1 – 0.18)* *or 40 – 7.2(0) or 40 × 0.82* *(£)32.8(0)*	*M1* *A1*	*FT 'their £40'* *On FT allow rounded or truncated to a penny*
4(b) (Area) ½ × 1.5 × (3.1 + 4.5) 5.7 (m^2)	M1 A1	 Accept rounding to 6 (m^2) May be seen or implied in further working
(Charge) 2.5(0) × 5.7 (£) 14.25	M1 A1	FT 'their 5.7' (including if previously rounded to 6), including if 'their 5.7' is not an area Allow if 'their area' is costed in parts provided there is an attempt to sum all of the part costs, provided 'their 5.7' ≠ 1.5, 3.1 or 4.5 CAO
5(a) a = 54° b = 54° c = 78°	 B1 B1 B1	Answer spaces take precedence, if blank check the diagram FT 'their a' FT 132 – 'their a' or 132 – 'their b'

5(b)(i) (Number of revolutions is) $\frac{1000}{\pi \times 29 \div 12}$ or $\frac{1000 \times 12}{\pi \times 29}$ or equivalent	M3	Complete method May be seen in stages M2 for any one of the following, or equivalents: • $\pi \times 29 \div 12$ • $\frac{1000}{\pi \times 29}$ • $\frac{\pi \times 29}{1000 \times 12}$ • $\frac{1000}{\pi \times (29 \div 2) \div 12}$ • $\frac{1000}{\pi \times (2 \times 29) \div 12}$ M1 for any one of the following, that may be embedded in other working: • $29 \div 12$ (= 2.4(1666…)) • 1000×12 (= 12000) • $\pi \times 29$ (= 91.06 to 91.118) • $\frac{1000}{\pi \times n \div 12}$ where $n \neq 0$, e.g. $1000 \times 12 \div (\pi \times 29^2)$ • $\frac{1000}{29 \div 12}$ (= 413.79…) • $1000 \times 12 \div 29$ (= 413.79…)
Answer in the inclusive range 131 to 132 (revolutions)	A1	CAO
5(b)(ii) (10 ×) $29 \times 30 \div 12$ or equivalent or for an answer of 72.5	M2	Allow embedded with an incorrect change of units Allow (10 ×) 2.4(16…) × 30 M1 for any one of the following: • $30 \div 12$ (= 2.5) • $29 \div 12$ (= 2.4166…) • sight of 2.4, 2.41, 2.416(6…) or 2.42 • sight of (1 inch =) 2.5 (cm)
725 (mm)	A1	Answer space takes precedence Allow answers in the range 720 (mm) to 726 (mm) from premature approximation, not from incorrect working
5(c) (Average speed in km/h =) $\frac{48}{1.5}$ or equivalent	M2	M1 for sight of $\frac{48}{1.3}$ or $\frac{48}{90}$ or for answers of 36.9(…) or 37 or 0.53(33...)
