GCSE MARKING SCHEME

AUTUMN 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.

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

WJEC GCSE MATHEMATICS – NUMERACY

AUTUMN 2023 MARKING SCHEME

GCSE Numeracy **Unit 1: Foundation Tier**	Mark	Comments
1(a) (i) A 3cm by 2cm rectangle drawn so that it is at least 2cm from the back of the house at least 1cm from everything else.	 B1 B1	Penalise -1 once only if the diagram is not a 3cm by 2cm rectangle but is another sized square or rectangle.
1(a)(ii) 6 m^2	B1	Do NOT FT from 'their rectangle' drawn in (a)(i)
1(b)(i) an acute angle	B1	
1(b)(ii) 42° (±2°) drawn at T	B1	Use of overlay NOTE: The angle drawn must be drawn at point T, using the given **horizontal** line. However, do award B1 if they redraw the given diagram and the angle of 42° (±2°) is correct. Award B1 for an angle of 42° (±2°) clearly indicated if they use a vertical line at T or have extended the horizontal line to the left of T (i.e. drawn 138° and then indicated 42°).
1(b)(iii) 180 – 69 111 (°)	M1 A1	Accept 69 + 42 or 21 + 90 or 31 + 80

2(a)

Airport	Number of passengers (to the nearest million)
Cardiff	**2 000 000**
Bristol	9 000 000
Birmingham	**12 000 000**
Exeter	**1 000 000**
Leeds-Bradford	4 000 000

Airport	
Cardiff	
Bristol	()
Birmingham	
Exeter	
Leeds-Bradford	

B1

B1

B1

B3

Answers in the table and pictogram take precedence.

Accept the word million used eg 2 million

Penalise -1 only for **consistent** use of incorrect place value for all 3 values.

Award B3 for all 4 correct entries
Award B2 for 3 correct entries
Award B1 for 2 correct entries

FT 'their values stated in the table'
FT implied use of million (i.e. with incorrect place value given in the 1st table but then used as million in the pictogram)

If a different symbol that is split into 4 is consistently used, then penalise -1 only.
If a different scale used then B0.

2(b)(i) Yes and suitable reason given e.g.

'half of 80 million is 40 million (and 46 086089 is more than 40 million)'
'46 million is more than 40 million (which is half of 80 million)'
'Double 46 million is 92 million (which is more than 80 million)'
'because half is 40000000 so Gatwick had more than half'
'because half of 80000000 is forty million (but Chris was correct because it was 46086089 which is more than half)'
'46086089 million is more than half of eighty million (as 40000000 is half of it)'
'because 46086089 doubled is greater than 80000000'

E1

Allow yes and
'half of 80 is 40'

Do not allow no with a suitable reason e.g.
'No, because half of 80 is 40 and Chris had 46 so he had extra people'
'No, because half of 80 million is 40 million and there was 46 million used in Gatwick'

2(b)(ii) 261 909

B1

2(c) 2508 × 3 or 2508 + 2508 + 2508 or equivalent

7524 (litres)

M1

A1

For 2508 + 2508 + 2508, allow if no addition sign seen but addition is implied award M1.

3(a) (Thursday) 28th (December)	B2	Answer space takes precedence Award B1 for any one of the following (for missing one criteria): • (Friday) 29th (December) • (Saturday) 30th (December) • (Sunday) 31st (December) • (Monday) 4th (December)(earliest possible date)
3(b) (left eye) 1.25 – 0.75 or 0.25 + 0.25 **OR** (right eye) 2.25 – 1.50 or 0.5 + 0.25	M1	Check table for workings. Allow embedded values e.g. 0.75 + **0.5(0)** = 1.25 **OR** 1.50 + **0.75** = 2.25 Allow place value errors e.g. 125 - 75
Right indicated **AND** 0.5 **AND** 0.75 seen	A1	Allow M1A1 if right is indicated and 50 **and** 75 seen (consistent use of non-decimals). If no marks awarded, award SC2 for right indicated and saying has increased by 0.25 or 25 more (than the left one)
3(c) (Cost of eye test) 32 – 0.25 × 32 or equivalent (£)24	M1 A1	If M0A0 award SC1 for (£)8
(Cost of frames) 84 – 1/3 × 84 or equivalent (£) 56	M1 A1	If M0A0 award SC1 for (£)28
(Total cost =) 24 + 56 + 39	M1	FT 'their derived 24' and 'their derived 56' including the use of (£)8 and (£)28
(£)119	A1	Award final A1 only if at least one M1 or SC1 has been awarded **and** there are derived values for both eye test and frames. e.g 8 + 56 + 39 = 103 award M0A0SC1M1A1M1A1. Use of (£)8 and (£)28: 8 + 28 + 39 (=£75) award SC1 SC1 M1 A1 If M0A0 awarded for the last 2 marks, award SC1 for an answer of (£)80 (cost of lenses not included)
3(c) 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.

<table>
<tr>
<td>4. Showing (65%), 60%, 86%, (80%)
OR 65/100, 60/100, 86/100, 80/100
OR 6.5/10, (6/10) 8.6/10, 8/10
OR 0.65, 0.6(0), 0.86, 0.8(0)
OR four correct calculations for a common amount

<table>
<tr><td></td><td colspan="4">Lowest ⟶ Highest</td></tr>
<tr><td>Subject</td><td>English</td><td>Maths</td><td>PE</td><td>History</td></tr>
<tr><td>Result</td><td>6/10</td><td>65%</td><td>80%</td><td>43/50</td></tr>
</table>
</td>
<td>B2

B1</td>
<td>Values may be shown in working or in the table

B2 for all correct % OR all correct decimals
all correct fractions <u>with a common denominator</u>
OR correct work using a common amount
OR a valid combination that allows full comparison
e.g. 6/10 = 60% and 80% = 40/50

B1 for one correct conversion that allows a comparison with another value

Allow any unambiguous indication (e.g. ‘converted values’).
FT ‘their converted values’ only if at least B1 previously awarded

If no marks awarded, award SC1 for any one of the following:
• a correct order of given values i.e. 6/10, 65%, 80%, 43/50 (ignore subjects)
• a correct order of subjects i.e. English, Maths, PE, History (can ignore any values given)</td>
</tr>
<tr>
<td>5. 20 × 25 + 28 × 15 + 17 × 10
(= 500 + 420 + 170)

(£) 1090</td>
<td>M2

A2</td>
<td>M1 for either
• sight of the sum of any 2 unique appropriate products (not multiples of these products)
or
• for sight of 20×25, 28×15 and 17×10

