GCSE MARKING SCHEME

SUMMER 2023

GCSE
MATHEMATICS – NUMERACY
UNIT 1 – FOUNDATION TIER
3310U10-1

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.

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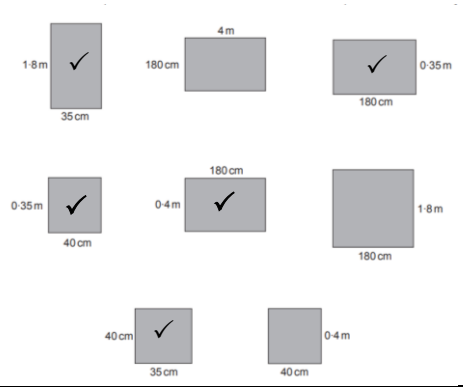
WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2023 MARK SCHEME

Unit 1: Foundation Tier	Mark	Comments
1(a) one million (and) three hundred thousand	B1	Allow: • 1 million (and) three hundred thousand • one million (and) 3 hundred thousand • 1 million (and) 3 hundred thousand • One point three million
1(b)(2023 – 1999=) 24	B1	Answer space takes precedence
1(c)(i) 73 900	B1	
1(c)(ii) 12000 (cm)	B1	Answer space takes precedence
1(c)(iii) 90 × 60 5400 (litres)	M1 A1	
1(c)(iv) **No** indicated and an appropriate correct calculation that involves: • Converting 15 miles to 24 km • Converting 18km to 11(.25) miles • Converting 10 miles to 16km and comparing this with 18km Eg '15 miles is 24 km' '5 × 3 = 15 and 8 × 3 = 24' '18 km is only (18 × 5 ÷ 8 =) 11(.25) miles' 18 × 5 ÷ 8 = 11(.25) '10 miles is 16 km so 18 km is only a little more than 10 miles' '16 km is 10 miles so 18 km is 10 miles and 2 km'	E2	Award E1 for: • **Yes, or a box not indicated/implied**, **and** a correct calculation (see LHS) • **No** indicated and a **correct method** without a full answer • **No** indicated and a **correct method** with an incorrect answer • **No** indicated and have compared 10 miles with 16km only eg No indicated with • 18 × 5 ÷ 8 • 15 ÷ 5 × 8 • 3 × 8 • '8 + 8 = 16 (km) and 5 + 5 = 10 (miles)' • 10 miles = 16km Award E0 for **only** 10 miles **or** 16km stated

2(a)(i) (Price for 40 boxes is 40 × 5 =) (£)200	B1	
(Discount is 200 ÷ 4 =) (£)50	B1	FT 'their 40 × 5' ÷ 4 This may be seen or implied in final answer
(Mr Evans paid 200 – 50 =) (£)150	B1	FT 'their 200' – 'their 50' Award B0 for an answer of 175(%) from 200 – 25(%) unless 25 has been derived as 'their 50'.
2(a)(i) <u>Alternative method 1</u> *(Price for 40 boxes is 40 × 5 =) (£)200*	*B1*	
(Mr Evans paid) 0.75 × 40 × 5 or equivalent	*M1*	*FT 'their 40 × 5'*
(£)150	*A1*	
2(a)(i) <u>Alternative method 2</u> *(Cost of 1 discounted box ¾ × 5 =)* *(£)15/4 or (£)3.75*	*B1*	
(Cost of 40 boxes =) *40 × (£)15/4 or 40 × (£)3.75*	*M1*	*FT 40 × 'their 15/4' or 40 × 'their 3.75'*
(£)150	*A1*	
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.
2(a)(ii) (Sells the 20 boxes for 20 × 8 =) (£)160	B1	
Sells the special offer boxes for (40 – 20) ÷ 2 × 13 or 20 × 13 ÷ 2 or equivalent	M1	Equivalent methods usually: 10 × 13 or 260 ÷ 2 or 20 × 6.5
(£)130	A1	
(Profit =) 160 + 130 – 150	M1	FT 'their 20 × 8' + 'their 130' – 'their 150 from 2ai' provided 'their 130' ≤ 260
(=) (£)140	A1	If final M0 A0, then award SC1 for sight of (£)290 from 160 + 130 Note: use of 20 × 13 = 260 and then 160 + 260 – 150 = 270 gains B1M0A0M1A1

2(b) All 5 correct wooden panels identified with no incorrect ones.  	B3	Award B2 for: 5 panels correct and 1 incorrect OR 4 panels correct and 0 or 1 incorrect OR 3 panels correct and 0 incorrect Award B1 for: 5 or 4 panels correct and 2 incorrect OR 3 panels correct and 1 or 2 incorrect OR 2 panels correct and 0 incorrect
2(c) (Area of flower) Evidence of counting squares within the shape 39 – 47 (squares) 156 – 188 (cm^2)	M1 A1 B1	Allow M1 for area within and some of the squares outside Award M0 if clearly working with perimeter Number of squares in range with no evidence of counting award M1 A1 FT 'their number of squares' × 4 correctly evaluated
2(c) <u>Alternative method</u> *(Area of flower) Evidence of counting squares within the shape **and** counting up in 4s* *156 – 188 (cm^2)*	*M2* *A1*	*If no evidence of counting squares, award M1 for evidence **of counting up in 4s** to at least 40*
3(a) August **and** 2018	B1	Allow 2018 and August Allow August with 18 used to represent 2018
3(b) 165 364 – 147 521 = 17 843 **and** 18 000	M1 A1	Allow 147 521 – 165 364 as evidence of subtraction Allow 165 – 147 as evidence of subtraction for M1 Allow adding on methods eg: 479 +17364 OR 2479 + 15364 OR equivalent If no marks, award SC1 for: • an **answer of 17000** seen from 165000 – 148000 • answer of 18000 with no workings shown
3(c) July and August	B2	Award B1 for each. Accept in any order.
3(d) Table set up with rows or columns: • Places - with all 4 places listed correctly • Tallies - Labelled with 'tallies' or 'number of tallies' • Frequency - Labelled with 'frequency' or equivalent as a heading	 B1 B1 B1	Do not award any marks if only a bar chart, graph or axes seen. Accept other places also listed and/or use of "other". Accept abbreviations. Allow tallies drawn. Do not accept title of row or column as: • number of people unless tallies shown • number of most popular (place) unless tallies shown Accept 'total' or 'number of people' or 'vote' for frequency. Do not accept number of most popular (place) for this column or row.

4. Method of comparison, e.g. per 10 ml or for 600 ml, or divide the cost of 30 ml by 3 and multiply by 4 or 5, or similar Correctly evaluated comparison of 2 of the 3 sizes Correctly evaluated comparison of all 3 sizes, may be different comparisons at different stages, AND conclusion 'Medium' or '40 ml' bottle is the best value for money	M1 A1 A1	Needs to show attempt to compare at least 2 of the 3 sizes Ignore incorrect units With a 1 ml comparison, allow truncation to 4p for large and 3p for medium, provided no incorrect working is seen, for the award of the first A1. Award of final A1 also possible if a full comparison and conclusion is 'Medium' Consistent units that are not obviously incorrect are required, or allow no units given Comparison of small / medium and medium / large **IS** a full comparison of all 3 sizes Comparison of small / medium and small / large **IS** a full comparison of all 3 sizes Comparison of medium / large and small / large **IS NOT** a full comparison of all 3 sizes
5(a) 4	B1	Accept '×4', 'times 4' or '11 × 4 = 44' Do not accept a choice, e.g. '33% and 4 times'
5(b) 17/50	B1	CAO. Do not accept 34/100 or 17%/50%
5(c) 'Accomplishments'	B1	Allow 'Accomplishments 49%' Do not accept 49(%)
5(d) Appropriate explanation, e.g. '(would have) needed to know the number of boys and girls in family category and total number of boys and the total of girls', '(would have) needed to know the gender (or sex) of each of the teenagers'	E1	Ignore additional incorrect or spurious statements Allow, e.g. 'split (the original data) into boys and girls', 'do another survey asking boys and girls separately', 'sex', 'gender' 'boys and girls on separate graphs', 'boys and girls' 'how many boys and girls took part in the survey', 'need number of girls and boys who took part in the survey', 'need number of boys and girls for family', 'need percentage of girls and percentage of boys' Do not accept, e.g. 'repeat the survey', 'more detailed data'
5(e) 743 × 11/100 or 74.3 + 7.43 or equivalent 81 or 82 (teenagers)	M1 A2	Only award A2 provided not from incorrect working Award A1 for any of the following: • final answer 81.7(3) • working leading to 81.(….) truncated or rounded to give a final answer of 81 or 82 • 'their 81.7(3)' rounded or truncated to a whole number If no marks, award SC3 for a whole number answer in the range 79 to 85 (teenagers) from any of trials 100 × 79 ÷ 743 (= 10.6…), 100 × 80 ÷ 743 (=10.76…), …, 100 × 85 ÷ 743 (= 11.4…)

<table>
<tr><td>5(f) Suitable reason, e.g.
‘teenagers can select more than one type of information’,
‘some teenagers are represented by more than one row’</td><td>E1</td><td>Do not accept, e.g.
‘they have been rounded’,
‘because the data is grouped’</td></tr>
<tr><td>6(a)(i) 50 (baths)</td><td>B1</td><td>Do not accept 50/80</td></tr>
<tr><td>6(a)(ii) All appropriate products given, i.e.
• (Bath, Taps)
(10 + 40) × 180 AND (40 + 30) × 60
(=9000 AND 4200)

• (Bath, Bath & tap, Tap)
10 × 180 AND 40 × (180 + 60) AND 30 × 60
(=1800 AND 9600 AND 1800)

• (Bath, Split bath & tap, Tap)
10 × 180 AND 40×180 AND 40×60 AND 30×60
(= 1800 AND 7200 AND 2400 AND 1800)

(£) 13200</td><td>M2

A1</td><td><u>FT from either an error in evaluating ‘10 + 40’ or for 40 < ‘their 50’ < 60 in (a)(i)</u>
Allow intention if brackets are missing (for M2 or M1)
Intention to ‘add’ is not required
If additional working is seen, there needs to be clear indication of which are the appropriate products

M1 for any one of the following partial method, ignore any additional inappropriate products:
<table>
<tr><td>Baths</td><td>(10 + 40) × 180</td><td>£9000</td></tr>
<tr><td>Taps</td><td>(40 + 30) × 60</td><td>£4200</td></tr>
<tr><td>Bath only and tap only</td><td>10 × 180 and 30 × 60</td><td>£1800 and £1800</td></tr>
<tr><td>Bath with tap</td><td>40 × (180 + 60)</td><td>£9600</td></tr>
<tr><td>Bath with tap</td><td>40 × 180 and 40 × 60</td><td>£7200 and £2400</td></tr>
</table>
CAO, not from FT from (a)(i)</td></tr>
<tr><td>6(b)(i) 5 (couplings)</td><td>B1</td><td></td></tr>
<tr><td>6(b)(ii) C = P - 1</td><td>B1</td><td></td></tr>
<tr><td>7. Width 5 (cm) seen or implied

Correct method to calculate the area of initial, e.g.
• 10 × 5 – (10 – 2) × (5 – 2)
• 10 × 2 + (5 – 2) × 2
• 5 × 2 + (10 – 2) × 2
• 8 × 2 + 3 × 2 + 2 × 2

(26) × (0.)50 ÷ 2 or (26) × (0.)25 or equivalent

(£)6.5(0) or 650(p)</td><td>B1

M1

M1

A2</td><td>E.g. may be implied by the sight of the appropriate use of 5 in an area calculation

FT ‘their width’ provided 2 < ‘their width’ < 10
Allow M1 if given as 2 or 3 separate areas provided sight of intention that it is the total area. Any subtraction of areas must be indicated

FT ‘their derived area’ provided not 2, 10 or 5, but including partial or full perimeter

CAO. For A2, if units are given they must be correct

If M2 or M1 previously awarded, A1 for any one of the following:
• Total area 26 (cm^2)
• Total cost for ‘their derived area’
• The sum or difference of ‘their costs’ would be a correct FT for ‘their areas’. Any subtraction of costs needs to be indicated</td></tr>
</table>

8(a) A statement regarding e.g. Q1: 'not relevant', 'irrelevant' 'confidentiality', 'too personal', 'inappropriate question', 'it isn't about where you live', 'no reason for the question'	E1	For any one equivalent statement. Ignore additional comments. Do not accept, e.g. 'no option boxes given', 'too open ended', 'no space to answer', 'not a clearly defined question', 'some people walk faster than others', 'doesn't have an answer for more than 5 minutes away', 'it doesn't make sense', 'many children do not know how far they live from school', 'they may not walk to school'
Q2: 'times not exclusive', 'overlapping boxes' 'no period of time given', '5 times in 2 boxes', 'doesn't say if it is in a week', 'it is vague as it doesn't say in a month', 'how many times a month or a week?,' 'should have put 6-10 times a week',	E1	For any **one** of these, or equivalent statement. Ignore additional comments. Do not accept, e.g. 'bias', 'not enough boxes to tick', 'not enough options', 'too vague' (unless a reason given), 'not specific' (unless a reason given), 'too broad' (unless a reason given), 'might not like board games', 'this isn't suitable because it has nothing to do with teachers', 'have other options' *SC1 if both correct but in reverse order.*
8(b) A criticism regarding • location (in the supermarket) • poor distribution method • does not target primary school children	E1	For any **one** of these, or equivalent statement. Ignore additional comments. Accept, e.g. 'may not be seen in the supermarket', 'wasn't asked verbally', 'should have been handed out', 'no guarantee anyone would answer them', 'won't know if a primary school child had filled it out', 'primary school children unlikely to be in a supermarket', 'children may not see it', 'supermarket targets adults', 'some may not go to supermarket as they shop online', 'supermarket is not the best place to fill a questionnaire', 'should be done in school', 'anyone could answer it not just primary school children' Do not accept, e.g. 'some children don't play board games', 'children play computer games', 'it would worry people who don't play board games'
9(a)(i) 11 (:00 am)	B1	Allow 11(:00 am) – 12(:)30 or 11(:00 am) to 12(:)30 Do not accept 11(:)00 pm or an incorrect time period for the first stop
9(a)(ii) 08:00 and 08:30	B1	