32 (km/h)	A1	CAO. Answer space takes precedence

6(a)(i) Unambiguously indicates or states 'Yes' with a reason, e.g. 'both 25 kg to 35 kg', 'the highest frequencies at the same mass'	E1	*Ignore any additional spurious or contradictory statements provided 'Yes' selected* Allow 'Yes' with a reason, e.g. 'both at 30 kg', 'both at the same mass', 'both have the same mass', 'tallest (highest frequency) is 30 kg for both polygons' Do not accept 'Yes' with a reason, e.g. 'don't know', 'both in the same place', 'the groups have the same width', 'the graph tells us this'
6(a)(ii) Unambiguously indicates or states 'Can't tell' with a reason, e.g. 'there were 30 dogs with a masses between 15 kg and 25 kg', 'no raw data is given', 'the actual mass of each dog is not given', 'the data is grouped'	E1	*Ignore any additional spurious or contradictory statements provided 'Can't tell' selected* Allow 'Can't tell' with a reason, e.g. 'doesn't show this', 'you can't tell the exact number of dogs' 'doesn't give the amount of dogs' Do not accept 'Can't tell' with a reason, e.g. 'don't know', 'it is an estimate', 'it isn't accurate', 'because they can be anywhere from 10 kg to 20 kg'
6(a)(iii) Unambiguously indicates or states 'Correct' with a reason, e.g. 'Pencwm polygon shows a greater drop for greater masses', 'fewer dogs but more large dogs in Glanafon', 'more dogs in Pencwm, but fewer large dogs', 'about the same number of large dogs, with fewer dogs in Glanafon', 'about the same number of large dogs, with more dogs in Pencwm',	E1	*Ignore any additional spurious or contradictory statements provided 'Correct' selected* **Do not** allow a reason based on calculations of proportions **alone**, e.g. Pencwm 27.5%, Glanafon 41.6% Allow 'Correct' with a reason, e.g. 'Pencwm (polygon) shows a steeper drop from 30 kg', 'line for Pencwm is steeper (drop)', 'Glanafon (polygon) has a less steep drop for larger dogs', 'the greater masses are more frequent (in Glanafon)' '2 of the 3 points for Glanafon are above Pencwm', 'Pencwm line drops below Glanafon after 40 (kg)' Do not accept 'Correct' with a reason, e.g. '36 dogs in Pencwm and 37 dogs in Glanafon' alone without considering proportion, 'the greatest is 45 kg', 'higher frequency in Glanafon', 'Pencwm is bigger but doesn't have higher proportion' 'as seen by the skew in (the) Glanafon (polygon)', 'seen by the shape (of the polygon) for Glanafon'

6(b) (Total number of dogs 20 + 30 + 45 + 25 + 7 + 4 =) 131 10×20 + 20×30 + 30×45 + 40×25 + 50×7 + 60×4 (= 200 + 600 + 1350 + 1000 + 350 + 240) (= 3740) ÷ 131 (28.5(496.... kg) so) 3.95 (kg) (less)	B1 M1 m1 A2	May be implied by the sight of ((20 + 30 + 45 + 25 + 7 + 4) ÷ 6 =) 21.8(33...) Ignore any additional products seen FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups e.g. use of • lower bounds of each group gives 3085 • upper bounds of each group gives 4395 FT an error in summing 20, 30, 45, 25, 7 and 4 CAO ISW further rounding or truncation Allow 4 (kg) from correct working Accept (29 (kg) and) 3.5 (kg) from correct working Award A1 for any of the following as the final answer • 28.5(496.... kg) • 29 (kg) (from correct working) OR Award A1 on FT from M1 m1 previously awarded for a correct evaluation of 'their estimate mean' e.g. use of lower bounds gives (3085/131 =) 23.54…