CAO. Answer space takes precedence

FT from M2 or M1 to award A1 for either
• any 2 of 500, 420 and 170 in a correctly evaluated sum of 3 products
or
• sight of 500, 420 and 170

<u>If no marks</u>,
• award SC1 for sight of (Saturday and Sunday interchanged) 17 × 25 + 28 × 15 + 20 × 10
AND
EITHER SC2 for an answer of (£)1045
OR SC1 for one of the following:
• any 2 of 425, 420 and 200 in a correctly evaluated sum of 3 products
• sight of 425, 420 and 200

• award SC1 for sight of (table followed in order used in Venn) 20 × 25 + 17 × 15 + 28 × 10
AND
EITHER SC2 for an answer of (£)1035
OR SC1 for one of the following:
• any 2 of 500, 255 and 280 in a correctly evaluated sum of 3 products
• sight of 500, 255 and 280</td>
</tr>
</table>

6(a) $\frac{90}{360}$ × 540 or ¼ × 540 or 540 ÷ 4 or equivalent 135 (people)	M1 A1	 Answer space takes precedence When repeatedly halving 540, if there are errors, award M0 A0 unless indication that the intention is to divide by 2, e.g. • 540 ÷ 2 = 220 (error) , 220 ÷ 2 = 110 is M1 A0 • 540, 220, 110 is M0 A0
6(b) Angle measured 170(°) ± 2(°) 0.4 × 170(° ± 2°) or equivalent 68(°) or angle in the range 67(°) to 69 (°)	B1 M1 A1	May be seen on the pie chart FT for 'their angle, provided 90° < 'their angle' < 180° Any method of repeated addition must **clearly** be addition to 40% Only allow angles in this range provided not from incorrect working Answer space takes precedence Allow A1 for labelled angle on the pie chart if no **final** answer given. On FT, using 'their 170', allow angles correctly rounded or truncated to the nearest degree
6(c) 540 − $\frac{7}{10}$ × 540 or (1 - $\frac{7}{10}$) × 540 or $\frac{3}{10}$ × 540 162 (not children)	M1 A1	For complete method Answer space takes precedence If no marks, award SC1 for sight of ($\frac{7}{10}$ × 540 =) 378

7(a)(i) 2.4 (kg)	B2	Answer space takes precedence B1 for any one of the following: • attempt to multiply 200 by 12 which may include a place value error, or equivalent shown as repeated addition, e.g. 2 × 12, 20 × 12, 2000 × 12, …. • sight of 2400 in working • an answer of 2400 • $\frac{48}{4} \times 200$ • 2kg 400g
7(a)(ii) 1 : 8 : 2	B2	Answer space takes precedence If units (g) are included then B1 only. B1 for sight of any one of the following (ignoring inclusion of 'g'): • 25 : 200 : 50 • 5 : 40 : 10 • equivalent multiple of the ratio 1 : 8 : 2 • a ratio involving 1, 8 and 2 in an incorrect order
7(b)(i) 6 g	B1	
7(b)(ii) (Daily recommendation =) 0.8 × 70 56 (g) 25 (%)	M1 A1 A2	Allow if embedded in further incorrect working only if this working includes the use of '14' Ignore any incorrect unit given, e.g. % or kg FT $\frac{14}{\text{'their 0.8 × 70'}}$ for possible A2 or A1 On FT allow rounding or truncation of the final percentage A1 for one of the following: • the fraction $\frac{14}{56}$ or $\frac{7}{28}$ or $\frac{1}{4}$ • a clear full method finding percentages of 56(g) clearly working towards 14(g)

8(a) ($\frac{1}{5}$ is \$40, total amount of gift is) 40 × 5 or 40 ÷ $\frac{1}{5}$	M1	Ignore \$ written as £ or €, etc
($)200	A1	ISW
(Amount gifted to animal charity is ¼ × 200) ($)50	B1	FT ¼ × 'their 200' correctly evaluated, provided • 'their 200' ≠ 40 • 'their 200' ≠ 200 – 40 (= 160) Allow FT 'their 200' = 8 *(see note below)*
(Gift to medical research is) ($) 200 – 40 – 50	M1	FT 'their derived 200' – 40 – 'their 50', provided > 0
($) 110	A1	FT provided both M marks previously awarded *If no marks, award SC1 for* *(40 – 1/5 × 40 – ¼ × 40 = 40 – 8 – 10 =) ($)22*
8(a) <u>Alternative method</u> *(Total amount of gift is) 40 × 5 or 40 ÷ $\frac{1}{5}$*	*M1*	*Ignore \$ written as £ or €, etc*
($)200	*A1*	*ISW*
(Proportion given to medical charity) *(1 – $\frac{1}{5}$ – $\frac{1}{4}$ =)* $\frac{11}{20}$ *or (1 – 0.2 – 0.25 =)* 0.55 *or (100 – 20 – 25 =)* 55 (%)	*B1*	*Allow for proportion given to children's and animal charity clearly shown as* $\frac{9}{20}$ *, 0.45 or 45 (%)*
(Gift to medical research is) $\frac{11}{20}$ × 200 *or 200 –* $\frac{9}{20}$ × 200	*M1*	*FT 'their incorrectly evaluated 1 –* $\frac{1}{5}$ – $\frac{1}{4}$ *' or* *'their incorrectly evaluated* $\frac{1}{5}+\frac{1}{4}$ *as appropriate and 'their derived 200', provided* • *'their 200'* ≠ 40 • *'their 200'* ≠ 200 – 40 (= 160) *Allow FT 'their 200' = 8*
($) 110	*A1*	*FT provided both M marks previously awarded*

8(b) Sight of 30 000 – 10 000 or 20 000 (30 000 – 10 000) × 0.22 or 20 000 × 0.22 or equivalent ($) 4400	 B1 M1 A1	Ignore incorrect units given throughout Any repeated addition method of 10% and 1% must clearly show addition to 22% CAO. Mark final answer
9(a) 209° ± 2°	B1	Answer space takes precedence
9(b)(i) Answer in the range 21 (km) to 25 (km)	B1	Answer space takes precedence
9(b)(ii) Correct interpretation of the map scale, e.g. • 1 cm represents 25 000 cm or 250 m • 2 cm represents 50 000 cm or 500 m or 0.5 km • 4 cm represents 100 000 cm or 1 000 m or 1 km OR Correct conversion 12 km to cm, 25 000 cm to km or equivalent, e.g. • (12 km =) 1 200 000 (cm) • (25 000 cm =) 0.25 (km) • sight of 1200 and 25 • sight of 12 and 0.25 12 ÷ 0.25 or 12 × 4 or 1 200 000 ÷ 25 000 or 1 200 ÷ 25 or equivalent 48 (cm)	B1 M1 A1	 Ignore place value error, e.g. 12 ÷ 'their number with digits 25', 12 × 'their number with digit 4' CAO
9(b)(ii) <u>Alternative method</u> *(Original map scale is 3 cm : 12 km =)* *3 : 1 200 000 or 1 : 400 000 or equivalent* $\frac{400\,000}{25\,000}$ × 3 or 16 × 3 or equivalent *48 (cm)*	*B1* *M1* *A1*	 *Ignore errors in place value* *CAO*