9(a)(iii) 15 km	B1	
9(b) 300°	B1	
10(a) Width 3.9 cm AND Lengths 17.7 cm and 18.5 cm	B2	Accept lengths given in either order, 17.7 cm and 18.5 cm or 18.5 cm and 17.7 cm B1 for any 2 correct measurements
10(b) (Strong) negative (correlation)	B1	CAO
10(c) Suitable line of best fit drawn	B1	The straight line (accept intention if a ruler is not used) must have points above and below it, generally this is 3 above and 4 below The line must be of sufficient length, to illustrate trend for at least 5 points The trend shows that there are points above and below the line at each end of the line Allow, e.g. the line of best fit following the '**trend**' • from top left corner provided 3 points are above the line • with 2 points above the line, one point 'on' the line and 4 points below the line • with 3 points above the line, 2 'on' the line and 2 points below the line Do not accept, e.g. • a line from the bottom right corner • with 3 points above the line and 3 or 4 points 'on' the line • from top corner with 4 points 'on' the line • a line joining the first point to the last point • a 'corner to corner' line • line NOT drawn to follow the clear 'trend' • joining 'point to point' • a line of insufficient length, trend only shown for fewer than 5 points Note: 'on' the line includes a point just touching the line, no gap between the point and the line

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UNIT 2 – FOUNDATION TIER
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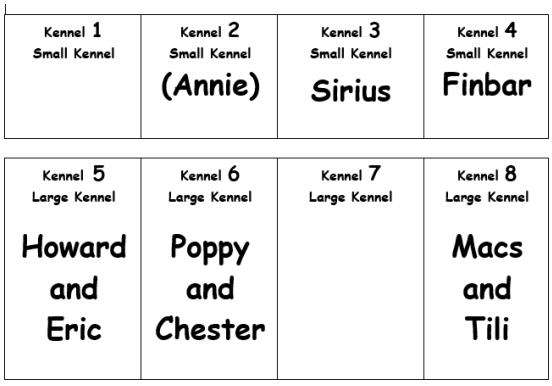
Unit *2*: Foundation Tier	**Mark**	**Comments**
1(a) 127 miles	B1	
1 (b) Identification of the 4 correct distances needed: 160, 69, 92, 42	B1	May be seen in the bullet list or in the table (only 4 values to be explicitly identified for B1) May be implied in later working e.g. a total of 726 implies adding the 4 correct values twice.
160 + 69 + 92 + 42	M1	FT the sum of 4 distances provided at least 3 correct For example: Award B0M1A1 for: 160 + 125 + 92 + 42 = 419
363 (miles)	A1	If no marks awarded, award SC1 for: • 3 (out of the 4) correct values added and evaluated correctly eg (69 + 92 + 42 =) 203 • 4 values, with only 2 being correct distances, added and evaluated correctly eg (127 + 125 + 92 + 42 =) 386 • 5 values, with the 4 correct values, added and evaluated correctly Award SC0 for answer of 615 from all 6 distances added
1 (c) (Snowdon =) 4 (hours) 30 (mins) or 4 ½ (hours) or 270 (minutes)	B1	Allow incorrect notation but penalise in OCW Allow 4:30 or 4.3(0)
(Cader Idris =) 5 (hours) 20 (mins) or 320 (minutes)	B1	Allow 5:20 or 5.2(0)
(Pen y Fan =) 2 (hours) 15 (mins) or 135 (minutes)	B1	Allow 2:15 or 2.15
(Total time =) 4 (hours) 30 (mins)+5 (hours) 20 (mins)+2 (hours) 15 (mins) or equivalent	M1	Award M1 for adding 'their' 3 times even if there is a mix of units and/or notation. FT 'their 4 (hours) 30 (mins) ' + 'their 5 (hours) 20 (mins)' + 'their 2 (hours) 15 (mins)' or equivalent
(Total time =) 12 (hours) 5 (mins)	A1	FT 'their total time' correctly evaluated and converted into hours and minutes Award A1 for 12:05 or 12.05 but A0 for 12:5 or 12.5 Award A0 for an answer of 11 (hours) 65 (mins) Note: 4 hours 30mins + 5 hours 20 mins + 2 hours 55 mins = 12 hours 5 mins is awarded B1B1B0M1A0
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.

1 (d) Sight of 10·05 (km)	B1	May be implied in later working
31·05 – 14·6 – 10·05 or 31.05 – (14.6 + 10.05) or 31.05 – 24.65	M1	FT 'their 10·05' for M1 including 10 050
6·4 (km)	A1	FT 31·05 – 14·6 – 'their 10.05' correctly evaluated and given in km. For A1, do not FT use of 10050(m) or a value that leads to a negative answer Note- use of 10.5 instead of 10.05: 31.05 – (14.6 + 10.5) or 31.05 – 25.1 = 5.95 is awarded B0M1A1
Alternative method: *Sight of 31 050 (m) AND 14 600 (m)*	*B1*	*May be implied in later working*
31 050 – 14 600 – 10 050 or equivalent	*M1*	*FT 'their 31 050' and 'their 14 600' for M1 including 31·05 and 14·6*
6·4 (km)	*A1*	*FT 'their 31 050' and 'their 14 600' correctly evaluated **AND** the answer given in km*
1 (e) 540+1452+53+28+280+350+300+500+340 (=(£)3843)	M1	Attempt to add all the values. Allow a total in the range of 3303 to 4383 as evidence of adding Allow one omission or one repeated value
÷ 9	m1	FT 'their 3843' Award M1 m1 A0 for 540+1452+53+28+280+350+300+500+340 ÷ 9 (=3540.77…)
(£)427 (this is more than £400)	A1	CAO
Alternative method: *540+1452+53+28+280+350+300+500+340 (=(£)3843)*	*M1*	*Attempt to add all the values.* *Allow a total in the range of 3303 and 4383 as evidence of adding* *Allow one omission or one repeated value*
400 × 9 (= £)3600)	*M1*	
(£)3843 is more than (£)3600	*A1*	*CAO*
2.(a) 5·9 + 1·9 + 5·9 + 1·9 or equivalent 15·6 (m)	M1 A1	If no marks awarded, award SC1 for 10·6(m) (correctly evaluated perimeter of the base of small kennel)
2 (b)	B3	B3 for all correct kennels B2 for 3 or 4 correct kennels B1 for 1 or 2 correct kennels



3. (Student Loan repayment =) $0.04 \times 27\,000$ or equivalent	M1	Answer space takes precedence Award M1 for a full correct method that would lead to a correct answer of 1080 e.g. 1% = 270, 4% = 4 × 270
(£)1080	A1	If M0A0 awarded for the **student loan**, award SC1 for: • (5105 - 0.04 × 27000 =) 4025 • (0.04 × (27000 – 5105) =) 875(.80) or 876 • (0.04 × 5105 =) 204(.20) • (5105 - 0.04 × 5105 =) 4900(.80) or 4901 • (27000 – 0.04 × 27000 =) 25920
(Pension Scheme contribution =) 27 000 ÷ 20 or 0.05 × 27000 or equivalent	M1	
(£)1350	A1	If M0A0 awarded for the **pension scheme contribution,** award SC1 for: • (1080 ÷ 20 = £) 54 • 'their 1080' ÷20 correctly evaluated rounded or truncated e.g. (875.8 ÷20=) 43(.79) or 44 • ((27000 – 1080) ÷20=) 1296 • ((27000 – 5105) ÷20=) 1094(.75) or 1095 • (5105 ÷20 =) 255(.25) • (27000 – 27000 ÷ 20 =) 25650 • ((27000 – 5105 – 1080) ÷ 20 =) 1040(.75) or 1041
(Total =) (£)7535 ISW	B1	FT (£)5105 + 'their 1080' + 'their 1350' correctly evaluated **provided** 1 mark previously awarded Sight of a total of (£)2430 implies M1A1 M1A1 B0 (from 1080 + 1350) **Unsupported** (£)19 465 implies (£)27000 - (£)7535 Award M1A1 M1A1 B0

4. Sight of 10 (chairs) $4 \times 17.84 + 10 \times 9.47$ (£)166.06	B1 M2 A2	May be implied in later working Award B1 for correct diagram drawn with 4 tables and 10 chairs shown FT for M2 for 4 tables **AND** 'their 10 chairs' where the number of chairs > 6 e.g. use of 4 tables and 8 chairs Award M1 for: • 4 × 17.84 (= (£)71.36)) • 10 × 9.47 (= (£)94.7(0)) • 'their number of chairs > 6' × 9.47 Only award A2 if 4 tables have been considered with their chairs > 6 Award A1 for • (£)71.36 • (£)94.7(0) • 'their number of chairs > 6' × 9.47 correctly evaluated Note: A total cost needs to be checked as it may imply M1 A1 Note: common incorrect totals are: $4 \times 17.84 + 12 \times 9.47$ = £185 $4 \times 17.84 + 16 \times 9.47$ = £222.88 $4 \times 17.84 + 24 \times 9.47$ = £298.64 These are awarded B0M2A2
5(a) 59°F	B1	
5(b) (40°C is) 68 + 18 +18 104 (°F)	M1 A1	Accept an appropriate calculation that would lead to a correct answer of 104°F May be shown in stages Allow $\frac{9}{5} \times 40 + 32$ or $1.8 \times 40 + 32$ or $9 \times 8 + 32$ or $18 \times 4 + 32$ FT from (a) provided 'their 59' > 0, i.e. $59 + 2.5 \times 18$ or $59 + 45$ or equivalent Answer space takes precedence
6(a)(i) 2¼ × 60 × 90 or 60 × 90 × 2 + 15 × 90 or 135 × 90 or 2¼ × 60 × 0.9(0) or 2¼ × 54 or equivalent (£) 121.5(0)	M2 A1	May be seen in stages Must be an indication of a full and complete method that could lead to a correct answer Allow M2 if initially a correct method is seen but an incorrect interpretation of ¼ is seen in further working, e.g. as 0.15 or 25 minutes. Do **not** award M2 if the start of working contains an error, e.g. 2.15 × 60 × 90 (M1) or 120 × 90 with 25 × 90 (M1) M1 for any one of the following: • (2¼ × 60 = 120 + 15 =) 135 (minutes) • 'their time' × (0.)90, e.g. ○ 2 × (0.)90 (= 180 or 1.80) ○ 2¼ × (0.)90 (= 202.5 or 2.025) ○ 60 × (0.)90 (=£54 or 5400p / hour) ○ 120 × 90 (= 10800p for 2 hours) ○ 120 × 0.9(0) (= £108 for 2 hours) CAO. Answer space takes precedence An answer of 12150(p) is M2 A0

6(a)(ii) 72(.00) ÷ 60 or 60 × 120 = 7200 or 60 × 1.2 = 72 or 6 × 12 = 72 or equivalent or 120(p) (per minute) or (£)1.2(0) (per minute) Landline, Band C	M1 A2	<u>Working **must** be shown to support choice of boxes</u> Allow M1 for Landline and C selected with working for Band A (£)18 or 1800(p) **and** Band B (£)36 or 3600(p) Both boxes must be indicated A1 for explicit sight of 120(p) or (£)1.2(0) (per minute) (not embedded) If no marks, award SC1 for boxes Landline **and** Band C indicated
6(b) (Cost in £) 2151.3(0) ÷ 143.42 (£) 15 (Length of call) 15 ÷ (0.)3(0) or 1500 ÷ 30 or 50 × (0.)30 = 15(.)00 or equivalent 50 (minutes)	M1 A1 m1 A1	Answer space takes precedence, if blank may be implied in further working Allow from a trial and improvement method Allow a place value error in intended division, e.g. 15 ÷ 3 FT 'their 2151.3(0) ÷ 143.42' CAO with no incorrect working seen Answer space takes precedence If answers are reversed ((£)50 and 15 (minutes)), award M1 A0 m1 A1 (not from incorrect working)

7(a) Gwesty Arwel (costs are) (1 night: 12 single rooms and 18 twin rooms) (84 × 12 and 102 × 36 ÷ 2) (£)1008 and (£)1836 OR (£)2844 OR (3 nights 12 single rooms and 18 twin rooms) (3 × 84 × 12 and 3 × 102 × 36 ÷ 2) (£)3024 and (£)5508 OR (£)8532 (Total discounted cost for 3 nights) 84 × 12 + 102 × 36 ÷ 2 × 3 × (1 – 0.14) (£) 7337.52 Hotel Glan y Môr (costs for 5 nights are) 12 × 58 + 36 × 34 (× 5) or (696 + 1224) (× 5) or 1920 (× 5) or 3480 + 6120 (£) 9600 (Total cost of the 8 nights is 7337.52 + 9600 =) (£) 16937.52	B2 M1 M1 A1 M1 A1 B1	B2 or B1 may be seen or implied in further working B1 for any one of the following: • (12 single rooms for 1 night) (£)1008 • (18 twin rooms for 1 night) (£)1836 • (12 single rooms for 3 nights) (£)3024 • (18 twin rooms for 3 nights) (£)5508 For both M marks, awarded in either order, FT 'their cost of single rooms + twin rooms' Calculations may be shown separately as single rooms and twin rooms, but must include intention to add costs in further working CAO If M1 M0 A0, award SC1 for (£)1194.48 or correctly evaluated total discount for 'their **3** nights' A single night calculation may be embedded in a calculation for a number of nights other than 5 or 2 different numbers provided not '× a' for single and '× 2a' for the twin rooms CAO FT adding 'their derived perceived final costs' provided at least 4 marks previously awarded
7(b) (Number of litres of fuel) (33860 – 32474) ÷ 4 = 346.5 (litres) (Cost of fuel) 346.5 × 1(.)86 (£)644.49 or 64449(p)	M2 A1 M1 A1	M1 for (km travelled) 33860 – 32474 (= 1386) Allow rounded to 347 or truncated to 346, provided not from incorrect working, including from trial and improvement, May be implied in later work If M0 A0, award SC1 for any one of the following: • (33860 ÷ 4 =) 8465 • (32474 ÷ 4 =) 8118.5 • ((33860 + 32474) ÷ 4 = 66334 ÷ 4 =) 16583.5 FT 'their number of litres of fuel' CAO. If units are given, they must be correct
7(b) Alternative method: *(Fuel cost per km) 1(.)86 ÷ 4* *= 46.5 (p/km) or 0.465 (£/km)* *(Distance travelled 33860 – 32474 =) 1386 (km)* *(Cost of fuel) 1386 × 0.465 or 1386 × 46.5* *(£)644.49 or 64449(p)*	*M1* *A1* *B1* *M1* *A1*	*Allow rounded to (0.)47 or truncated to (0.)46* *FT 1386 × 'their derived 46.5' or* *1386 × 'their derived 0.465'* *OR* *FT 'their 1386' × 'their 1(.)86 ÷ 4', including use of 33860, 32474 and 33860 + 32474* *CAO. If units are given, they must be correct*

8(a) (Girls) 4 + 18 + 10 + 5 AND (Boys) 3 + 20 + 11 + 4 'Correct' indicated or implied AND number of girls 37 AND number of boys 38	M2 A1	For M2 allow **an error** in 1 of the 8 values M1 for either (Girls) 4 + 18 + 10 + 5 (=37) or (Boys) 3 + 20 + 11 + 4 (=38) CAO
8(b) (Girls) $\frac{4}{37}$ (× 100) **OR** (Boys) $\frac{3}{38}$ (× 100) 10.8(….%) or 11(%) **AND** 7.8(9…%) or 7.9 (%) or 8(%) Difference 2.9(%)	 M1 A2 A1	FT 'their first values' and 'their 'totals' from (a) If their number of girls = their number of boys then FT for possible first M1 A1 only Do not accept '4 out of 37' or '3 out of 38' Do not award A2 or A1 from incorrect working seen Allow A2 as implied by a final answer in the range 2.8(%) to 3.2(%) from the sight of the appropriate decimals if individual percentages are not seen A1 for any one of the following: • (Girls) 10.8(….%) or 11(%) • (Boys) 7.8(9…%) or 7.9 (%) or 8(%) • (Girls) 0.108… **and** (Boys) 0.078… Only FT from A2 previously awarded Answer space takes precedence Must be given as a percentage to 1 decimal place Do not FT from premature approximation If no marks, from appropriate working award SC1 for working with any one of the following: • (first and last 10 seconds) 9/37 and 7/38 • (last 10 seconds) 5/37 and 4/38 or equivalents as decimals or percentages **OR** SC2 for the respective answers: • (24.3(2…) – 18.4(2...)) 5.9(%) • (13.5(1…) –10.5(2…) = 2.99 =) 3.0 (%)

GCSE MARKING SCHEME

SUMMER 2023

GCSE
MATHEMATICS – NUMERACY
UNIT 1 – INTERMEDIATE TIER
3310U30-1

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.