6(b) <u>Alternative MS if Glanafon's last 2 points used for possible award of B1 M1 m1 only</u> *(Sight of 20 + 30 + 45 + 25 + 10 +7 =) 137* *10×20 + 20×30 + 30×45 + 40×25 + 50×10 + 60×7* *(= 200 + 600 + 1350 + 1000 + 500 + 420)* *(= 4070)* *÷ 137*	*B1* *M1* *m1*	*May be implied by the sight of* *((20 + 30 + 45 + 25 + 10 + 7) ÷ 6 =) 22.8(33...)* *Ignore any additional products seen* *FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups* *e.g. use of* • *lower bounds of each group gives 3385* • *upper bounds of each group gives 4755* *FT an error in summing 20, 30, 45, 25, 10 and 7*
7(a) 8 × 1172 ÷ 5 or 1172 × 1.6 1875.2 (km)	M1 A1	Do not allow 1172 × 1.5 Accept 1875 (km) from correct working Answer space takes precedence
7(b) 0.366 × 1000 ÷ 60 6.1 (m/s)	M1 A1	 Accept 6 (m/s) from correct working Answer space takes precedence

7(c) (Difference 60 million – 41 000 000 =) 19 000 000 or 19 million	B1	May be implied in further working Allow 19 m(il)
(Underspend) $\frac{19\,000\,000}{60\,000\,000}$ (× 100) or equivalent	M1	FT 'their 60 million – 41 000 000' including if a place value error made
31.67(%)	A1	CAO (must be 2 d.p.) Answer space takes precedence
7(c) <u>Alternative method</u> *(Underspend)* *(100 –)* $\frac{41\,000\,000}{60\,000\,000}$ *(× 100) or equivalent*	*M1*	*Allow place value error*
31.67(%)	*A2*	*CAO (must be 2 d.p.)* *Answer space takes precedence* *A1 for 31.6(6…%), 31.7(%), 32(%) or 68.33(%)*
7(d) 4×10^6	B1	
7(e) (Change to $) 350 × 1.25	M1	*Do not penalise slips in giving incorrect use of £ for $*
($)437.5(0)	A1	
(Only $10 and $50 notes available so he can buy) ($)430	A1	FT 'their ($)437.5(0)' (provided not a multiple of 10) rounded down to nearest multiple of 10 Accept stated or implied as ($)7.50 can't be converted ($)430 implies previous M1 A1, provided not from incorrect working
(Fewest number of notes making up $430) **8** $50 (notes) and **3** $10 (notes)	A1	FT 'their $430' provided it is a multiple of 10 (and provided M1 previously awarded) Must be fewest number of notes, that may be listed Sight of correct number of notes with no incorrect working implies previous A1, unless contradicted
(Cost in £ to buy $430 is) 430 ÷ 1.25 or 350 – 7.5(0) ÷ 1.25 (= 350 – 6)	M1	FT 'their whole number multiple of $10' ÷ 1.25 Ignore attempt at any further calculation if 430 ÷ 1.25 seen
(£)344	A1	Must be <(£)350 **and** depends on M1 M1 previously awarded Mark final answer If final M0 A0, then award SC1 for (£) 6 (left) or similar on FT, provided not from incorrect or inappropriate working
7(e) <u>Alternative method</u> *£40 = $50 and £8 = $10*	*M1*	
8 $50 notes, 3 $10 notes	*A3*	*A2 for 8 $50 notes* ***and** sight of 350 – 8 × 40 or equivalent* *OR* *A1 for 8 $50 notes*
(Cost to buy £350 is) 8 × 40 + 3 × 8	*M1*	
(£)344	*A1*	

8(a)(i) 440 × 48 ÷ 2.2 9600 (kg)	M1 A1	May be seen in stages Mark final answer Allow answers in the inclusive range 9588 to 9601 from premature approximation Answer space takes precedence
8(a)(ii) 230 000 000 000	B1	
8(b) (Area) 2.47 × 40000 ÷ 10000 or equivalent 9.88 (acres) (Density of trees) 615 ÷ 9.88 62(.2...trees per acre) (>60)	 M1 A1 m1 A1	**Throughout, if 4 marks are awarded, penalise -1 if conclusion 'Yes' is not indicated** **On FT the conclusion may be different to 'Yes'** May be implied in further working Allow 9.8 (acres), 9.9 (acres) or 10 (acres) Depends on M1 m1 previously awarded