GCSE MARKING SCHEME

AUTUMN 2023

GCSE
MATHEMATICS – NUMERACY
UNIT 2 – FOUNDATION TIER
3310U20-1

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AUTUMN 2023 MARKING SCHEME

GCSE Numeracy **Unit 2: Foundation Tier**	Mark	Comments
1(a) **No and** suitable reason given e.g. 'because on Friday he walked less than 10000 steps' 'because Friday is (only) 9754' 'because Friday is below 10000'	E1	Ignore spurious comments if No indicated and an appropriate reason is given. Allow the following with **no** indicated: 'because Friday is less' 'didn't walk 10000 on Friday' 'Friday didn't walk to 10000' 'Friday didn't achieve 10000' 'The first 4 days he did but the last day he only got a 4-digit number' 'because Friday was 9000' Do not allow 'Yes' indicated with a reason e.g. 'Glen has achieved his target' 'Friday is nearly 10000' 'he has achieved at least 10000 steps because 9754 is closer to 10000 than 9000 if rounded up'
1(b) 8285 (steps)	B2	Allow embedded answers such as 58285 – 8285 = 50000 Award B1 for any one of the following: • 10672 + 13586 + 12341 + 11932 + 9754 – 50000 • subtracting 50000 from an attempt at adding the 5 given values • 58285 – 50000 • 58285
1(c) 13600	B1	
2(a)(i) 08:22 or 8:22 (a.m)	B2	Allow 08:22 a.m Allow 08:22 – 08:47 as an indication that it is the 08:22 train from Bridgend. Allow indication that it is the train that **arrives** at Cardiff at 08:47 or **arrives** at Cardiff at 8:47 (a.m) Award B1 for • (0)8:22 p.m • sight of (0)8:50 (a.m) • (0)8:47 (a.m) (i.e. doesn't state that it arrives at Cardiff at (0)8:47 a.m) • (0)8:57 (a.m)

2(a)(ii) (0)8:26 (a.m.) AND 28 mins	B3	Answer lines take precedence Workings may be seen in or by the table If B3 not awarded: Award B2 for: • (0)8:26 (a.m.) • 28 mins • If both answer lines are incorrect or no answer is given, then award B2 for sight of all 4 times for the length of journey with up to **one error** (i.e. 4 correct or 3 correct and 1 incorrect) OR 3 correct times for the length of journey with **one omission**. Award B1 for any one of the following seen: • (0)7:43 (a.m.) AND 25 mins • (0)7:53 (a.m.) AND 20 mins • (0)8:22 (a.m.) AND 25 mins • (0)8:26 p.m.
2(b) (Caz's Café = (£2.49 + 95p + 80p) × 5 or equivalent (£)21.2(0) (Simon's Sandwiches 3.50 × 5 =) (£)17.5(0) (Saving 21.20 – 17.50 =) (£)3.7(0)	 M1 A1 B1 B1	Treat use of 7 days as a misread. (4.24 × 5) If M0 A0 award SC1 for sight of (£)4.24 FT 'their **stated or derived** 21.20' – 'their **stated or derived** 17.50' provided at least one mark previously awarded and not any value given in the question used and 2 costs have been stated or calculated and the saving is > 0. Misuse of units can be penalised in OCW
2(b) Alternative method *(Saving per day) (£)2.49 + 95(p) + 80(p) – (£)3.5*(0) *74(p) or (£)0.74* *(Savings for the week) 5 × 74(p)* *(£)3.7*(0)	 *M1* *A1* *M1* *A1*	*Treat use of 7 days as a misread.* *(£)4.24 – (£)3.50* *Allow for sight of 0.74 or 74* *If M0 A0 award SC1 for appropriate sight of (£)4.24* *FT 5 × 'their 74(p)' provided M1 previously awarded* *Misuse of units can be penalised in OCW*
2(b). 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.

3(a)(i) (For Aber to Cwm:) 6 (miles) (5.9 to 6.1)	B2	For B2, FT 'their distance measured' × 0.5 correctly evaluated provided the distance is in the range 11.8 to 12.2 cm Award B1 for: • distance measured as 12(cm) (±2mm) • 'their **stated** distance measured outside the range 11.8 to 12.2 cm' × 0.5 correctly evaluated
3(a)(ii) (For Aber to Borth to Dinas:) 4 (miles) (3.8 to 4.2)	B2	FT 'their distance measured' × 0.5 correctly evaluated provided the distance is in the range 7.6 to 8.4 cm Award B1 for: • Total distance measured as 8(cm) (±4mm) • 2 distances seen as 3(cm) (±2mm) AND 5(cm) (±2mm) • 'their **stated** distance measured outside the range 7.6 to 8.4 cm' × 0.5 correctly evaluated • 1.5 (miles) or 2.8 to 3.2(cm) × 0.5 correctly evaluated (for Aber to Borth) • 2.5 (miles) or 4.8 to 5.2 (cm) × 0.5 correctly evaluated (for Borth to Dinas)