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WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2023 MARK SCHEME

Unit 1: Intermediate Tier	**Mark**	**Comments**
1. Method of comparison, e.g. per 10 ml or for 600 ml, or divide the cost of 30 ml by 3 and multiply by 4 or 5, or similar	M1	Needs to show attempt to compare at least 2 of the 3 sizes
Correctly evaluated comparison of 2 of the 3 sizes	A1	Ignore incorrect units With a 1 ml comparison, allow truncation to 4p for large and 3p for medium, provided no incorrect working is seen, for the award of the first A1. Award of final A1 also possible if a full comparison and conclusion is 'Medium'
Correctly evaluated comparison of all 3 sizes, may be different comparisons at different stages, AND conclusion 'Medium' or '40 ml' bottle is the best value for money	A1	Consistent units that are not obviously incorrect are required, or allow no units given Comparison of small / medium and medium / large **IS** a full comparison of all 3 sizes Comparison of small / medium and small / large **IS** a full comparison of all 3 sizes Comparison of medium / large and small / large **IS NOT** a full comparison of all 3 sizes
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.
2(a) 4	B1	Accept '×4', 'times 4' or '11 × 4 = 44' Do not accept a choice, e.g. '33% and 4 times'
2(b) 17/50	B1	CAO. Do not accept 34/100 or 17%/50%
2(c) 'Accomplishments'	B1	Allow 'Accomplishments 49%' Do not accept 49(%)

<table>
<tr><td>2(d) Appropriate explanation, e.g.
‘(would have) needed to know the number of boys and girls in family category and total number of boys and the total of girls’,
‘(would have) needed to know the gender (or sex) of each of the teenagers’</td><td>E1</td><td>Ignore additional incorrect or spurious statements
Allow, e.g.
‘split (the original data) into boys and girls’,
‘do another survey asking boys and girls separately’,
‘sex’,
‘gender’
‘boys and girls on separate graphs’,
‘boys and girls’
‘how many boys and girls took part in the survey’,
‘need number of girls and boys who took part in the survey’,
‘need number of boys and girls for family’,
‘need percentage of girls and percentage of boys’

Do not accept, e.g.
‘repeat the survey’,
‘more detailed data’</td></tr>
<tr><td>2(e) 743 × 11/100 or 74.3 + 7.43 or equivalent
81 or 82 (teenagers)</td><td>M1
A2</td><td>Only award A2 provided not from incorrect working

Award A1 for any of the following:
• final answer 81.7(3)
• working leading to 81.(….) truncated or rounded to give a final answer of 81 or 82
• ‘their 81.7(3)’ rounded or truncated to a whole number

If no marks, award SC3 for a whole number answer in the range 79 to 85 (teenagers) from any of trials
100 × 79 ÷ 743 (= 10.6…), 100 × 80 ÷ 743 (=10.76…), …, 100 × 85 ÷ 743 (= 11.4…)</td></tr>
<tr><td>2(f) Suitable reason, e.g.
‘teenagers can select more than one type of information’,
‘some teenagers are represented by more than one row’</td><td>E1</td><td>Do not accept, e.g.
‘they have been rounded’,
‘because the data is grouped’</td></tr>
<tr><td>3(a)(i) 50 (baths)</td><td>B1</td><td>Do not accept 50/80</td></tr>
<tr><td>3(a)(ii) All appropriate products given, i.e.
• (Bath, Taps)
(10 + 40) × 180 AND (40 + 30) × 60
(=9000 AND 4200)

• (Bath, Bath & tap, Tap)
10 × 180 AND 40 × (180 + 60) AND 30 × 60
(=1800 AND 9600 AND 1800)

• (Bath, Split bath & tap, Tap)
10 × 180 AND 40×180 AND 40×60 AND 30×60
(= 1800 AND 7200 AND 2400 AND 1800)

(£) 13200</td><td>M2

A1</td><td><u>FT from either an error in evaluating ‘10 + 40’ or for 40 < ‘their 50’ < 60 in (a)(i)</u>
Allow intention if brackets are missing (for M2 or M1)
Intention to ‘add’ is not required
If additional working is seen, there needs to be clear indication of which are the appropriate products

M1 for any one of the following partial method, ignore any additional inappropriate products:
<table><tr><td>Baths</td><td>(10 + 40) × 180</td><td>£9000</td></tr><tr><td>Taps</td><td>(40 + 30) × 60</td><td>£4200</td></tr><tr><td>Bath only and tap only</td><td>10 × 180 and 30 × 60</td><td>£1800 and £1800</td></tr><tr><td>Bath with tap</td><td>40 × (180 + 60)</td><td>£9600</td></tr><tr><td>Bath with tap</td><td>40 × 180 and 40 × 60</td><td>£7200 and £2400</td></tr></table>
CAO, not from FT from (a)(i)</td></tr>
</table>

3(b)(i) 5 (couplings)	B1	
3(b)(ii) C = P - 1	B1	
4. (Electricity cost is) 400 ×(£)0.32 or 400 × 32(p) (£)128 or 12800(p) (All charges £128 + 62 =) (£)190 or 19000(p) (Total bill including VAT at 5%) (£)199.5(0) or 19950(p)	 M1 A1 B1 B2	<u>Incorrect unit of money is penalised – 1 once only on the first occurrence, by withholding an A or B mark</u> Accept £128.00p FT 'their derived electricity cost' provided ≠ 400 or (0.)32 May be seen or implied in further working Allow B1 for the correct evaluation of the sum of two resulting individual charges when VAT has been subtracted from either 'their derived electricity cost' or the standing charge, or from both, individually For B2, FT 'their all charges', accepting rounding or truncation to a penny, **provided** 'their all charges' is from attempted **sum** of electricity cost + standing charge For B1, FT for one of the following. • (Electricity cost including VAT 1.05 × 128 =) (£128 + £6.40 =) 13440(p) or (£)134.4(0) • 1.05 × 'their cost of electricity' correctly evaluated • (Standing charge cost including VAT =) (£62 + £3.10 =) 6510(p) or (£) 65.10 Where 'their all charges' includes electricity and standing charge considered (includes, for example, if subtracted or added) • (cost including VAT) 1.05 × 190(.00) • sight of 1.05 × 'their all charges' or equivalent • (VAT) (£)9.50 or 950(p) • 0.05 × 'their all charges' correctly evaluated <u>including if embedded or implied in further working or totals</u>
5. Width 5 (cm) seen or implied Correct method to calculate the area of initial, e.g. • 10 × 5 – (10 – 2) × (5 – 2) • 10 × 2 + (5 – 2) × 2 • 5 × 2 + (10 – 2) × 2 • 8 × 2 + 3 × 2 + 2 × 2 (26) × (0.)50 ÷ 2 or (26) × (0.)25 or equivalent (£)6.5(0) or 650(p)	B1 M1 M1 A2	E.g. may be implied by the sight of the appropriate use of 5 in an area calculation FT 'their width' provided 2 < 'their width' < 10 Allow M1 if given as 2 or 3 separate areas provided sight of intention that it is the total area. Any subtraction of areas must be indicated FT 'their derived area' provided not 2, 10 or 5, but including partial or full perimeter CAO. For A2, if units are given they must be correct If M2 or M1 previously awarded, A1 for any one of the following: • Total area 26 (cm^2) • Total cost for 'their derived area' • The sum or difference of 'their costs' **would be** a correct FT for 'their areas'. Any subtraction of costs needs to be indicated

6(a) A statement regarding e.g. Q1: 'not relevant', 'irrelevant' 'confidentiality', 'too personal', 'inappropriate question', 'it isn't about where you live', 'no reason for the question'	E1	For any one equivalent statement. Ignore additional comments. Do not accept, e.g. 'no option boxes given', 'too open ended', 'no space to answer', 'not a clearly defined question', 'some people walk faster than others', 'doesn't have an answer for more than 5 minutes away', 'it doesn't make sense', 'many children do not know how far they live from school', 'they may not walk to school'
Q2: 'times not exclusive', 'overlapping boxes' 'no period of time given', '5 times in 2 boxes', 'doesn't say if it is in a week', 'it is vague as it doesn't say in a month', 'how many times a month or a week?,' 'should have put 6-10 times a week',	E1	For any **one** of these, or equivalent statement. Ignore additional comments. Do not accept, e.g. 'bias', 'not enough boxes to tick', 'not enough options', 'too vague' (unless a reason given), 'not specific' (unless a reason given), 'too broad' (unless a reason given), 'might not like board games', 'this isn't suitable because it has nothing to do with teachers', 'have other options' *SC1 if both correct but in reverse order.*
6(b) A criticism regarding • location (in the supermarket) • poor distribution method • does not target primary school children	E1	For any **one** of these, or equivalent statement. Ignore additional comments. Accept, e.g. 'may not be seen in the supermarket', 'wasn't asked verbally', 'should have been handed out', 'no guarantee anyone would answer them', 'won't know if a primary school child had filled it out', 'primary school children unlikely to be in a supermarket', 'children may not see it', 'supermarket targets adults', 'some may not go to supermarket as they shop online', 'supermarket is not the best place to fill a questionnaire', 'should be done in school', 'anyone could answer it not just primary school children' Do not accept, e.g. 'some children don't play board games', 'children play computer games', 'it would worry people who don't play board games'

7. (Mari's share of the prize) $4 \times 2700 \div (4 + 5)$ OR (Huw's share of the prize) $5 \times 2700 \div (4 + 5)$ (Mari's share is £) 1200	M1 A1	(4×300) (5×300) Allow for sight of (£)1200 irrespective of the name assigned May be implied in later calculation (Huw's share is £1500)
(Mari donates) 0.24×1200 (£) 288	M1 A1	FT $0.24 \times$ 'their smaller share' (Note: 'their smaller share' < 1350)
(Fraction of his prize Huw donates) $\frac{0.24 \times 1200}{5 \times 2700 \div (4 + 5)}$ or $\frac{0.24 \times 1200}{2700 - 1200}$ or $\frac{288}{1500}$ or $1 - \frac{(1500 - 0.24 \times 1200)}{2700 - 1200}$ or $1 - \frac{1212}{1500}$ $\frac{24}{125}$	M1 A1	FT 'their $0.24 \times$ 'their smaller share'' and $2700 -$ 'their smaller share' Must be a simplified fraction, ISW (e.g. 19.2%) An unsimplified fraction (144/750 or 96/500 or 72/375 or 48/250) is awarded M1 A0 Only FT if there are at least 2 different common prime factors for the numerator and denominator for simplifying, and not both numerator and denominator being a multiple of 10, i.e. equivalent level of difficulty If consistently working with Mari's getting the larger share, initially possible M1, A1 or M1, A0, but then M0, A0, M0, A0. However, also award SC2 for a final answer of $^{3}/_{10}$ or SC1 for (donation) (£)360. Mari with larger share leads to: $\frac{0.24 \times 1500}{2700 - 1500} = \frac{360}{1200} = \frac{3}{10}$
7. Alternative method: *(Fraction of his prize Huw donates)* $\frac{4}{5} \times \frac{24}{100}$ $\frac{24}{125}$	*M3* *A3*	*M2 for sight of ⅘ of 24%* *M1 for sight of ⅘ of 24* *Must be a simplified fraction* *A2 for correct unsimplified fraction, e.g.* $\frac{96}{500}$ *Only FT if there are at least 2 different common prime factors for the numerator and denominator for simplifying, i.e. equivalent level of difficulty* *ISW (e.g. 19.2%)*

8(a) Width 3.9 cm AND Lengths 17.7 cm and 18.5 cm	B2	Accept lengths given in either order, 17.7 cm and 18.5 cm or 18.5 cm and 17.7 cm B1 for any 2 correct measurements
8(b) 9 : 35	B2	Mark final answer Must be expressed as a ratio for B1 or B2 B1 for sight of 4(.)5 : 17(.)5 or equivalent, or 35 : 9
8(c) (Strong) negative (correlation)	B1	CAO
8(d) Suitable line of best fit drawn	B1	The straight line (accept intention if a ruler is not used) must have points above and below it, generally this is 3 above and 4 below The line must be of sufficient length, to illustrate trend for at least 5 points The trend shows that there are points above and below the line at each end of the line Allow, e.g. the line of best fit following the '**trend**' • from top left corner provided 3 points are above the line • with 2 points above the line, one point 'on' the line and 4 points below the line • with 3 points above the line, 2 'on' the line and 2 points below the line Do not accept, e.g. • a line from the bottom right corner • with 3 points above the line and 3 or 4 points 'on' the line • from top corner with 4 points 'on' the line • a line joining the first point to the last point • a 'corner to corner' line • line NOT drawn to follow the clear 'trend' • joining 'point to point' • a line of insufficient length, trend only shown for fewer than 5 points Note: 'on' the line includes a point just touching the line, no gap between the point and the line
8(e) 'No' indicated or implied with an explanation, e.g. 'not certain to fit the trend', 'only a small sample of remotes measured'	E1	Allow 'No' with, e.g. 'can be all different sizes of remotes', 'width does not depend on the length of the remote', 'width could be anywhere in the range 1 to 6 cm', 'not all remotes are the same width', 'insufficient data', 'may not fit the pattern' Do not accept 'No' with, e.g. 'no way of knowing' (without a reason), 'because you can't be certain' (without a reason)