8(b) Alternative method 1 *(Area) 2.47 × 40 000 ÷ 10 000 or equivalent* *9.88 (acres)* *(Maximum number of trees) 9.88 × 60* *592(.8) (trees) or 593 (trees) (< 615)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 9.8 (acres), 9.9 (acres) or 10 (acres)* *Depends on M1 m1 previously awarded* *Allow suitable rounding, e.g. 590 or 600*
8(b) Alternative method 2 *(Area) 2.47 × 40 000 ÷ 10 000 or equivalent* *9.88 (acres)* *(Minimum area) 615 ÷ 60* *10.25 (acres) (> 9.88)*	*M1* *A1* *M1* *A1*	*May be implied in further working* *Allow 9.8 (acres), 9.9 (acres) or 10 (acres)* *Do not allow embedded in further working* *Allow rounded to 10 (acres) provided 'their area' (9.88m^2) has not been rounded to 10*
8(b) Alternative method 3 *(Minimum area) 615 ÷ 60* *10.25 (acres)* *(Convert to m^2) 10 000 × 10.25 ÷ 2.47* *41 497(.97 m^2) or 41 498(m^2) (>40 000)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 10 (acres)* *Depends on M1 m1 previously awarded* *Accept suitable rounding, e.g. 41 000 or 41 500*
8(b) Alternative method 4 *(Trees in 2.47 acres) 615 ÷ (40 000 ÷ 10 000)* *or equivalent* *153.75 (trees)* *(Density of trees) 153.75 ÷ 2.47* *62(.2...trees per acre) (> 60)*	*M1* *A1* *m1* *A1*	*May be implied in further working* *Allow 153, 153.8 or 154 (trees)* *Depends on M1 m1 previously awarded*
8(b) Alternative method 5 *(Forest area per tree) 40 000 ÷ 615* *65(.0406.. m^2)* *(Fire risk, area per tree) 10 000 ÷ (60 × 2.47)* *67(.476…m^2) (> 65)*	*M1* *A1* *M1* *A1*	*Do not allow embedded in further working*

8(c)(i) (Height of the tree =) 21 × tan 39 17.(…. m)	M2 A1	*OR alternative full method* M1 for tan 39 = $\frac{\text{height of tree}}{21}$ CAO
8(c)(i) Alternative method 1 *Hypotenuse = 21/cos39 (= 27.02…)* ***AND** Height =* $\sqrt{(27(.02)^2 - 21^2)}$ 16.9(7…m) to 17.(0..m)	*M2* *A1*	*M1 for Hypotenuse = 21/cos39 (= 27.02…)* ***AND** Height*^{2} = 27(.02)^2 – 21^2 *CAO*
8(c)(i) Alternative method 2 *(Angle of elevation)* $\tan^{-1}\frac{17}{21}$ *38.9(9...°) or 39(°)*	*M2* *A1*	*M1 tan (elevation)* = $\frac{17}{21}$ *CAO*
8(c)(i) Alternative method 3 *(Horizontal distance)* $\frac{17}{\tan 39}$ *20.9(98…m) or 21m*	*M2* *A1*	*M1 for tan 39 =* $\frac{17}{\text{distance}}$ *CAO*
8(c)(ii) diameter = $\frac{1.75}{\pi}$ or (radius =) $\frac{1.75}{2 \times \pi}$ (Area of cross section =) π × (1.75 ÷ 2π)^2 × 17 ÷ 2 (Volume) answer in the range 2.07 (m^3) to 2.15 (m^3)	M2 M1 m1 A1	M1 for any one of the following: • 1.75 = π × diameter • 1.75 = 2 × π × radius (Note: radius = $\frac{7}{8\pi}$ m, radius ≈ 0.28m) FT for 'their derived radius' provided it is from a calculation involving the use of π (Note: area of cross section = $\frac{49}{64\pi}$ m^2 area of cross section ≈ 0.24 m^2) FT provided previous M1awarded CAO, accept an answer of 2 (m^3) from correct working without sight of premature approximation leading to an answer outside the range
9. 2500 × (1 – 0.23) × (1 – 0.04)^{39} × (1 + 0.14)^{10} or 2500 × 0.77 × 0.96^{39} × 1.14^{10} or equivalent (£) 1452(.30)	M3 A1	May be seen in stages M2 for a product with any 3 correct terms OR M1 for a product with any 2 correct terms CAO, ignore premature rounding in working provided answer is (£) 1452.(…), allow rounded to (£)1450 from correct working