3(b) (Perimeter=) 106 + 68 + 106 + 68 or equivalent 348 (m) 5000 ÷ 348 or 348 × 15 or 348 × 14 15 (laps)	M1 A1 M1 A2	 Division may be seen as repeated addition/subtraction or repeated trials. Allow 348 × 13 (= 4524) Allow 348 × 16 (= 5568) FT 'their derived perimeter' including partial perimeter but not use of 106 or 68 Use of area gains no marks Accept a unique embedded answer for A2 or A1 e.g. Award A2 if only 348 × 15 = 5220 seen e.g. Award A1 if only 348 × 14 = 4872 seen Award A1 if both 348 × 15 = 5220 AND 348 × 14 = 4872 seen with **no** final answer given for the number of laps. Award A1 for 14 or 14.4 or 14.37 or 14.3(6…..) or 14.5 seen. FT 5000 ÷ 'their 348' for possible A2 or A1. On FT, award A2 provided they have rounded **up** to the nearest whole number. Otherwise award A1 for a correctly evaluated answer for 5000 ÷ 'their 348' without rounding up. If on FT the answer is a whole number with no rounding required award A1 only. <u>For use of partial perimeter of 174cm</u> 5000 ÷ 174 = 29 laps award M0A0M1A2 5000 ÷ 174 = 28.7… award M0A0M1A1 If trials used (apply in line with the MS above): • For 174 × 29 = 5046 Award M0A0M1A2 • For 174 × 28 = 4872 Award M0A0M1A1 • For 174 × 27 (= 4698) Award M0A0M1A0 • For 174 × 30 (= 5220) Award M0A0M1A0 Note: if 4872 seen from repeated addition but 28 laps not seen award M0A0M1A0 (need a value for the number of laps or an embedded value of the number of laps)
4. (22.5 (cm) ÷ 2·5) 9 (inches) 9 × 3.75 + 2.25 36 **and** no indicated	 B1 M1 A1	Ignore any incorrect units given. Workings may be on the diagram. May be implied FT 'their derived 9' provided ≠ 22.5 FT appropriate response from 'their 9' Allow rounded or truncated answers on FT with the appropriate response.
<u>4. Alternative method</u> *((37 – 2.25) ÷ 3.75 =) 9.2(6…..)* *9.2(6..) × 2.5* *23(.16666….) **and** no indicated*	 *B1* *M1* *A1*	*Ignore any incorrect units given.* *Workings may be on the diagram.* *May be implied. Rounded or truncated* *FT 'their derived 9.2(6….).' provided ≠ 37* *Accept answers in the range 23 to 23.25*

5.		Penalise -1 once only if incorrect units given Note: All parts need to be looked at as final answer does not imply all 4 marks
3 × 1000(g) and 2 × 600(g) and 4 × 175(g) (3000 and 1200 and 700)	M1	Allow mixed units for M1
4900 (g) or 4.9 (kg)	A1	CAO. This may be implied by sight of 5180 or 5.18
(4900 + 280 or 4.9 + 0.28 =) 5180 (g) or 5.18 (kg)	B1	FT 'their 4.9kg or 4900g' provided M1 awarded and at least 2 of 3000 and 1200 and 700 have been added to 280
(£)22.90	B1	FT 'their total mass' for costs of signed and 1st class including if mass of box omitted. (Note: cost for 4.9kg without box is £16.85) Unsupported answer of (£)22.90 award final B1 only Award M2A0B1 for 3000 + 1200 + 700 + 280 seen but not the final mass and state costs as £22.90, Award M1A1B0B1 for mass as 4900g or 4.9kg and box not added on but write the costs as (£)22.90 or (£)16.85. For working with individual costs of the total mass of each type of candle and do not consider the box, M1 can be awarded plus: Award SC1 for final answer of (£)33.87 (from 16.85 + 10.02 + 7) For working with individual costs for each individual candle plus a box for each candle (the mass of each candle & box not given) Award SC2 for (6 x £7 + 3 x £10.02 =) (£)72.06 OR Award SC1 for 6 x £7 + 3 x £10.02 For working with the costs for each individual candle (mass of the candles not given) and no marks awarded (M0A0B0B0), award SC1 for (9 × £7=) (£)63
5. Alternative method for those adding the mass of the box initially		*Penalise -1 once only if incorrect units given* *Note: All parts need to be looked at as final answer does not imply all 4 marks*
3 × 1000(g) + 2 × 600(g) + 4 × 175(g) + 280(g) *(3000 + 1200 + 700 + 280)*	*M2*	*Allow mixed units for M1 or M2.* *Award M1 for one of the following:* • *a sum of 3 out of the 4 terms with one of the 3 being 280g.* • *sum of 4 terms with one **product** incorrect*
5180 (g) or 5.18 (kg)	*A1*	*FT from M1 only for their correctly evaluated sum*
(£)22.90	*B1*	*FT 'their total mass' for costs of signed and 1st class* *Unsupported answer of (£)22.90 award final B1 only*

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

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

9(a) (Sale price) 45 – 0.18 × 45 or 45 × (1 – 0.18) or 45 – 8.1(0) or 45 × 0.82 (£)36.9(0)	M1 A1	 May be seen or implied in further working
(Maggie's mum pays) 8 × 36.9(0) ÷ (8 + 1) or 36.9(0) – 36.9(0) ÷ (8 + 1) 8 × 4.1(0) or 36.9(0) – 4.1(0) (£)32.8(0)	M1 A1	FT 'their £36.90' On FT allow rounded or truncated to a penny
9(a) Alternative method *(Maggie's mum's share of original price)* *8 × 45 ÷ (8 + 1) or 45 – 45 ÷ (8 + 1)* *(£) 40*	*M1* *A1*	 *May be seen or implied in further working*
(Maggie's mum pays) *40 – 0.18 × 40 or 40 × (1 – 0.18)* *or 40 – 7.2(0) or 40 × 0.82* *(£)32.8(0)*	*M1* *A1*	*FT 'their £40'* *On FT allow rounded or truncated to a penny*
9(b) (Area) ½ × 1.5 × (3.1 + 4.5) 5.7 (m^2)	M1 A1	 Accept rounding to 6 (m^2) May be seen or implied in further working
(Charge) 2.5(0) × 5.7 (£) 14.25	M1 A1	FT 'their 5.7' (including if previously rounded to 6), including if 'their 5.7' is not an area Allow if 'their area' is costed in parts provided there is an attempt to sum all of the part costs, provided 'their 5.7' ≠ 1.5, 3.1 or 4.5 CAO
10(a) a = 54° b = 54° c = 78°	 B1 B1 B1	Answer spaces take precedence, if blank check the diagram FT 'their a' FT 132 – 'their a' or 132 – 'their b'
10(b) (10 ×) 29 × 30 ÷ 12 or equivalent or for an answer of 72.5 725 (mm)	M2 A1	Allow embedded with an incorrect change of units Allow (10 ×) 2.4(16…) × 30 M1 for any one of the following: • 30 ÷ 12 (= 2.5) • 29 ÷ 12 (= 2.4166…) • sight of 2.4, 2.41, 2.416(6…) or 2.42 • sight of (1 inch =) 2.5 (cm) Answer space takes precedence Allow answers in the range 720 (mm) to 726 (mm) from premature approximation, not from incorrect working
11(a) 8 × 1172 ÷ 5 or 1172 × 1.6 1875.2 (km)	M1 A1	Do not allow 1172 × 1.5 Accept 1875 (km) from correct working Answer space takes precedence
11(b) 0.366 × 1000 ÷ 60 6.1 (m/s)	M1 A1	 Accept 6 (m/s) from correct working Answer space takes precedence