9(a)(i) 11 (:00 am)	B1	Allow 11(:00 am) – 12(:)30 or 11(:00 am) to 12(:)30 Do not accept 11(:)00 pm or an incorrect time period for the first stop
9(a)(ii) 08:00 and 08:30	B1	
9(a)(iii) 15 km	B1	
9(b)(i) 300°	B1	
9(b)(ii) 1 : 100 000	B1	
9(c)(i) 1 500 000 ÷ (2 × 60) 12500 (litres/min)	M2 A1	With no other further working May be shown in stages M1 for any one of the following, that may be embedded in further incorrect working: • 1 500 000 ÷ 2 (or 750 000) • 1 500 000 ÷ 60 (or 25 000) CAO
9(c)(ii) Sight of 30 000 (cm) AND 1 500 000 000 (cm^3) 1 500 000 000 ÷ 30 000 or equivalent 50 000 (cm^2)	B1 M1 A1	Or two values of the correct comparative order, not for 1 500 000 and 300 For the intention of this division, allow with place value error (including 1 500 000 ÷ 300) for M1 only CAO. ISW if sight of answer 50 000 **cm^2**

10(a) (Sugar 0.58 × 300 =) 174 (g) (Cocoa 300 ÷ 8 =) 37.5 (g) (Milk powder) 4 × 37.5 ÷ 5 (=) 30 (g) (Palm oil 300 – 174 – 37.5 – 30 =) 58.5 (g) OR (Ingredients other than palm oil 174 + 37.5 + 30 =) 241.5 (g) (% of Palm oil) (100 ×) $\frac{58.5}{300}$ or 58.5 ÷ 3 or 0.195 or (100 ×) 1 – $\frac{241.5}{300}$ or 1 – 0.805 or equivalent 19.5 (%)	B1 B1 M1 A1 B1 M1 A1	 FT 'their derived mass of cocoa' May be implied in further working FT correctly evaluated sum of 'their sugar, cocoa and milk' provided at least 2 marks previously awarded and this sum is < 300 FT 'their 58.5' or 'their 241.5' as appropriate CAO, must be given as a percentage
10(a) Alternative method 1: *(Cocoa) ⅛ × 100 or 1 ÷ 8* *12.5 % or 0.125* *(Milk powder) □ × ⅛ (× 100)* *10 % or 0.1* *(Other than palm oil) (58 + 12.5 + 10 =) 80.5 %* *or (0.58 + 0.125 + 0.1 =) 0.805* *(Palm oil) 100 – (58 + 12.5 + 10)* *or 1 – (0.58 + 0.125 + 0.1) or 0.195* *19.5 (%)*	*M1* *A1* *M1* *A1* *B1* *M1* *A1*	 *FT 'their 12.5% or 0.125' or 'their % or decimal mass of cocoa'* *May be implied in further working* *FT 58 + 'their 12.5 + 10' or 0.58 + 'their 0.125 + 0.1' correctly evaluated provided at least 2 marks previously awarded and this sum is < 100 or < 1 respectively* *FT 58 + 'their sum of %s cocoa and milk' or equivalent working with decimals* *CAO, must be given as a percentage*
10(a) Alternative method 2: *(Proportion other than palm oil)* $\frac{58}{100} + \frac{1}{8} + \frac{4}{5} \times \frac{1}{8}$ *or* $\frac{58}{100} + \frac{1}{8} + \frac{1}{10}$ *805/1000 or 161/200* *(Palm oil)* $1 - {}^{161}/_{200}$ *or* ${}^{39}/_{200}$ *or* ${}^{19.5}/_{100}$ *19.5 (%)*	*M3* *A1* *M2* *A1*	 *May be implied in further working* *FT from M3* *CAO, must be given as a percentage*
10(b) Realising that 840g is 120% For appropriate use of 120% being 840g, e.g. 840 ÷ 1.2 or 8400 ÷ 12 or 100 × 840/120 700 (g)	B1 M1 A1	 Also implies previous B1 Award all 3 marks for an answer of 700(g) provided not from incorrect working

11(a) 40 (seconds)	B1	
11(b) 0.9 × 60 or 60 - 0.1 × 60 = 54 (employees) In 60 seconds, 57 employees logged on or 54 employees logged on within 58 seconds	 M1 A1 B1	Penalise incorrect units -1 only. Ignore additional spurious statements Check the diagram for indication, provided values are written FT 'their 54 employees' provided M1 previously awarded and number of seconds < 60
11(b) Alternative method 1: *By 1 minute, 57 employees logged on* *(100 ×) 57/60* *0.95 or 95(%)* *or* *570/600 compared with (90% =) 540/600*	 *B1* *M1* *A1*	*Penalise incorrect units -1 only.* *If M0 A0, award SC1 for 'only 5% (or 0.05) not logged on'* *If no marks, award SC1 for an answer of 93(.3..)% or 96(.6..)% or rounded to 97% or equivalents as decimals from use of 56 or 58 respectively*
11(b) Alternative method 2: *For **clearly** considering employees not logged on, must be evidence of this before awarding marks* *(0.1 × 60 =) 6 (employees not logged on)* *(After 9:01 a.m.) 60 – 57* *3 (employees not logged on)*	 *B1* *M1* *A1*	*Penalise incorrect units -1 only.* *If M0 A0, award SC1 for an answer of 4 or 2 employees from sight of calculation 60 - 56 or 60 - 58*
11(b) Alternative method 3: *For **clearly** considering employees not logged on, must be evidence of this before awarding marks* *(0.1 × 60 =) 6 (employees not logged on)* *(For 6 employees not logged on graph gives)* *58 seconds* *Conclusion that after 58 seconds there are fewer than 6 employees not logged (i.e. more than 90% logged on)*	 *B1* *M1* *A1*	*Penalise incorrect units -1 only.* *FT 'their 6 employees'' provided 0.1 × 60 attempted and 'their 58 seconds' < 60*
12(a) At a randomly chosen name	B1	
12(b) (360 ÷ 6 =) 60 or 360 ÷ 60 = 6 or 6 × 60 = 360 1st 4, 2nd 64, 3rd 124, 4th 184, 5th 244, 6th 304	B1 B1	May be implied by any of the following: • consistent position patterns + 60 indicated for at least 3 consecutive positions e.g. (4,) 60, 120, 180, 240, 300 • sight of 64 for student 2 CAO

13(a) Correct format of a box-and-whisker	B1	Do not ignore additional lines drawn End stopper lines omitted can be ignored For unambiguous indications of the following:
Showing lower end whisker at 10 seconds	B1	On the graph paper. Allow for the least point indicated
Showing LQ 40 seconds	B1	On the graph paper. Must be the lower line of a rectangle
Showing median at 84 seconds AND UQ at 108 seconds AND greatest time 130 seconds	B1	On the graph paper Median and UQ must be unambiguous vertical lines, allow 130 indicated as a point or a vertical line
13(b) 6 seconds	B1	
13(c) 0.75 × 200 or equivalent 150 (phone calls)	M1 A1	Allow sight of '75% of 200' or ' ¾ of 200' Answer space takes precedence If no marks, award SC1 for an answer of 50 (phone calls)

GCSE MARKING SCHEME

SUMMER 2023

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

INTRODUCTION

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WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2023 MARK SCHEME

Unit *2*: Intermediate Tier	**Mark**	**Comments**
1(a) 59°F	B1	
1(b) (40°C is) 68 + 18 +18	M1	Accept an appropriate calculation that would lead to a correct answer of 104°F May be shown in stages Allow $\frac{9}{5} \times 40 + 32$ or $1.8 \times 40 + 32$ or $9 \times 8 + 32$ or $18 \times 4 + 32$ FT from (a) provided 'their 59' > 0, i.e. $59 + 2.5 \times 18$ or $59 + 45$ or equivalent
104 (°F)	A1	Answer space takes precedence
2(a)(i) 2¼ × 60 × 90 or 60 × 90 × 2 + 15 × 90 or 135 × 90 or 2¼ × 60 × 0.9(0) or 2¼ × 54 or equivalent	M2	May be seen in stages Must be an indication of a full and complete method that could lead to a correct answer Allow M2 if initially a correct method is seen but an incorrect interpretation of ¼ is seen in further working, e.g. as 0.15 or 25 minutes. Do **not** award M2 if the start of working contains an error, e.g. 2.15 × 60 × 90 (M1) or 120 × 90 with 25 × 90 (M1) M1 for any one of the following: • (2¼ × 60 = 120 + 15 =) 135 (minutes) • 'their time' × (0.)90, e.g. ○ 2 × (0.)90 (= 180 or 1.80) ○ 2¼ × (0.)90 (= 202.5 or 2.025) ○ 60 × (0.)90 (=£54 or 5400p / hour) ○ 120 × 90 (= 10800p for 2 hours) ○ 120 × 0.9(0) (= £108 for 2 hours)
(£) 121.5(0)	A1	CAO. Answer space takes precedence An answer of 12150(p) is M2 A0
2(a)(ii) 72(.00) ÷ 60 or 60 × 120 = 7200 or 60 × 1.2 = 72 or 6 × 12 = 72 or equivalent or 120(p) (per minute) or (£)1.2(0) (per minute)	M1	<u>Working **must** be shown to support choice of boxes</u> Allow M1 for Landline and C selected with working for Band A (£)18 or 1800(p) **and** Band B (£)36 or 3600(p)
Landline, Band C	A2	Both boxes must be indicated A1 for explicit sight of 120(p) or (£)1.2(0) (per minute) (not embedded) If no marks, award SC1 for boxes Landline **and** Band C indicated

2(b)(i) (Cost in pesos) 6 × 47.85 287.1 (pesos)	M1 A1	 Answer space takes precedence
2(b)(ii) (Cost in £) 2151.3(0) ÷ 143.42 (£) 15	M1 A1	 Answer space takes precedence, if blank may be implied in further working Allow from a trial and improvement method
(Length of call) 15 ÷ (0.)3(0) or 1500 ÷ 30 or 50 × (0.)30 = 15(.)00 or equivalent	m1	Allow a place value error in intended division, e.g. 15 ÷ 3 FT 'their 2151.3(0) ÷ 143.42'
50 (minutes)	A1	CAO with no incorrect working seen Answer space takes precedence If answers are reversed ((£)50 and 15 (minutes)), award M1 A0 m1 A1 (not from incorrect working)
3(a) <u>Gwesty Arwel (costs are)</u> (1 night: 12 single rooms and 18 twin rooms) (84 × 12 and 102 × 36 ÷ 2) (£)1008 <u>and</u> (£)1836 OR (£)2844 OR (3 nights 12 single rooms and 18 twin rooms) (3 × 84 × 12 and 3 × 102 × 36 ÷ 2) (£)3024 <u>and</u> (£)5508 OR (£)8532	B2	B2 or B1 may be seen or implied in further working B1 for any one of the following: • (12 single rooms for 1 night) (£)1008 • (18 twin rooms for 1 night) (£)1836 • (12 single rooms for 3 nights) (£)3024 • (18 twin rooms for 3 nights) (£)5508
(Total discounted cost for 3 nights) 84 × 12 + 102 × 36 ÷ 2 × 3 × (1 – 0.14)	 M1 M1	For both M marks, awarded in either order, FT 'their cost of single rooms + twin rooms' Calculations may be shown separately as single rooms and twin rooms, but must include intention to add costs in further working
(£) 7337.52	A1	CAO If M1 M0 A0, award SC1 for (£)1194.48 or correctly evaluated total discount for 'their **3** nights'
<u>Hotel Glan y Môr (costs for 5 nights are)</u> 12 × 58 + 36 × 34 (× 5) or (696 + 1224) (× 5) or 1920 (× 5) or 3480 + 6120	M1	A single night calculation may be embedded in a calculation for a number of nights other than 5 or 2 different numbers provided not '× a' for single and '× 2a' for the twin rooms
(£) 9600	A1	CAO
(<u>Total cost of the 8 nights</u> is 7337.52 + 9600 =) (£) 16937.52	B1	FT adding 'their derived perceived final costs' provided at least 4 marks previously awarded
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.

3(b) (Number of litres of fuel) (33860 – 32474) ÷ 4 = 346.5 (litres)	M2 A1	M1 for (km travelled) 33860 – 32474 (= 1386) Allow rounded to 347 or truncated to 346, provided not from incorrect working, including from trial and improvement, May be implied in later work If M0 A0, award SC1 for any one of the following: • (33860 ÷ 4 =) 8465 • (32474 ÷ 4 =) 8118.5 • ((33860 + 32474) ÷ 4 = 66334 ÷ 4 =) 16583.5
(Cost of fuel) 346.5 × 1(.)86 (£)644.49 or 64449(p)	M1 A1	FT 'their number of litres of fuel' CAO. If units are given, they must be correct
3(b) Alternative method: *(Fuel cost per km) 1(.)86 ÷ 4* *= 46.5 (p/km) or 0.465 (£/km)* *(Distance travelled 33860 – 32474 =) 1386 (km)* *(Cost of fuel) 1386 × 0.465 or 1386 × 46.5* *(£)644.49 or 64449(p)*	*M1* *A1* *B1* *M1* *A1*	*Allow rounded to (0.)47 or truncated to (0.)46* *FT 1386 × 'their derived 46.5' or* *1386 × 'their derived 0.465'* *OR* *FT 'their 1386' × 'their 1(.)86 ÷ 4', including use of 33860, 32474 and 33860 + 32474* *CAO. If units are given, they must be correct*
4(a) (700 × 100 ÷ 2.5) ÷12 or 700 ÷ 0.3(0) or 70000 ÷ 30 or equivalent 2333(.3.... feet) or 2333(feet 4 inches)	M2 A1	Must be using given conversions May be seen in stages M1 for any one of the following: • Sight of 1 foot (12 inches) as 30(cm) • Intention of (70000 ÷ 2.5) *** • Sight of digits 233(33…) *** • Intention (700 ÷ 2.5) ÷ 12*** • Sight of 28000 (inches) *** Allow with incorrect place value, due to incorrect or no conversion, but division has been implied CAO. Ignore if an incorrect unit is given