GCSE MARKING SCHEME

AUTUMN 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 GCSE MATHEMATICS – NUMERACY

AUTUMN 2023 MARKING SCHEME

GCSE Numeracy **Unit 1: Intermediate Tier**	Mark	Comments
1(a) $\frac{3}{10}$	B2	Mark final answer B1 for $\frac{15}{50}$ or $\frac{30}{100}$
1(b) 20 × 25 + 28 × 15 + 17 × 10 (= 500 + 420 + 170)	M2	M1 for either • sight of the **sum** of any 2 unique appropriate products (not multiples of these products) or • for sight of 20×25, 28×15 and 17×10
(£) 1090	A2	CAO. Answer space takes precedence FT from M2 or M1 to award A1 for either • any 2 of 500, 420 and 170 in a correctly evaluated sum of 3 products or • sight of 500, 420 and 170 **<u>If no marks</u>**, • award SC1 for sight of (Saturday and Sunday interchanged) 17 × 25 + 28 × 15 + 20 × 10 **AND** EITHER SC2 for an answer of (£)1045 OR SC1 for one of the following: • any 2 of 425, 420 and 200 in a correctly evaluated sum of 3 products • sight of 425, 420 and 200 • award SC1 for sight of (table followed in order used in Venn) 20 × 25 + 17 × 15 + 28 × 10 **AND** EITHER SC2 for an answer of (£)1035 OR SC1 for one of the following: • any 2 of 500, 255 and 280 in a correctly evaluated sum of 3 products • sight of 500, 255 and 280

2(a) $\frac{90}{360}$ × 540 or ¼ × 540 or 540 ÷ 4 or equivalent	M1	
135 (people)	A1	Answer space takes precedence When repeatedly halving 540, if there are errors, award M0 A0 unless indication that the intention is to divide by 2, e.g. • 540 ÷ 2 = 220 (error) , 220 ÷ 2 = 110 is M1 A0 • 540, 220, 110 is M0 A0
2(b) Angle measured 170(°) ± 2(°)	B1	May be seen on the pie chart
0.4 × 170(° ± 2°) or equivalent	M1	FT for 'their angle, provided 90° < 'their angle' < 180° Any method of repeated addition must **clearly** be addition to 40%
68(°) or angle in the range 67(°) to 69 (°)	A1	Only allow angles in this range provided not from incorrect working Answer space takes precedence Allow A1 for labelled angle on the pie chart if no **final** answer given. On FT, using 'their 170', allow angles correctly rounded or truncated to the nearest degree
2(c) 540 $-\frac{7}{10}$ × 540 or (1 - $\frac{7}{10}$) × 540 or $\frac{3}{10}$ × 540	M1	For complete method
162 (not children)	A1	Answer space takes precedence If no marks, award SC1 for sight of ($\frac{7}{10}$ × 540 =) 378

3(a)(i) (1 ×) $\frac{10}{4}$ × 1000 or 1000 × 10 ÷ 4 or 1000 × 2.5 or equivalent 2500 (cm^3)	M2 A1	M1 for appropriate sight (that need not be within a product) of any one of the following: • 2.5 (may be seen in the answer space) • $\frac{10}{4}$ • 10 ÷ 4 • (1 litre =)1000 (cm^3) • sight of digits 25 with incorrect place value CAO. Answer space takes precedence
3(a)(ii) 2.4 (kg)	B2	Answer space takes precedence B1 for any one of the following: • attempt to multiply 200 by 12 which may include a place value error, or equivalent shown as repeated addition, e.g. 2 × 12, 20 × 12, 2000 × 12, …. • sight of 2400 in working • an answer of 2400 • $\frac{48}{4}$ × 200 • 2kg 400g
3(a)(iii) 1 : 8 : 2	B2	Answer space takes precedence If units (g) are included then B1 only. B1 for sight of any one of the following (ignoring inclusion of 'g'): • 25 : 200 : 50 • 5 : 40 : 10 • equivalent multiple of the ratio 1 : 8 : 2 • a ratio involving 1, 8 and 2 in an incorrect order
3(a)(iv) Sight of a suitable division, e.g. • 400 ÷ 28 • 400 ÷ 25 • 400 ÷ 30 • 390 ÷ 30 Answer in the range 13 to 16	M1 A1	Allow if written a s a fraction rather than as a division Must be from sight or attempt at a suitable division or unsupported Allow an answer in the range from sight of repeated addition or multiplication (that may include rounding within additions)
3(b)(i) 6 g	B1	
3(b)(ii) (Daily recommendation =) 0.8 × 70 56 (g) 25 (%)	M1 A1 A2	Allow if embedded in further incorrect working only if this working includes the use of '14' Ignore any incorrect unit given, e.g. % or kg FT $\frac{14}{\text{'their } 0.8 \times 70'}$ for possible A2 or A1 On FT allow rounding or truncation of the final percentage A1 for one of the following: • the fraction $\frac{14}{56}$ or $\frac{7}{28}$ or $\frac{1}{4}$ • a clear full method finding percentages of 56(g) clearly working towards 14(g)

4(a) ($\frac{1}{5}$ is \$40, total amount of gift is) 40 × 5 or 40 ÷ $\frac{1}{5}$	M1	Ignore \$ written as £ or €, etc
($)200	A1	ISW
(Amount gifted to animal charity is ¼ × 200) ($)50	B1	FT ¼ × 'their 200' correctly evaluated, provided • 'their 200' ≠ 40 • 'their 200' ≠ 200 – 40 (= 160) Allow FT 'their 200' = 8 *(see note below)*
(Gift to medical research is) ($) 200 – 40 – 50	M1	FT 'their derived 200' – 40 – 'their 50', provided > 0
($) 110	A1	FT provided both M marks previously awarded *If no marks, award SC1 for* *(40 – 1/5 × 40 – ¼ × 40 = 40 – 8 – 10 =) ($)22*
4(a) <u>Alternative method</u> *(Total amount of gift is) 40 × 5 or 40 ÷ $\frac{1}{5}$*	*M1*	*Ignore \$ written as £ or €, etc*
($)200	*A1*	*ISW*
(Proportion given to medical charity) *(1 – $\frac{1}{5}$ – $\frac{1}{4}$ =)* $\frac{11}{20}$ *or (1 – 0.2 – 0.25 =)* 0.55 *or (100 – 20 – 25 =)* 55 (%)	*B1*	*Allow for proportion given to children's and animal charity clearly shown as* $\frac{9}{20}$ *, 0.45 or 45 (%)*
(Gift to medical research is) $\frac{11}{20}$ × *200* *or 200* – $\frac{9}{20}$ × *200*	*M1*	*FT 'their incorrectly evaluated 1 –* $\frac{1}{5}$ – $\frac{1}{4}$ *' or* *'their incorrectly evaluated* $\frac{1}{5}+\frac{1}{4}$ *as appropriate* *and 'their derived 200', provided* • *'their 200'* ≠ 40 • *'their 200'* ≠ 200 – 40 (= 160) *Allow FT 'their 200' = 8*
($) 110	*A1*	*FT provided both M marks previously awarded*
4(a) Organisation and communication	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanations and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Writing	W1	For W1, candidates will be expected to: • show all their working • make few, if any, errors in spelling, punctuation and grammar • use correct mathematical form in their working • use appropriate terminology, units, etc.

4(b) Sight of 30 000 – 10 000 or 20 000 (30 000 – 10 000) × 0.22 or 20 000 × 0.22 or equivalent ($) 4400	 B1 M1 A1	Ignore incorrect units given throughout Any repeated addition method of 10% and 1% must clearly show addition to 22% CAO. Mark final answer
5(a) 209° ± 2°	B1	Answer space takes precedence
5(b)(i) Answer in the range 21 (km) to 25 (km)	B1	Answer space takes precedence
5(b)(ii) Correct interpretation of the map scale, e.g. • 1 cm represents 25 000 cm or 250 m • 2 cm represents 50 000 cm or 500 m or 0.5 km • 4 cm represents 100 000 cm or 1 000 m or 1 km OR Correct conversion 12 km to cm, 25 000 cm to km or equivalent, e.g. • (12 km =) 1 200 000 (cm) • (25 000 cm =) 0.25 (km) • sight of 1200 and 25 • sight of 12 and 0.25 12 ÷ 0.25 or 12 × 4 or 1 200 000 ÷ 25 000 or 1 200 ÷ 25 or equivalent 48 (cm)	B1 M1 A1	 Ignore place value error, e.g. 12 ÷ 'their number with digits 25', 12 × 'their number with digit 4' CAO
5(b)(ii) <u>Alternative method</u> *(Original map scale is 3 cm : 12 km =)* *3 : 1 200 000 or 1 : 400 000 or equivalent* $\frac{400\,000}{25\,000}$ × 3 or 16 × 3 or equivalent *48 (cm)*	*B1* *M1* *A1*	 *Ignore errors in place value* *CAO*

6(a)(i) Correct statement of Pythagoras' theorem • (Height^2 =) $50^2 - (60 \div 2)^2$ • (Height^2 =) $50^2 - 30^2$ • 50^2 = height^2 + $(60 \div 2)^2$ • 50^2 = height^2 + 30^2	M1	<u>Clear indication that all measurements have been converted to 3cm, 5cm, 4cm may be awarded all marks</u>
Correct stage of evaluation • (Height^2 =) 2500 – 900 • (Height^2 =) 1600 • sight of $\sqrt{1600}$ • (Height =) $\sqrt{(50^2 - 30^2)}$	A1	Working must be seen Allow M1 A1 for a slip in the initial notation then corrected at this evaluation stage
(Height =) $\sqrt{1600}$ (Height = 40 mm) or Height^2 = 1600 (Height = 40 mm) or $1600 = 40^2$ (Height = 40 mm)	A1	Mark final answer A0 for an incorrect statement, e.g. $\sqrt{1600} = 40^2$
6(a)(i) <u>Alternative method 1</u> *Identifies the relationship '3, 4, 5' and relates to the given (right-angled) triangle, e.g. sight of* • *3, 4, 5 and 30(mm), 40(mm), 50(mm)* • *3**cm**, 4**cm**, 5**cm*** • *3, 4, 5 and '× 10'* • *30, 40, 50 and '÷ 10'* ***AND** a statement or conclusion, e.g.* • *Pythagorean triple* • *Right-angled triangle* • *3, 4, 5 triangle means it would be 30, 40, 50 triangle*	*B3*	*For B3 there **must** be an accompanying statement or conclusion* *B2 for identifying the relationship '3, 4, 5' and relates to the given(right-angled) triangle* • *without a conclusion or statement, or* • *with an incorrect conclusion or statement* *B1 for sight of any one of the following:* • *'3, 4, 5'* • *30 (mm) and 40 (mm) appropriately indicated on the diagram* • *A **right-angled** triangle drawn (with or without 90° indicated) appropriately labelled 30 (mm), 40 (mm) and 50 (mm)*
6(a)(i) <u>Alternative method 2</u> *Assuming height as 40mm with use of 50mm or 30mm within a correct statement of Pythagoras' Theorem, e.g.* • *((½ base)^2 =) $50^2 - 40^2$* • *$50^2 = 40^2 + x^2$* • *((hypotenuse)^2 =) $40^2 + 30^2$*	*M1*	*<u>Clear indication that all measurements have been converted to 3cm, 5cm, 4cm may be awarded all marks</u>*
Correct stage of evaluation, e.g. • *((½ base)^2 = $50^2 - 40^2$ =) 900* • *(½ base =) $\sqrt{900}$* • *((hypotenuse)^2 = $40^2 + 30^2$ =) 2500* • *(hypotenuse =) (½ base =) $\sqrt{2500}$*	*A1*	*Working must be seen*
Appropriate full evaluation, e.g. • *(½ base =) 30 (mm)* • *(hypotenuse =) 50 (mm)*	*A1*	*Mark final answer*
6(a)(ii) (Volume) ½ × 60 × 40 × 20 or equivalent	M2	M1 for sight of area of X-section possibly in stages, ½ × 60 × 40 or ½×30×40 + ½×30×40 (= 1200 mm^2)
24 000 (mm^3) (> 20 000 mm^3)	A1	CAO