4(b) 1.34 × 8 ÷ 5 or × 1.6 (to convert miles to km) × 1000 (to convert km to m) ÷ 84 (to find number of minutes) (Time correct to the nearest minute) 2(:) 26 p.m. or 14(:)26	M1 M1 M1 A2	May be seen in any order Allow × 1.61 or × 1.609 Do not accept × 1.5 (= 2144 m) Accept embedded '× 1000', e.g. sight of 1340, (1.34 × 1200 =) 1608, (1.34 × 1500 =) 2010 (i.e. × 1500 is awarded M0 M1) (= 25.52…minutes) (Note: sight of ÷ 0.084 is equivalent to × 1000 (M1) and ÷ 84 (M1)) Ignore further incorrect stages of working, provided they do not involve multiplication or division by 1.6, 1000 or 84 CAO. Answer space takes precedence A2 awarded only if there is no incorrect working Depends on M1 M1 M1 previously awarded, for rounding time to nearest minute and adding to 2 p.m. Allow 2.26 p.m. or 14.26(p.m.) Award A1 for any one of the following: • 2(:) 25(.5...) p.m. or 14(:)25(5...) • 2(:)26 or 2(:)26 a.m. or 02(:)26 or 02(:)26 p.m. • 26 (minutes) • FT from M2 (or M3) for 'their correctly rounded time to the nearest minute' added to 2 p.m. expressed with p.m. or correct 24-hr notation, provided 1 < 'their whole number of minutes' < 60 • FT from M0 M1 M1 o for use of ×1500m to give 2(:)24 p.m. or 14(:)24 o for 1.34 × 1000 ÷ 84 = 15.952…to give 2(:)16 p.m. or 14(:)16 ** ** 84 × 16 = 1344 is awarded M0 M1 M1, with possible FT A1 for 2(:)16 p.m. or 14(:)16)
4(b) <u>Alternative method:</u> *84* *÷ 1.6* *÷ 1000* *1.34 ÷ (84 ÷ 1.6 ÷ 1000) (time taken)* *(Time correct to the nearest minute)* *2(:) 26 p.m. or 14(:)26*	 *M1* *M1* *M1* *A2*	*Initial 2 method marks may be in either order* *Or ÷ 1.61 or ÷ 1.609* *÷ 1500 is M0 M1* *CAO. Answer space takes precedence* *A2 awarded only if there is no incorrect working* *Depends on M1 M1 M1 previously awarded, for rounding time to nearest minute and adding to 2 p.m.* *Allow 2.26 p.m. or 14.26(p.m.)* *A1 as shown above* *FT from M0 M1 M1 and M2 as shown above*
5(a) (Girls) 4 + 18 + 10 + 5 AND (Boys) 3 + 20 + 11 + 4 'Correct' indicated or implied AND number of girls 37 AND number of boys 38	M2 A1	For M2 allow **an error** in 1 of the 8 values M1 for either (Girls) 4 + 18 + 10 + 5 (=37) or (Boys) 3 + 20 + 11 + 4 (=38) CAO

5(b)		FT 'their first values' and 'their 'totals' from (a) If their number of girls = their number of boys then FT for possible first M1 A1 only
(Girls) $\frac{4}{37}$ (× 100) **OR** (Boys) $\frac{3}{38}$ (× 100)	M1	Do not accept '4 out of 37' or '3 out of 38'
10.8(….%) or 11(%) **AND** 7.8(9…%) or 7.9 (%) or 8(%)	A2	Do not award A2 or A1 from incorrect working seen Allow A2 as implied by a final answer in the range 2.8(%) to 3.2(%) from the sight of the appropriate decimals if individual percentages are not seen A1 for any one of the following: • (Girls) 10.8(….%) or 11(%) • (Boys) 7.8(9…%) or 7.9 (%) or 8(%) • (Girls) 0.108… **and** (Boys) 0.078…
Difference 2.9(%)	A1	Only FT from A2 previously awarded Answer space takes precedence Must be given as a percentage to 1 decimal place Do not FT from premature approximation If no marks, from appropriate working award SC1 for working with any one of the following: • (first and last 10 seconds) 9/37 and 7/38 • (last 10 seconds) 5/37 and 4/38 or equivalents as decimals or percentages **OR** SC2 for the respective answers: • (24.3(2…) – 18.4(2...)) 5.9(%) • (13.5(1…) –10.5(2…) = 2.99 =) 3.0 (%)
6a(i) (Median group) 166 ≤ *h* < 174	B1	Accept '166 to 174' or '166 – 174' or 'third group' or 'group 3' or similar Do not accept 9 or 14 or 170
Reason, e.g. '14th height'	E1	Depends on B1 previously awarded or previous B0 was due to giving the answer '9','14' or '170' E1 for clear indication that median height is the 14th Allow, e.g. sight of 14, 'middle person', 'middle height', 'by counting the frequencies, ½ the people are taller', 'half the people are taller', '13.5(th) (musician)', 'total of 27 (people), the middle of that is in the group' Do not accept, e.g. 'middle group', 'in the middle', 'middle', 'middle number', 'groups are not specific', 'because the median (height) is 174'

6(a)(ii) Indicates unambiguously 'No' with a valid reason, such as 'only know the group' 'it doesn't show raw data' 'the actual heights are not given', 'the 3 people could be anywhere in the group 150cm to (less than) 158cm', 'no way of knowing individual heights'	E1	Ignore spurious additional comments Allow 'No' with, e.g. 'don't know the height of these 3 people ', 'all 3 people could all be 155cm tall', 'everyone in group 150cm to 158cm could be 157cm', 'could all be taller than 154(cm)', '3 of them from 150 to 158 but not certain of height', 'we only know they are between 150 and 158', 'of the 3 people there may be, (but it is not certain)', '(data is) not specific', 'little chance as there are only 3 people in the group', 'the groups are not that specific', 'it's not specific enough', 'there is a possibility that there is one person shorter than 154cm as the midpoint is 154cm' Do not accept, e.g. 'everyone in the group 150cm to 158cm could be 158cm tall'
6(b) Midpoints 154, 162, 170, 178, (186,) 194 154×3 + 162×10 + 170×9 + 178×4 (+186×0) + 194×1 (= 462 + 1620 + 1530 + 712 + 0 + 194 = 4518) ÷ 27 167(.333.... cm) or equivalent	B1 M1 m1 A1	 186×0 may not be seen FT 'their midpoints' or at the bounds of the appropriate groups, provided no more than one of 'their midpoints' lies outside the group ISW Treat an error of e.g. 186 × 0 written as 186, leading to total 4704, 4704 ÷ 27 = 174(.222….) as follows: B1 M1 m1 possible but A0 or equivalents on FT
7. 1800×1.02^{28} 3133 (steps) or 3134 (steps)	M2 A2	M1 for any one of the following: • sight of 1800 × 1.02 • (1800 × 1.02 =) 1836 • from non-compound: ○ (1800 + 36 × 28 =)1800 + 1008 ○ (28 × 2% = 56% so) 1.56 × 1800 ○ a final answer of 2808 CAO A1 for 3133.8(... steps) If no marks, award SC1 for 1800×1.02^{27} or 1800×1.02^{29} or 3072.3(9…) or 3196.5(2…) **OR** SC2 for 3072 or 3073 (steps) or 3196 or 3197 (steps) respectively
8(a) A1	B1	

8(b) 59.4 × 42(.0) ÷ (100 × 100) or 0.594 × 0.42	M2	For a product using the correct place value in the conversion of units (= 0.249(48 m^2) or 0.25 (m^2)) Do not accept use of 59 instead of 59.4 for M2 M1 for a calculation including the product of digits 59(.4) and 42(.0), which may include error(s) due to place value
× 120	m1	FT from M2 or M1
29.9376(g) or 29.94(g) or an answer in the range 29.8 (g) to 30 (g)	A1	CAO. Statement answer space takes precedence If incorrect size of paper selected, award SC2 for the following answers, allow suitable rounding, or truncation at 1 or more decimal place(s): A0* | A1 | A3 | A4 119.993..(g)* | 59.946…(g) | 14.9688(g) | 7.4844(g) *Paper size A0 appropriate working or 119.9(…) **must** be seen OR Award SC1 for the appropriate digits with a place value error
8(c) (Diagonal $A4^2$ =) $21^2 + 29.7^2$	M1	May be shown in further working
Diagonal^2 = 1323.09 or (Diagonal =) √1323.09	A1	
(Diagonal A4 =) 36 (cm) or 36.3(7... cm) or 36.4 (cm)	A1	FT from M1 for the correctly evaluated square root of 'their 1323.09' provided 'their answer' > 29.7 (cm) Must be from correct working
(Diagonal A5) 36.37... × 21(.0) ÷ 29.7 or 36.37... × 0.7(0....) or 36.37... ÷ (29.7 ÷ 21(.0)) or 36.37… ÷ 1.4(1…)	M1	FT 'their derived diagonal' or 'their stated diagonal' provided ≠ 21 or ≠ 29.7
Answer in the range 25.2 (cm) to 26(cm)	A1	Answer must be from correct working.
8(c) <u>Alternative method</u>: *(Side of A5) 21(.0) × 21(.0) ÷ 29.7* *or 21 × 0.7(0...)* *or 21 ÷ 1.4(1...)* *or 29.7 ÷ 2*	*M1*	*May be shown in further working*
Answer in the range 14.7 (cm) to 15(cm)	*A1*	*Must be from correct working*
(Diagonal $A5^2$ =) $21(.0)^2 + 14.848...^2$	*M1*	*FT 'their derived side of A5' or 'their stated side of A5' provided ≠ 21 or ≠ 29.7*
Diagonal^2 = 661.4775.... or (Diagonal =) √661.4775...	*A1*	
(Diagonal A5) Answer in the range 25.2 (cm) to 26(cm)	*A1*	*Answer must be from correct working.* *FT from M1 for the correctly evaluated square root of 'their 661.4775...' provided 'their answer' > 21 (cm)*

8(d) Sight of 84.15(cm) or 841.5(mm) **and** 59.45 (cm) or 594.5(mm) or equivalents in m	B1	<u>Penalise incorrect unit -1 once (withhold B or A mark)</u> Award B1 for sight of 4 × 0.05 in an appropriate calculation Allow 0.04999(....) for 0.05, must clearly be a recurring 9 digit
2 × (84.15 + 59.45) or 2 × (84.1 + 59.4) + 4 × 0.05 or equivalent	M1	Or equivalent in mm or m If B0, FT provided unambiguously chosen: 84.1 < 'their 84.15' ≤ 84.2 and 59.4 < 'their 59.45' ≤ 59.5
2872 (mm) or 287.2 (cm) or 2.872 (m)	A1	CAO. Allow 287.1999 (cm) or equivalent (Note: Not using bounds leads to an incorrect answer of 287cm B0 M0 A0) If incorrect size of paper selected, award SC1 for the following answers, or equivalents: A0: 406.2 (cm) | A2: 203 (cm) | A3: 143.6 (cm) | A4: 101.6 (cm)
9. (Length of the package, x + y) (x =) 17.5 × cos34° or (x =) 17.5 × sin56° AND (y =) 11.1 × cos56° or (y =) 11.1. × sin34°	M3	Or alternative full method M2 for any 1 of these statements correct or as appropriate from an alternative method OR M1 for .../17.5 = cos34° or .../17.5 = sin56°, or .../11.1 = cos56° or .../11.1 = sin34°
Sight of 14.5(08... cm) and 6.2(07.... cm) or for the sum of these: 20.7(… cm) or 21 (cm)	A2	<u>Must be from correct working (not from $11.1^2 + 17.5^2$)</u> A1 for 14.5(08... cm) or 6.2(07.... cm)
(Volume =) 19 × 6.7 × (14.5(08...) + 6.2(07....)) or 19 × 6.7 × 20.7 or 19 × 6.7 × 21	M1	FT 'their x + y' provided some use of trigonometry attempted previously (including incorrect use) and both x > 0 and y > 0. Award M1 for an unsupported correct volume, or 'their FT volume' provided FT criteria met
Answer in the range 2635 (cm^3) to 2673.5 (cm^3) AND Cost (£)14.85	A1	Answer space takes precedence FT from truncation or rounding FT for appropriate cost for 'their volume' provided it is ≤10 000 (cm^3) FT is 127.3 × 'their x + their y' correctly evaluated If 'y' not considered, possible M2, A1 then also award SC1 for a volume of 1845 (cm^3) to 1847.2 (cm^3) AND cost (£)13.6(0) If 'x' not considered, possible M2, A1 then also award SC1 for a volume of 789 (cm^3) to 790.6 (cm^3) AND cost (£)12.55 If no marks, award SC1 for an answer in the range 2635 (cm^3) to 2673.5 (cm^3) AND Cost (£)14.85 from use of 20.7…(cm) from $\sqrt{(11.1^2 + 17.5^2)}$

10. (Surface area) π × 0.18 × 2.5 or equivalent	M2	<u>Accept equivalents in cm throughout</u> Must be the complete method M1 for any one of the following provided it is not embedded in further incorrect working: • π × 0.18 (= 0.565... m) • π × 18 cm (= 56.5... cm) • π × 18 cm × 2.5 (m) • π × 0.18 × 250 cm • ** π × 0.18 × 2.5 + (2 ×) π × 0.09^2 or equivalent Allow M1 for any one of the following provided it is not embedded in further incorrect working: • π × 2 × 0.18 × 2.5 or π × 0.36 × 2.5 (= 2.827…) • π × $\frac{0.18}{2}$ × 2.5 or π × 0.09 × 2.5 (= 0.706…) or equivalent
1.41 (m^2) or 14100 cm^2	A2	Mark final answer. Must be correct to 3 significant figures. A1 for any one of the following: • 1.4(13... m^2), correct but not to 3 sig. figs. • 1.4(... m^2) from premature approximation • ** 1.44 (m^2), from including 1 end • ** 1.46 (m^2), from including 2 ends **No other FT allowed from M1

GCSE MARKING SCHEME

SUMMER 2023

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

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

SUMMER 2023 MARK SCHEME

Unit 1: Higher Tier	Mark	Comments
1. (Mari's share of the prize) $4 \times 2700 \div (4 + 5)$ OR (Huw's share of the prize) $5 \times 2700 \div (4 + 5)$	M1	(4×300) (5×300)
(Mari's share is £) 1200	A1	Allow for sight of (£)1200 irrespective of the name assigned May be implied in later calculation (Huw's share is £1500)
(Mari donates) 0.24×1200	M1	FT $0.24 \times$ 'their smaller share' (Note: 'their smaller share' < 1350)
(£) 288	A1	
(Fraction of his prize Huw donates) $\frac{0.24 \times 1200}{5 \times 2700 \div (4 + 5)}$ or $\frac{0.24 \times 1200}{2700 - 1200}$ or $\frac{288}{1500}$ or $1 - \frac{1500 - 0.24 \times 1200)}{2700 - 1200}$ or $1 - \frac{1212}{1500}$	M1	FT 'their $0.24 \times$ 'their smaller share'' and $2700 -$ 'their smaller share'
$\frac{24}{125}$	A1	Must be a simplified fraction, ISW (e.g. 19.2%) An unsimplified fraction (144/750 or 96/500 or 72/375 or 48/250) is awarded M1 A0 Only FT if there are at least 2 different common prime factors for the numerator and denominator for simplifying, and not both numerator and denominator being a multiple of 10, i.e. equivalent level of difficulty If consistently working with Mari's getting the larger share, initially possible M1, A1 or M1, A0, but then M0, A0, M0, A0. However, also award SC2 for a final answer of $^3/_{10}$ or SC1 for (donation) (£)360. Mari with larger share leads to: $\frac{0.24 \times 1500}{2700 - 1500} = \frac{360}{1200} = \frac{3}{10}$

1. Alternative method: *(Fraction of his prize Huw donates)* $\frac{4}{5} \times \frac{24}{100}$ $\frac{24}{125}$	*M3* *A3*	*M2 for sight of ⅘ of 24%* *M1 for sight of ⅘ of 24* *Must be a simplified fraction* *A2 for correct unsimplified fraction, e.g.* $\frac{96}{500}$ *Only FT if there are at least 2 different common prime factors for the numerator and denominator for simplifying, i.e. equivalent level of difficulty* *ISW (e.g. 19.2%)*
Organisation and communication Writing	OC1 W1	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 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.
2(a) 1 : 100 000	B1	
2(b)(i) 1 500 000 ÷ (2 × 60) 12500 (litres/min)	M2 A1	With no other further working May be shown in stages M1 for any one of the following, that may be embedded in further incorrect working: • 1 500 000 ÷ 2 (or 750 000) • 1 500 000 ÷ 60 (or 25 000) CAO
2(b)(ii) Sight of 30 000 (cm) AND 1 500 000 000 (cm^3) 1 500 000 000 ÷ 30 000 or equivalent 50 000 (cm^2)	B1 M1 A1	Or two values of the correct comparative order, not for 1 500 000 and 300 For the intention of this division, allow with place value error (including 1 500 000 ÷ 300) for M1 only CAO. ISW if sight of answer 50 000 **cm^2**

3(a) (Sugar 0.58 × 300 =) 174 (g) (Cocoa 300 ÷ 8 =) 37.5 (g) (Milk powder) 4 × 37.5 ÷ 5 (=) 30 (g) (Palm oil 300 – 174 – 37.5 – 30 =) 58.5 (g) OR (Ingredients other than palm oil 174 + 37.5 + 30 =) 241.5 (g) (% of Palm oil) (100 ×) $\frac{58.5}{300}$ or 58.5 ÷ 3 or 0.195 or (100 ×) 1 – $\frac{241.5}{300}$ or 1 – 0.805 or equivalent 19.5 (%)	B1 B1 M1 A1 B1 M1 A1	 FT 'their derived mass of cocoa' May be implied in further working FT correctly evaluated sum of 'their sugar, cocoa and milk' provided at least 2 marks previously awarded and this sum is < 300 FT 'their 58.5' or 'their 241.5' as appropriate CAO, must be given as a percentage
3(a) Alternative method 1: *(Cocoa) ⅛ × 100 or 1 ÷ 8* *12.5 % or 0.125* *(Milk powder) $^4/_5$ × ⅛ (× 100)* *10 % or 0.1* *(Other than palm oil) (58 + 12.5 + 10 =) 80.5 %* *or (0.58 + 0.125 + 0.1 =) 0.805* *(Palm oil) 100 – (58 + 12.5 + 10)* *or 1 – (0.58 + 0.125 + 0.1) or 0.195* *19.5 (%)*	*M1* *A1* *M1* *A1* *B1* *M1* *A1*	 *FT 'their 12.5% or 0.125' or 'their % or decimal mass of cocoa'* *May be implied in further working* *FT 58 + 'their 12.5 + 10' or 0.58 + 'their 0.125 + 0.1' correctly evaluated provided at least 2 marks previously awarded and this sum is < 100 or < 1 respectively* *FT 58 + 'their sum of %s cocoa and milk' or equivalent working with decimals* *CAO, must be given as a percentage*
3(a) Alternative method 2: *(Proportion other than palm oil)* $\frac{58}{100}+\frac{1}{8}+\frac{4}{5}\times\frac{1}{8}$ *or* $\frac{58}{100}+\frac{1}{8}+\frac{1}{10}$ *805/1000 or 161/200* *(Palm oil) 1 -* $^{161}/_{200}$ *or* $^{39}/_{200}$ *or* $^{19.5}/_{100}$ *19.5 (%)*	*M3* *A1* *M2* *A1*	 *May be implied in further working* *FT from M3* *CAO, must be given as a percentage*
3(b) Realising that 840g is 120% For appropriate use of 120% being 840g, e.g. 840 ÷ 1.2 or 8400 ÷ 12 or 100 × 840/120 700 (g)	B1 M1 A1	 Also implies previous B1 Award all 3 marks for an answer of 700(g) provided not from incorrect working

4(a) 40 (seconds)	B1	
4(b) 0.9 × 60 or 60 – 0.1 × 60 = 54 (employees) In 60 seconds, 57 employees logged on or 54 employees logged on within 58 seconds	 M1 A1 B1	Penalise incorrect units -1 only. Ignore additional spurious statements Check the diagram for indication, provided values are written FT 'their 54 employees' provided M1 previously awarded and number of seconds < 60
4(b) Alternative method 1: *By 1 minute, 57 employees logged on* *(100 ×) 57/60* *0.95 or 95(%)* *or* *570/600 compared with (90% =) 540/600*	 *B1* *M1* *A1*	*Penalise incorrect units -1 only.* *If M0, A0 award SC1 for 'only 5% (or 0.05) not logged on'* *If no marks, award SC1 for an answer of 93(.3..)% or 96(.6..)% or rounded to 97% or equivalents as decimals from use of 56 or 58 respectively*
4(b) Alternative method 2: *For **clearly** considering employees not logged on, must be evidence of this before awarding marks* *(0.1 × 60 =) 6 (employees not logged on)* *(After 9:01 a.m.) 60 – 57* *3 (employees not logged on)*	 *B1* *M1* *A1*	*Penalise incorrect units -1 only.* *If M0A0, award SC1 for an answer of 4 or 2 employees from sight of calculation 60 - 56 or 60 - 58*
4(b) Alternative method 3: *For **clearly** considering employees not logged on, must be evidence of this before awarding marks* *(0.1 × 60 =) 6 (employees not logged on)* *(For 6 employees not logged on graph gives) 58 seconds* *Conclusion that after 58 seconds there are fewer than 6 employees not logged (i.e. more than 90% logged on)*	 *B1* *M1* *A1*	*Penalise incorrect units -1 only.* *FT 'their 6 employees'' provided 0.1 × 60 attempted and 'their 58 seconds' < 60*

5(a) At a randomly chosen name	B1	
5(b) (360 ÷ 6 =) 60 or 360 ÷ 60 = 6 or 6 × 60 = 360 1st 2nd 3rd 4th 5th 6th 4 64 124 184 244 304	B1 B1	May be implied by any of the following: • consistent position patterns + 60 indicated for at least 3 consecutive positions e.g. (4,) 60, 120, 180, 240, 300 • sight of 64 for student 2 CAO
6(a) Correct format of a box-and-whisker Showing lower end whisker at 10 seconds Showing LQ 40 seconds Showing median at 84 seconds AND UQ at 108 seconds AND greatest time 130 seconds	B1 B1 B1 B1	Do not ignore additional lines drawn End stopper lines omitted can be ignored For unambiguous indications of the following: On the graph paper. Allow for the least point indicated On the graph paper. Must be the lower line of a rectangle On the graph paper Median and UQ must be unambiguous vertical lines, allow 130 indicated as a point or a vertical line
6(b) 6 seconds	B1	
6(c) 0.75 × 200 or equivalent 150 (phone calls)	M1 A1	Allow sight of '75% of 200' or '$^3/_4$ of 200' Answer space takes precedence If no marks, award SC1 for an answer of 50 (phone calls)
7(a)(i) (Least possible volume of a carton =) 40 × 12.5 = 500 (cm^3)	M1 A1	Allow use of $12 \leq h < 13$ for M1 only CAO If no marks awarded, SC1 for use of 12.5
7(a)(ii) Use of 8500 $\frac{8500}{500}$ (× 60) = 1020	B1 M1 A1	Allow 8499.999(…) for 8500 FT 'their 500' from (a)(i) If B0, FT provided unambiguously chosen: 8000 < 'their 8500' ≤ 9000 CAO for 'their 500' from (a)(i)

7(b) (length^2 =) 960 ÷ 20 length^2 = 48 OR (length =) $\sqrt{48}$ (length =) $4\sqrt{3}$	M1 A1 B2	 Or equivalent e.g. $\sqrt{4} \times \sqrt{12}$ Mark final answer Accept $40\sqrt{3}$ mm, but not $0.04\sqrt{3}$ m For B2, FT 'their derived 48' provided of equivalent difficulty (it has a square number as one of its factors) For B1, FT 'their derived 48' B1 for writing 48 as a product of 2 or more factors where one of the factors OR the product of 2 of their factors is a square number e.g. 16 × 3 or 4 × 4 × 3 or 4 × 12 or 2 × 2 × 12 OR B1 for writing $\sqrt{48}$ as a product of 2 or more factors where one of the factors OR the product of 2 of their factors gives a whole number e.g. $\sqrt{16} \times \sqrt{3}$ or $\sqrt{2} \times \sqrt{2} \times \sqrt{12}$ or $2\sqrt{12}$
8(a) $\frac{1000}{2\times10^{-24}}$ OR $\frac{1000}{1.5\times10^{-24}}$ OR $\frac{1000}{1.6\times10^{-24}}$ $= 5 \times 10^{26}$ OR $6.6(66\ldots) \times 10^{26}$ OR 6.25×10^{26} or 6.7×10^{26} or 6.3×10^{26} or 7×10^{26} or 6×10^{26}	M1 A2	Or equivalents A1 for equivalent values but not in standard form e.g. 500×10^{24} or 0.5×10^{27} or their equivalent ordinary numbers
8(a) Alternative method: $\frac{1020}{1.7\times10^{-24}}$ $= 6 \times 10^{26}$	*M1* *A2*	*Allow M1 for $1000/1.7\times10^{-24}$ provided their answer has a leading digit of 6* *A1 for equivalent value but not in standard form* *e.g. 600×10^{24} or 0.6×10^{27} or the equivalent ordinary number* *If M0A0, award SC1 for an answer of $5.8(\ldots)\times 10^{26}$ or 5.9×10^{26} from $1000/1.7\times10^{-24}$*
8(b) $2\times(1.7 \times 10^{-24}) + (2.7 \times 10^{-23})$ or equivalent $= 3.04 \times 10^{-23}$ (g)	M1 A2	If a candidate adds the mass of 2 atoms of oxygen and 1 atom of hydrogen, treat as a misread (Answer will be 5.57×10^{-23}) A1 for the equivalent of 3.04×10^{-23} but not in standard form e.g. 30.4×10^{-24} or the equivalent ordinary number, OR A1 for 3×10^{-23} If no marks, award SC1 for an answer of 2.87×10^{-23} (using one atom of hydrogen)

9(a) $\frac{2}{3} \times \pi \times \text{radius}^3 = \frac{128\pi}{3}$ or equivalent $\text{radius}^3 = \frac{128\pi \times 3}{2 \times \pi \times 3}$ or equivalent OR $\text{radius} = \sqrt[3]{\frac{128\pi \times 3}{2 \times \pi \times 3}}$ or equivalent (radius =) 4 (cm) (Surface area =) $2 \times \pi \times 4^2$ $= 32\pi$ (cm^2)	M1 M1 A2 M1 A1	 For isolating radius^3 FT if the volume of a sphere used for a possible M1A1 only CAO A1 for $\text{radius}^3 = 64$ or (radius =) $\sqrt[3]{64}$ OR A1 for $\text{radius}^3 = 32$ or (radius =) $\sqrt[3]{32}$ if the volume of a sphere used FT 'their 4' provided an attempt made to use the formula for the volume of a sphere to calculate the radius Accept 3200π mm^2 or 0.0032π m^2 If 'their radius = $\sqrt[3]{32}$' then their SA will be $2^{13/3}\pi$ If final M0A0, award SC1 for $4 \times \pi \times$ 'their r^2' evaluated correctly provided an attempt made to use the formula for the volume of a sphere to calculate the radius
9(b) $\sqrt[3]{8} : \sqrt[3]{27}$ or $\sqrt[3]{8 \div 27}$ or $\sqrt[3]{27 \div 8}$ (= 2 : 3) (= 2/3) (= 3/2) (Height =) $18 \times \frac{2}{3}$ or $18 \div \frac{3}{2}$ or equivalent = 12 (cm)	B1 M1 A1	May be implied in further working Implies previous B1 provided not from incorrect working FT 'their 2/3' or 'their 3/2' provided first B1 awarded CAO Note: 27 ÷ 18 = 1.5 followed by either 18 ÷ 1.5 = 12 or 8 × 1.5 = 12 is awarded B0M0A0

10(a)(i) ½ × 40 × 20 = 400 (m)	M1 A1	
10(a)(ii) (time at 20 m/s =) $\frac{16000 - 400 - 0.5\times80\times20}{20}$ OR $\frac{16000 - 400 - 2\times400}{20}$ (= $\frac{14800}{20}$) = 740 (seconds) (Total journey time = 740 + 40 + 80 =) 860 (seconds)	M3 A1 B1	FT 'their 400' from (a)(i) M2 for one of: • 400 + 20 × (time at 20m/s) + $\frac{1}{2}$×80×20 = 16000 • 400 + 20 × (time at 20m/s) + 2×400 = 16000 • 16000 – 400 – 0.5×80×20 (= 14800) • 16000 – 400 – 2×400 (= 14800) M1 for one of: • 1/2×80×20 (= 800) • 2×400 (= 800) • 400 + 20×(time at 20m/s) + … = 16000 or equivalent ISW. FT 'their 740' provided at least M2 previously awarded
10(a)(ii) Alternative method 1: *$\frac{1}{2}$ ((time at 20) + 120 + (time at 20)) × 20 = 16000* *(time at 20m/s =) $\frac{16000 \times 2 - 2400}{40}$ or equivalent* *(=29600/40)* *= 740 (seconds)* *(Total journey time = 740 + 40 + 80 =) 860 (seconds)*	*M2* *m1* *A1* *B1*	*FT 'their 400' from (a)(i)* *Or equivalent* *e.g. only considering the journey from t=40* *$\frac{1}{2}$ ((time at 20)+80 + (time at 20))×20 = 16000 − 400* *M1 for one of:* • *$\frac{1}{2}$ ((time at 20) + 120 + (time at 20))×20* • *$\frac{1}{2}$ ((time at 20) + 80 + (time at 20))×20* *For isolating (time at 20 m/s)* *FT 'their 740' provided at least M1 previously awarded*
10(a)(ii) Alternative method 2: *$\frac{1}{2}$ ((total time) + (total time) – 120) × 20 = 16000* *(total time =) $\frac{16000 \times 2 + 2400}{40}$ or equivalent* *(=34400/40)* *= 860 (seconds)*	*M3* *m1* *A1*	*Or equivalent e.g.* *400 + 20(total time – 120) + (20 × 80)/2 = 16000* *M2 for* • *$\frac{1}{2}$ ((total time) + (total time) – 120) × 20 or* • *400 + 20(total time – 120) + (20 × 80)/2*