6(b) Sight of or implication that: 5 × number of people + 105 = 207 + 3 × number of people or 5x + 105 = 207 + 3x (5 – 3) × number of people = 207 – 105 or number of people = $\frac{207-105}{5-3}$ or 5x – 3x = 207 – 105 or 2x = 102 51 (people)	M1 m1 A1	Implication includes attempt to balance costing for the same number of people ≥ 3 at each venue, e.g. • (10 people) 5 × 10 + 105 with 207 + 3 × 10 • (110, 115,) 120 with (210, 213,) 216 Includes correctly evaluated trial to attempt to balance costing for the same number of people at each venue provided 'their trial for 30 ≤ the number of people ≤ 70', e.g. correct costing for both venues for 40 people as (FH) (£)305 and (ML) (£)327 From M1, allow 1 slip in the rearrangement of 'their equation' provided 'their equation' is then simplified to ax = b, where a ≠ 0 and b ≠ 0 Sight of cost (£)360 for each venue implies M1 m1 CAO If no marks, award SC1 for finding the number of (whole) people for the same cost at each venue, provided the cost is > (£) 220
7. (4(.)40 ÷ 3.3) × 9 ÷ 10 (= $\frac{4(00)}{3} \times \frac{9}{10}$) or ($\frac{9}{10}$ × 4(.)40) ÷ 3.3 (= $\frac{3.96}{3.3}$) or 4 × $\frac{9}{10}$ ÷ 3 (= $\frac{3.60}{3}$) or equivalent full method (£)1.2(0) or 120(p)	M2 A2	<u>Accept equivalent in pence throughout</u> M1 for any one of the following or equivalent: • (1kg Sparkle costs) 4(.)40 ÷ 3.3 (= $\frac{4(00)}{3}$) • (3.3kg Dazzle costs) $\frac{9}{10}$ × 4(.)40 (= 3(.)96) • (3kg Dazzle costs) 4 × $\frac{9}{10}$ (= 3(.)60) • (3kg Sparkle costs) 4(.)00 CAO. If units are given they must be correct Do not award A2 or A1 from incorrect working Award A1 (from M1 or M2) for any one of the following: • (1kg Sparkle costs) $\frac{4(00)}{3}$ or 1.33(…) or 133.(..) • (3.3kg Dazzle costs) 3(.)96 • (3kg Dazzle costs) 3(.)60 Award A1 (from M2) for a correctly evaluated FT, with final answer rounded or truncated to a penny, for any one of the following: • 'their 4(.)40 ÷ 3.3' × $\frac{9}{10}$ • 'their $\frac{9}{10}$ × 4(.)40' ÷ 3.3 • 'their 4 × $\frac{9}{10}$' ÷ 3

8(a)(i) (2.5, 42) stated with a suitable line of best fit drawn through this point	B2	For B2 do not ignore the answer space stating an incorrect point, or giving reverse coordinates Conditions of a suitable line of best fit: • The straight line (accept intention if a ruler is not used) must have points above and below it • The line must be of sufficient length, to illustrate trend for at least 6 points • The trend shows that there are points above and below the line towards each end of the line For B2 the point (2.5, 42) **must** be stated or plotted with a suitable line of best fit through this point. If (2.5, 42) is not stated or plotted, then it is only possible to award a maximum of B1 Allow B2 for one of the following: • a blank answer space with (2.5, 42) plotted with a suitable line of best fit through (2.5, 42) • (2.5, 42) stated in the answer space, but not plotted, with suitable line of best fit passing through (2.5, 42) B1 for sight of any one of the following: • (2.5, 42) stated in the answer space • blank answer space with (2.5, 42) indicated by a correct plot • A suitable line of best fit for the given points: o with no additional point plotted o passing through 'their additional incorrect point' (plotted) o suitable if 'their additional incorrect point' plotted is ignored
8(a)(ii) Reading from line of best fit for number of cups (tolerance to the nearest gridline) for rainfall of 2.0 mm	B1	Answer space takes precedence **STRICT FT** from (a)(i) 'their line of best fit' which must be drawn for negative correlation No mark is awarded if no line of best fit drawn in (a)(i)
8(b) $5 \times 18 + 5 \times 0.5$ or 18.5×5 92.5 (cm)	M1 A1	Allow for $18 <$ 'their 18.5' ≤ 19 CAO If no marks, award SC1 for sight of 18.5 (cm) or 18.4999(... cm) provided clearly a recurring 9 digit
8(c) Selects or unambiguously implies 'No' with a reason, e.g. '(Space) minimum 97.25 (cm) (which is less than 97.3 cm)'	E1	Allow 'No' with a reason, e.g. '97.25 (cm)' '(least) 97.25 and (greatest) 97.75' Do not accept 'No' with the reason, e.g. '97.75 (cm)'

9(a)(i) Entries 146 and 160 in the table and the cumulative frequency diagram completed correctly (correct plots (11, 146) and (13, 160) and all plots joined)	B2	B1 for any one of the following: • 146 and 160 in the table, correct plots but **not** joined • 146 and 160 in the table, with one correct plot and one incorrect plot in completing the **cumulative** frequency diagram with plots joined • one error in the table, including FT 'their 146' + 14 and these **cumulative** entries used correctly to complete the **cumulative** frequency diagram with plots joined • correct cumulative frequency diagram with plots joined, with incorrect, incomplete or not attempted entries in the table
9(a)(ii) 8.2 to 8.4 (minutes)	B1	Answer space takes precedence Allow 8 minutes 12 seconds to 8 minutes 24 seconds FT reading from the graph for 'their median', from ½ × 'their 160', provided 'their 160' ≥ 110, with a tolerance of ½ small square from 'their **cumulative** frequency graph', provided it is possible to read 'their median' from the vertical axis on the graph paper provided
9(a)(iii) 7.2 minutes	B1	Answer space in the statement takes precedence, if blank award for indication of '7.2' (circled) in the list Allow '7' in the answer space provided 7.2 indicated in the list Do not accept '8' in the answer space if 7.2 indicated in the list
9(a)(iv) $\frac{20}{160}$ (× 100) or $\frac{1}{2}$ × 25 (%) or equivalent 12.5 (%) or 12½ (%)	M1 A1	FT for (100 ×) 20/'their 160', provided 'their 160'> 106 On FT allow rounding or truncation to 1 decimal place
9(b) (Costs are 180 + 220) (£) 400 **AND** (Profit is 700 – 180 – 220) (£) 300 **OR** (Receipts / Costs =) $\frac{700}{400}$ (× 100) (Percentage profit is) $\frac{300}{400}$ (× 100) or $\frac{700}{400}$ (× 100) – 1 (× 100) 75 (%)	B1 M1 A1	May be embedded, e.g. 700 – 400 = 300 (= 1.75 or 175%) FT 'their 400' and 700 – 'their 400' provided their costs or profit are ≠ 180, ≠ 220 and ≠ 700 CAO Allow if all costs and the total are consistently multiplied by 3.
9(c) 8(.)40 ÷ 1(.)20 or 8(.)40 – 8(.)40 ÷ 6 or equivalent (£) 7 or 700 (p)	M1 A1	Accept a **complete** and **convincing** method of trial and improvement If units are given they must be correct Sight of 7 + 1.40 = 8.40 is awarded M1 A0 unless (£)7 is selected