10(b) e.g. 10x = 10.8181… and 1000x = 1081.8181… or equivalent AND an attempt to subtract	M1	Allow 10x = 0.8181… and 1000x = 81.8181…
(x =) $\frac{1071}{990}$ or $\frac{108171}{99990}$ or $1\frac{81}{990}$ or equivalent	A1	Accept e.g. $\frac{107.1}{99}$ or $\frac{10817.1}{9999}$ Allow e.g. $\frac{8.1}{99}$ or $\frac{81}{990}$ or $\frac{8181}{99990}$
(x =) $1\frac{9}{110}$	A1	FT 'their $\frac{1071}{990}$' provided of equivalent difficulty
11. (Volume of octagonal prism =) $50 \times 20 + 2 \times \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)$ or $50 \times 20 + 2 \times \frac{1}{2} \times 70 \times 15$ (= 1000 + 1050)	M2	May be embedded within a volume calculation 50×20 may be seen as $20\times20 + 2\times20\times((50 - 20)/2)$ or $20\times20 + 2\times20\times15$ $2 \times \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)$ may be seen as $2 \times (20\times((50 - 20)/2) + 2\times\frac{1}{2}\times(50–20)/2\times(50–20)/2)$ or $2 \times (20\times15 + 2\times\frac{1}{2}\times15\times15)$ M1 for $50 \times 20 + \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)$ or M1 for $50 \times 20 + \frac{1}{2} \times 70 \times 15$ OR M1 for …… + $2 \times \frac{1}{2} \times (50 + 20) \times ((50 - 20)/2)$ or M1 for …… + $2 \times \frac{1}{2} \times 70 \times 15$
× 5 × 10 = 102 500 (cm^3)	m1 A1	FT from M1 CAO If M0m0A0 awarded, and from an incorrect assumption that the octagon is regular, award SC1 for areas of: • $8 \times (20 \times 25)/2 = 2000$ (possibly leading to a volume of 100 000) or • $50^2 - 20^2 = 2100$ (possibly leading to a volume of 105 000)
(Volume of a cone =) $\frac{1}{3} \times 800 \times 60$	M1	Award M1A0 if this is multiplied by 10
= 16 000 (cm^3)	A1	CAO
(Total volume = 102 500 + 16 000 =) 118 500 (cm^3)	B1	FT 'their 102 500' and 'their 16 000' provided at least one M1 mark awarded and is the sum of the volumes of their 10 octagonal bases and 1 (or 10) cone/s
11. <u>Alternative method for the first 4 marks:</u> *(Volume of octagonal prism =)* $50^2 - 4 \times \frac{1}{2} \times (50 - 20)/2 \times (50 - 20)/2$ *or* $50^2 - 4 \times \frac{1}{2} \times 15 \times 15$ *(= 2500 – 450)*	*M2*	*May be embedded within a volume calculation* *M1 for … $- 4 \times \frac{1}{2} \times (50 - 20)/2 \times (50 - 20)/2$ or* *M1 for … $- 4 \times \frac{1}{2} \times 15 \times 15$*
× 5 × 10 *= 102 500 (cm^3)*	*m1* *A1*	*FT from M1* *CAO*

GCSE MARKING SCHEME

SUMMER 2023

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

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

SUMMER 2023 MARK SCHEME

Unit 2: Higher Tier	Mark	Comments
1. 1.34 × 8 ÷ 5 or × 1.6 (to convert miles to km)	M1	May be seen in any order Allow × 1.61 or × 1.609 Do not accept × 1.5
× 1000 (to convert km to m)	M1	(= 2144 m) Accept embedded '× 1000', e.g. sight of 1340, (1.34 × 1200 =) 1608, (1.34 × 1500 =) 2010 (i.e. × 1500 is awarded M0 M1)
÷ 84 (to find number of minutes)	M1	(= 25.52…minutes) (Note: sight of ÷ 0.084 is equivalent to × 1000 (M1) and ÷ 84 (M1)) Ignore further incorrect stages of working, provided they do not involve multiplication or division by 1.6, 1000 or 84
(Time correct to the nearest minute) 2(:) 26 p.m. or 14(:)26	A2	CAO A2 awarded only if there is no incorrect working Depends on M1 M1 M1 previously awarded, for rounding time to nearest minute and adding to 2 p.m. Allow 2.26 p.m. or 14.26(p.m.) Award A1 for any one of the following: • 2(:) 25(.5...) p.m. or 14(:)25(5...) • 2(:)26 or 2(:)26 a.m. or 02(:)26 or 02(:)26 p.m. • 26 (minutes) • FT from M2 (or M3) for 'their correctly rounded time to the nearest minute' added to 2 p.m. expressed with p.m. or correct 24-hr notation, provided 1 < 'their whole number of minutes' < 60 • FT from M0 M1 M1 o for use of ×1500m to give 2(:)24 p.m. or 14(:)24 o for 1.34 × 1000 ÷ 84 = 15.952…to give 2(:)16 p.m. or 14(:)16 ** ** 84 × 16 = 1344 is awarded M0 M1 M1, with possible FT A1 for 2(:)16 p.m. or 14(:)16)
1. <u>Alternative method:</u> 84 ÷ 1.6 (km to miles) ÷ 1000 (metres to km) 1.34 ÷ (84 ÷ 1.6 ÷ 1000) (time taken) (Time correct to the nearest minute) 2(:) 26 p.m. or 14(:)26	*M1 M1 M1 A2*	*Initial 2 method marks may be in either order Or ÷ 1.61 or ÷ 1.609 ÷ 1500 is M0 M1 CAO. Answer space takes precedence A2 awarded only if there is no incorrect working Depends on M1 M1 M1 previously awarded, for rounding time to nearest minute and adding to 2 p.m. Allow 2.26 p.m. or 14.26(p.m.) A1 as shown above FT from M0 M1 M1 and M2 as shown above*

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.
2a(i) (Median group) $166 \leq h < 174$	B1	Accept '166 to 174' or '166 – 174' or 'third group' or 'group 3' or similar Do not accept 9 or 14 or 170
Reason, e.g. '14th height'	E1	Depends on B1 previously awarded or previous B0 was due to giving the answer '9', '14' or '170' E1 for clear indication that median height is the 14^{th} Allow, e.g. sight of 14, 'middle person', 'middle height', 'by counting the frequencies, ½ the people are taller', 'half the people are taller', '13.5(th) (musician)', 'total of 27 (people), the middle of that is in the group' Do not accept, e.g. 'middle group', 'in the middle', 'middle', 'middle number', 'groups are not specific', 'because the median (height) is 174'
2(a)(ii) Indicates unambiguously 'No' with a valid reason, such as 'only know the group' 'it doesn't show raw data' 'the actual heights are not given', 'the 3 people could be anywhere in the group 150cm to (less than) 158cm', 'no way of knowing individual heights'	E1	Ignore spurious additional comments Allow 'No' with, e.g. 'don't know the height of these 3 people ', 'all 3 people could all be 155cm tall', 'everyone in group 150cm to 158cm could be 157cm', 'could all be taller than 154(cm)', '3 of them from 150 to 158 but not certain of height', 'we only know they are between 150 and 158', 'of the 3 people there may be, (but it is not certain)', '(data is) not specific', 'little chance as there are only 3 people in the group', 'the groups are not that specific', 'it's not specific enough', 'there is a possibility that there is one person shorter than 154cm as the midpoint is 154cm' Do not accept, e.g. 'everyone in the group 150cm to 158cm could be 158cm tall'

2(b) Midpoints 154, 162, 170, 178, (186,) 194 154×3 + 162×10 + 170×9 + 178×4 (+186×0) + 194×1 (= 462 + 1620 + 1530 + 712 + 0 + 194 = 4518) ÷ 27 167(.333.... cm) or equivalent	B1 M1 m1 A1	 186×0 may not be seen FT 'their midpoints' or at the bounds of the appropriate groups, provided no more than one of 'their midpoints' lies outside the group ISW Treat an error of e.g. 186 × 0 written as 186, leading to total 4704, 4704 ÷ 27 = 174(.222….) as follows: B1 M1 m1 possible but A0 or equivalents on FT
3. 1800×1.02^{28} 3133 (steps) or 3134 (steps)	M2 A2	M1 for any one of the following: • sight of 1800 × 1.02 • (1800 × 1.02 =) 1836 • from non-compound: ○ (1800 + 36 × 28 =)1800 + 1008 ○ (28 × 2% = 56% so) 1.56 × 1800 ○ a final answer of 2808 CAO A1 for 3133.8(... steps) If no marks, award SC1 for 1800×1.02^{27} or 1800×1.02^{29} or 3072.3(9…) or 3196.5(2…) **OR** SC2 for 3072 or 3073 (steps) or 3196 or 3197 (steps) respectively
4(a) A1	B1	
4(b) 59.4 × 42(.0) ÷ (100 × 100) or 0.594 × 0.42 × 120 29.9376(g) or 29.94(g) or an answer in the range 29.8 (g) to 30 (g)	M2 m1 A1	For a product using the correct place value in the conversion of units (= 0.249(48 m^2) or 0.25 (m^2)) Do not accept use of 59 instead of 59.4 for M2 M1 for a calculation including the product of digits 59(.4) and 42(.0), which may include error(s) due to place value FT from M2 or M1 CAO. Statement answer space takes precedence If incorrect size of paper selected, award SC2 for the following answers, allow suitable rounding, or truncation at 1 or more decimal place(s): A0* | A1 | A3 | A4 119.993..(g)* | 59.946…(g) | 14.9688(g) | 7.4844(g) *Paper size A0 appropriate working or 119.9(…) **must** be seen OR Award SC1 for the appropriate digits with a place value error

4(c) (Diagonal A4^2 =) $21^2 + 29.7^2$ Diagonal^2 = 1323.09 or (Diagonal =) $\sqrt{1323.09}$ (Diagonal A4 =) 36 (cm) or 36.3(7... cm) or 36.4 (cm) (Diagonal A5) 36.37... × 21(.0) ÷ 29.7 or 36.37... × 0.7(0....) or 36.37... ÷ (29.7 ÷ 21(.0)) or 36.37… ÷ 1.4(1…) Answer in the range 25.2 (cm) to 26(cm)	M1 A1 A1 M1 A1	May be shown in further working FT from M1 for the correctly evaluated square root of 'their 1323.09' provided 'their answer' > 29.7 (cm) Must be from correct working FT 'their derived diagonal' or 'their stated diagonal' provided ≠ 21 or ≠ 29.7 Answer must be from correct working.
4(c) <u>Alternative method</u>: *(Side of A5) 21(.0) × 21(.0) ÷ 29.7* *or 21 × 0.7(0...)* *or 21 ÷ 1.4(1...)* *or 29.7 ÷ 2* *Answer in the range 14.7 (cm) to 15(cm)* *(Diagonal A5^2 =) 21(.0)^2 + 14.848...^{2}* *Diagonal^2 = 661.4775.... or (Diagonal =) √661.4775...* *(Diagonal A5) Answer in the range* *25.2 (cm) to 26(cm)*	*M1* *A1* *M1* *A1* *A1*	*May be shown in further working* *Must be from correct working* *FT 'their derived side of A5' or 'their stated side of A5' provided ≠* 21 or ≠ 29.7 *Answer must be from correct working.* *FT from M1 for the correctly evaluated square root of 'their 661.4775...' provided 'their answer' > 21 (cm)* *Note:* *Side A5* / *Diagonal^2* / *Answer, in cm* *14* / *637* / *25.23…* *14.7* / *657.09* / *25.63…* *14.8* / *660.04* / *25.69.. or 25.7* *14.84* / *661.2256* / *25.71...* *14.85* / *661.5225* / *25.72…* *14.9* / *663.01* / *25.748… or 25.75* *15* / *666* / *25.8…*
4(d) Sight of 84.15(cm) or 841.5(mm) **and** 59.45 (cm) or 594.5(mm) or equivalents in m 2 × (84.15 + 59.45) or 2 × (84.1 + 59.4) + 4 × 0.05 or equivalent 2872 (mm) or 287.2 (cm) or 2.872 (m)	B1 M1 A1	<u>Penalise incorrect unit -1 once (withhold B or A mark)</u> Award B1 for sight of 4 × 0.05 in an appropriate calculation Allow 0.04999(....) for 0.05, must clearly be a recurring 9 digit Or equivalent in mm or m If B0, FT provided unambiguously chosen: 84.1 < 'their 84.15' ≤ 84.2 and 59.4 < 'their 59.45' ≤ 59.5 CAO. Allow 287.1999 (cm) or equivalent (Note: Not using bounds leads to an incorrect answer of 287cm B0 M0 A0) If incorrect size of paper selected, award SC1 for the following answers, or equivalents: A0 / A2 / A3 / A4 406.2 (cm) / 203 (cm) / 143.6 (cm) / 101.6 (cm)

5. (Length of the package, x + y) (x =) 17.5 × cos34° or (x =) 17.5 × sin56° AND (y =) 11.1 × cos56° or (y =) 11.1. × sin34°	M3	Or alternative full method M2 for any 1 of these statements correct or as appropriate from an alternative method OR M1 for .../17.5 = cos34° or .../17.5 = sin56°, or .../11.1 = cos56° or .../11.1 = sin34°
Sight of 14.5(08... cm) and 6.2(07.... cm) or for the sum of these: 20.7(… cm) or 21 (cm)	A2	Must be from correct working (not from $11.1^2 + 17.5^2$) A1 for 14.5(08... cm) or 6.2(07.... cm)
(Volume =) 19 × 6.7 × (14.5(08...) + 6.2(07....)) or 19 × 6.7 × 20.7 or 19 × 6.7 × 21	M1	FT 'their x + y' provided some use of trigonometry attempted previously (including incorrect use) and both x > 0 and y > 0. Award M1 for an unsupported correct volume, or 'their FT volume' provided FT criteria met
Answer in the range 2635 (cm^3) to 2673.5 (cm^3) AND Cost (£)14.85	A1	Answer space takes precedence FT from truncation or rounding FT for appropriate cost for 'their volume' provided it is ≤10 000 (cm^3) FT is 127.3 × 'their x + their y' correctly evaluated Volume (cm^3) / Cost 0 to 1000 / £12.55 greater than 1000, up to 2000 / £13.60 greater than 2000, up to 4000 / £14.85 greater than 4000, up to 10 000 / £16.25 If 'y' not considered, possible M2, A1 then also award SC1 for a volume of 1845 (cm^3) to 1847.2 (cm^3) AND cost (£)13.6(0) If 'x' not considered, possible M2, A1 then also award SC1 for a volume of 789 (cm^3) to 790.6 (cm^3) AND cost (£)12.55 If no marks, award SC1 for an answer in the range 2635 (cm^3) to 2673.5 (cm^3) AND Cost (£)14.85 from use of 20.7…(cm) from $\sqrt{(11.1^2 + 17.5^2)}$

6. (Surface area) π × 0.18 × 2.5 or equivalent	M2	<u>Accept equivalents in cm throughout</u> Must be the complete method M1 for any one of the following provided it is not embedded in further incorrect working: • π × 0.18 (= 0.565... m) • π × 18 cm (= 56.5... cm) • π × 18 cm × 2.5 (m) • π × 0.18 × 250 cm • ** π × 0.18 × 2.5 + (2 ×) π × 0.09^2 or equivalent Allow M1 for any one of the following provided it is not embedded in further incorrect working: • π × 2 × 0.18 × 2.5 or π × 0.36 × 2.5 (= 2.827…) • π × $\frac{0.18}{2}$ × 2.5 or π × 0.09 × 2.5 (= 0.706…) or equivalent
1.41 (m^2) or 14100 cm^2	A2	Mark final answer. Must be correct to 3 significant figures. A1 for any one of the following: • 1.4(13... m^2), correct but not to 3 sig. figs. • 1.4(... m^2) from premature approximation • ** 1.44 (m^2), from including 1 end • ** 1.46 (m^2), from including 2 ends **No other FT allowed from M1
7(a) Frequency densities of 0.4, 0.28, 0.48, 0.16, 0.07	B2	If table is blank, check histogram B1 for any 3 correct
Correct bars drawn	B1	FT their frequency densities provided B1 previously awarded
7(b) $\frac{3}{5}$×10 + 10 + 7 + 12 + 8 + 7 (=50) or equivalent OR 6 + $\frac{2}{5}$×10 (=10) or equivalent	B1	15×0.4 may be used instead of 3/5×10 40×0.4 may be used instead of 3/5×10 + 10 10×0.4 may be used instead of 2/5 ×10
(100 ×) $\frac{3/5×10 + 10 + 7 + 12 + 8 + 7}{6 + 10 + 10 + 7 + 12 + 8 + 7}$ OR (100 ×) $\frac{(60 – (6 + 2/5×10))}{60}$ or (100) × $\frac{50}{60}$	M1	FT for a numerator /'their 6+10+10+7+12+8+7' where 44 < numerator < 54 for B0M1A0 If their denominator ≠ 60, then 6+10+10+7+12+8+7 or 5×12 must be seen leading to their incorrect denominator If their fraction is for the number of months where there was less than 60mm rainfall, FT for a numerator /'their 6+10+10+7+12+8+7' where 6 < numerator < 16 for B0M1A0 provided an attempt is subsequently made to subtract this from 100%
= 83.3(3…) or $83\frac{1}{3}$ (%)	A1	CAO. Accept 83 (%) from correct working

8(a) $\frac{30}{360} \times \pi \times 400^2$ or equivalent = 41 866 to 41 893.4 (m^2)	M1 A1	 Or $\frac{40000\pi}{3}$
8(b) $\frac{\text{Angle}}{360} \times 2 \times \pi \times 400 = 1067.6$ (Angle =) $\frac{1067.6 \times 360}{2 \times \pi \times 400}$ or equivalent = 152.9 to 153 (º)	M1 m1 A1	May be implied in further work For isolating the angle If no marks, award SC1 for an answer of 305.8 to 306 (º) from using the calculation $\frac{1067.6 \times 360}{\pi \times 400}$
8(c) Valid reason e.g. 'More area to water the further away from the pivot you are', 'The outer tower will be moving faster' 'It has to cover a larger distance', 'The part closest to the pivot needs to deliver less water or it would flood'	E1	Ignore spurious additional comments Accept e.g. 'To cover more area' Allow e.g. 'So all the crops get the same amount of water' Do not accept e.g. 'The crops furthest away need more water', 'To keep up with the tower closest to the pivot as this doesn't move so far', 'So the water will spray at a constant speed'

9(a) (Monthly rate =) 0.25% or 0.0025	B1	B0 for 0.0025%. May be implied in further work
$10\,000 \times 1.0025^n$	B1	For use of 'n' or for use of any value of n
$10\,000 \times 1.0025^{20}$ (= (£)10 512(.055…))	M1	Allow (£)$10\,000 \times 1.0025^{19}$ (= (£)10 485(.84…) or (£)10 486) with convincing work that over (£)10 500 will be reached in a months' time An answer of (n=) 20 (months) implies B1B1M1 provided no incorrect work seen
(Date =) 30th November 2024	A1	CAO Allow 31st November 2024 or 1st December 2024 If only the first B1 awarded and using the calculation $(10000\times1.03) \times 1.0025^8$ or 10300×1.0025^8, award a further SC1 for (£)10507(.81…) or (£)10508 AND 30th November (allowing 31st) or 1st December 2024 If no marks awarded and from using a multiplier of 1.03^2, award SC1 for (£)10 609 AND 31st May (allowing 30th) or 1st June (2023), OR If no marks awarded and from using a multiplier of 1.025^2, award SC1 for (£)10 506(.25) AND 31st May (allowing 30th) or 1st June (2023)
9(a) Alternative method: *(Monthly rate =) 0.25% or 0.0025*	*B1*	*B0 for 0.0025%. May be implied in further work*
$10\,000 \times 1.0025^n = 10500$	*B1*	*Or $1.0025^n = \frac{10500}{10000}$ or equivalent*
(Number of months =) *$\frac{\log(10500/10000)}{\log 1.0025}$ or $\frac{\log 1.05}{\log 1.0025}$ or $\log_{1.0025}(1.05)$*	*M1*	*Implies previous B1B1* *Note: The logs in the first 2 possibilities for M1 can be to any base* *An answer of (n=) 19.5(404…) or 20 (months) implies B1B1M1 provided no incorrect work seen*
(= 19.5(404…) or 20 months)		
(Date =) 30th November 2024	*A1*	*CAO* *Allow 31st November 2024 or 1st December 2024* *If no marks awarded and from using 1.03 instead of 1.0025, award SC1 for 1.6(506…) or 2 (months) AND 31st May (allowing 30th) or 1st June (2023), OR* *If no marks awarded and from using 1.025 instead of 1.0025, award SC1 for 1.9(759…) or 2 (months) AND 31st May (allowing 30th) or 1st June (2023)*
9(b) (AER =) $\left(1+\frac{0.03}{12}\right)^{12}-1$	M1	M0A0 if n ≠ 12 substituted into the AER formula
= 3.04 (%)	A1	Allow an answer of 3.04(…) % An unsupported 3.04% is awarded M1A1

10(a) Strategy of attempting to use the sine rule followed by 0.5absinC or right-angled trigonometry	S1	
(left side =) $\frac{6.2 \times \sin 50}{\sin(180-50-35)}$ or $\frac{6.2}{\sin 95} \times \sin 50$	M2	M1 for $\frac{\text{left side}}{\sin 50} = \frac{6.2}{\sin(180-50-35)}$ or equivalent
= 4.76(…) or 4.77 or 4.8 (m)	A1	
(Area of triangle =) $\frac{1}{2} \times 4.76(\ldots) \times 6.2 \times \sin 35$	M1	FT 'their 4.76(…)' provided sine rule attempted Note: This calculation may come from use of right-angled trigonometry to find height = 4.76(…) x sin35 and then use of ½ × base × height
= 8.44 to 8.56 (m^2)	A1	
(Volume of room =) 67.5 to 68.5 (m^3)	B1	FT 'their 8.44 to 8.56' × 8 provided at least M1M1 (not M2M0) previously awarded
10(a) Alternative method 1: *Strategy of attempting to use the sine rule followed by 0.5absinC or right-angled trigonometry*	*S1*	
(right side =) $\frac{6.2 \times \sin 35}{\sin(180-50-35)}$ or $\frac{6.2}{\sin 95} \times \sin 35$	*M2*	*M1 for* $\frac{\text{right side}}{\sin 35} = \frac{6.2}{\sin(180-50-35)}$
= 3.56(…) or 3.57 or 3.6 (m)	*A1*	
(Area of triangle =) $\frac{1}{2} \times 3.56(\ldots) \times 6.2 \times \sin 50$	*M1*	*FT 'their 3.56(…)' provided sine rule attempted* *Note: This calculation may come from use of right-angled trigonometry to find height = 3.56(…) x sin50 and then use of ½ × base × height*
= 8.44 to 8.56 (m^2)	*A1*	
(Volume of room =) 67.5 to 68.5 (m^3)	*B1*	*FT 'their 8.44 to 8.56' × 8 provided at least M1M1 (not M2M0) previously awarded*
10(a) Alternative method 2: *Strategy of attempting to use the sine rule followed by 0.5absinC or right-angled trigonometry*	*S1*	
(left side =) $\frac{6.2 \times \sin 50}{\sin(180-50-35)}$ *or* $\frac{6.2}{\sin 95} \times \sin 50$ *OR*	*M2*	*M1 for* $\frac{\text{left side}}{\sin 50} = \frac{6.2}{\sin(180-50-35)}$ *or equivalent OR*
(right side =) $\frac{6.2 \times \sin 35}{\sin(180-50-35)}$ *or* $\frac{6.2}{\sin 95} \times \sin 35$		*M1 for* $\frac{\text{right side}}{\sin 35} = \frac{6.2}{\sin(180-50-35)}$ *OR* *M1 for correct full method to calculate their 2nd side using sine or cosine rules following an incorrect method to initially calculate the left or right side*
left side = 4.76(…) or 4.77 or 4.8 (m) AND *right side = 3.56(…) or 3.57 or 3.6 (m)*	*A1*	
(Area of triangle =) $\frac{1}{2} \times 4.76(\ldots) \times 3.56(\ldots) \times \sin 95$	*M1*	*FT 'their 4.76(…)' AND 'their 3.56(…)' AND 'their 95' provided sine rule attempted twice or the sine rule followed by the cosine rule attempted*
= 8.44 to 8.61 (m^2)	*A1*	
(Volume of room =) 67.5 to 68.5 (m^3)	*B1*	*FT 'their 8.44 to 8.5625' × 8 provided at least M1M1 (not M2M0) previously awarded* *Note: An area of e.g. 8.61 leads to a volume of 68.88 which is outside the acceptable range and is B0*

10(b)(i) Strategy of attempting to use 3D Pythagoras	S1	Must be for carrying through an initial Pythagoras step from one plane into a second plane
$1^2 + 0.7^2$ OR $1^2 + 1.2^2$ OR $0.7^2 + 1.2^2$ or $\sqrt{1^2 + 0.7^2}$ OR $\sqrt{1^2 + 1.2^2}$ OR $\sqrt{0.7^2 + 1.2^2}$ (=1.22…) (=1.56…) (=1.389…)	M1	FT 'their 2.4 ÷ 2' May be embedded in further working
(Total length of lead =) $\sqrt{1^2 + 0.7^2 + 1.2^2}$ (×2) or (= $\sqrt{2.93}$ (×2))	M2	Implies S1 and previous M1 Note: $\sqrt{2.93}$ = 1.71(1…) and may come from sight of $\sqrt{1.93 + 1}$ or $\sqrt{2.44 + 0.49}$ or $\sqrt{1.49 + 1.44}$ M1 for $1^2 + 0.7^2 + 1.2^2$ or 1 + 0.49 + 1.44
(Total length of lead needed =) 3.4 to 3.5 (m)	A1	Do not accept answers outside this range that round to 3.4 or 3.5 i.e. needs to come from 2 × ($\sqrt{2.89}$ to $\sqrt{3.0625}$)
10(b)(ii) (Area of a curved surface =) $\pi \times 9.2 \times 30$ OR $\pi \times 8 \times 30$ (= 866.6 to 867.2 or 276π cm^2) (= 753.6 to 754.1 or 240π cm^2)	B1	Or equivalents. Do not award if they go on to multiply by another length creating a volume
(Area of a semicircular ring =) $\frac{\pi \times 9.2^2}{2} - \frac{\pi \times 8^2}{2}$ or equivalent (= 32.4 to 32.43 or $10.3(2)\pi$ cm^2)	B1	May be implied by sight of double these values i.e. 64.8 to 64.86 or $20.6(4)\pi$ Do not award if they go on to multiply by another length creating a volume
(Total surface area =) $\pi \times 9.2 \times 30 + \pi \times 8 \times 30 + 1.2 \times 30 + 1.2 \times 30 + \left(\frac{\pi \times 9.2^2}{2} - \frac{\pi \times 8^2}{2}\right) + \left(\frac{\pi \times 9.2^2}{2} - \frac{\pi \times 8^2}{2}\right)$ (= (866.6 to 867.2) + (753.6 to 754.1) + 36 + 36 + (32.4 to 32.43) + (32.4 to 32.43))	M2	Must be 6 correct areas and no further incorrect areas added/subtracted M1 for the sum of 4 or 5 correct surface areas
= 1756.9 to 1758.3 (cm^2)	A1	(Or $536.6(4)\pi + 72$) For an answer in this range only, and must come from M2

10(c) Statements required: • Number the tiles from 0001 to 2000 • Consider successive 4-digit numbers • Do not use numbers outside the range • Ignore repeats (Working in rows would give tiles) 1924, 1521, 1205, (0)114, ~~1521~~, 1098, (0)769, 1003 ISW, OR (Working in columns would give tiles) (0)114, 1098, 1924, 1003, 1521, (0)769, ~~1003~~, 1205 ISW	E2 B1	All 4 needed for E2 E1 for any 2 or 3 correct statements Allow (000)1 to 2000 Allow an equivalent numbering system e.g. (000)0 to 1999 Allow this statement to be implied by their numbering of the tiles (from 0001) AND their use of 4-digit numbers in their answer OR 4-digit numbers used in their answer and 0114 or 0769 seen e.g. Do not use 0000 and 2001 – 9999, OR Use the numbers (000)1 to 2000 Do not allow 'Use numbers less than 2000' if they have numbered the tiles from 0001 to 2000 Allow in any order provided no repeats
10(c) <u>Alternative method:</u> *Statements required:* • *Number the tiles from 0001 to 2000* • *Consider successive 4-digit numbers* • *Divide each number by 2000 and use the remainder to choose a tile* • *Ignore repeats* *(Working in rows would give tiles)* *1205, (000)2, 1924, 1521, (0)735, ~~1205~~,(0)114, 1533 ISW OR* *(Working in columns would give tiles)* *1205,(0)114,(0)377, 1533, (000)2, ~~1533~~, 1098, (0)788 ISW*	*E2* *B1*	*All 4 needed for E2* *E1 for any 2 or 3 correct statements* *Allow (000)1 to 2000* *Allow an equivalent numbering system* *e.g. (000)0 to 1999* *Their numbering system can be implied by the range of numbers they state they will choose from* *Allow this statement to be implied by their numbering of the tiles (from 0001) AND their use of 4-digit numbers in their answer* *OR* *4-digit numbers used in their answer and e.g. 0002, 0735 or 0114 seen* *0000 or remainder of 0 means tile 2000 is chosen* *If (000)0 to 1999 is used, when the remainder is 0, tile 0000 is selected* *Allow in any order provided no repeats*