10(a)(i) King Edward and 90(g)	B1	

10(a)(ii) (90 – 52 =) 38(g)	B2	Do not award from sight of any incorrect working
		
		B1 for sight of any of the following:
		• 52 **and** 90
		• Sight of 90 and 50 < 'their lowest mass' ≤ 54 **and** 90 – 'their lowest mass' correctly evaluated
		• Answer of 35(g) **and** unambiguous selection of
		  ○ (King Edward) 98 and 63 or
		  ○ (Desiree) 88 and 53

10(b) Selects: Desiree, **and** Interquartile range **and** less than for the other 2 varieties	E1	
11. (Width of poster) $2 \times \frac{26.4}{2.4}$ or 2×11 or equivalent 22 (cm) (Perimeter of poster $2 \times (22 + 26.4) =$) 96.8 (cm) 100 (cm)	M1 A1 A1 B1	 Mark final answer for the width of the poster FT 'their 22' provided M1 previously awarded FT provided 95 < 'their 96.8' <100, as 100 correct to 1 significant figure Accept working in mm or m, units must then be given in the final answer Do not accept an unsupported answer of 100 (cm)
11. Alternative method *(Perimeter of stamp) 8.8 (cm)* ***AND*** *sight of* $\frac{26.4}{2.4}$ *(= 11) or* $\frac{2.4}{26.4}$ *(=* $\frac{1}{11}$*)* *(Perimeter of poster)* $(2 + 2.4 + 2 + 2.4) \times \frac{26.4}{2.4}$ *or* $8.8 \times \frac{26.4}{2.4}$ *or* 8.8×11 *or equivalent* *96.8 (cm)* *100 (cm)*	*B1* *M1* *A1* *B1*	 *FT 'their 2 + 2.4 + 2 + 2.4'* *FT provided 95 < 'their 96.8' <100, as 100 correct to 1 significant figure* *Accept working in mm or m, units must then be given in the final answer* *Do not accept an unsupported answer of 100 (cm)*

GCSE MARKING SCHEME

AUTUMN 2023

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

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WJEC GCSE MATHEMATICS – NUMERACY

AUTUMN 2022 MARKING SCHEME

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

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

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

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

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

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

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

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

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

GCSE MARKING SCHEME

AUTUMN 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

AUTUMN 2023 MARKING SCHEME

GCSE Numeracy **Unit 1: Higher Tier**	Mark	Comments
1(a)(i) Correct statement of Pythagoras' theorem • (Height^2 =) $50^2 - (60 \div 2)^2$ • (Height^2 =) $50^2 - 30^2$ • 50^2 = height^2 + $(60 \div 2)^2$ • 50^2 = height^2 + 30^2	M1	Clear indication that all measurements have been converted to 3cm, 5cm, 4cm may be awarded all marks
Correct stage of evaluation • (Height^2 =) 2500 – 900 • (Height^2 =) 1600 • sight of $\sqrt{1600}$ • (Height =) $\sqrt{(50^2 - 30^2)}$	A1	Working must be seen Allow M1 A1 for a slip in the initial notation then corrected at this evaluation stage
(Height =) $\sqrt{1600}$ (Height = 40 mm) or Height^2 = 1600 (Height = 40 mm) or 1600 = 40^2 (Height = 40 mm)	A1	Mark final answer A0 for an incorrect statement, e.g. $\sqrt{1600} = 40^2$
1(a)(i) Alternative method 1 *Identifies the relationship '3, 4, 5' and relates to the given (right-angled) triangle, e.g. sight of* • *3, 4, 5 and 30(mm), 40(mm), 50(mm)* • *3cm, 4cm, 5cm* • *3, 4, 5 and '× 10'* • *30, 40, 50 and '÷ 10'* ***AND** a statement or conclusion, e.g.* • *Pythagorean triple* • *Right-angled triangle* • *3, 4, 5 triangle means it would be 30, 40, 50 triangle*	*B3*	*For B3 there **must** be an accompanying statement or conclusion* *B2 for identifying the relationship '3, 4, 5' and relates to the given(right-angled) triangle* • *without a conclusion or statement, or* • *with an incorrect conclusion or statement* *B1 for sight of any one of the following:* • *'3, 4, 5'* • *30 (mm) and 40 (mm) appropriately indicated on the diagram* • *A **right-angled** triangle drawn (with or without 90° indicated) appropriately labelled 30 (mm), 40 (mm) and 50 (mm)*
1(a)(i) Alternative method 2 *Assuming height as 40mm with use of 50mm or 30mm within a correct statement of Pythagoras' Theorem, e.g.* • *((½ base)^2 =) $50^2 - 40^2$* • *$50^2 = 40^2 + x^2$* • *((hypotenuse)^2 =) $40^2 + 30^2$*	*M1*	*Clear indication that all measurements have been converted to 3cm, 5cm, 4cm may be awarded all marks*
Correct stage of evaluation, e.g. • *((½ base)^2 = $50^2 - 40^2$ =) 900* • *(½ base =) $\sqrt{900}$* • *((hypotenuse)^2 = $40^2 + 30^2$ =) 2500* • *(hypotenuse =) (½ base =) $\sqrt{2500}$*	*A1*	*Working must be seen*
Appropriate full evaluation, e.g. • *(½ base =) 30 (mm)* • *(hypotenuse =) 50 (mm)*	*A1*	*Mark final answer*
1(a)(ii) (Volume) ½ × 60 × 40 × 20 or equivalent	M2	M1 for sight of area of X-section possibly in stages, ½×60×40 or ½×30×40 + ½×30×40 (= 1200 mm^2)
24 000 (mm^3) (> 20 000 mm^3)	A1	CAO

1(b) Sight of or implication that: 5 × number of people + 105 = 207 + 3 × number of people or 5x + 105 = 207 + 3x (5 – 3) × number of people = 207 – 105 or number of people = $\frac{207-105}{5-3}$ or 5x – 3x = 207 – 105 or 2x = 102 51 (people)	M1 m1 A1	Implication includes attempt to balance costing for the same number of people ≥ 3 at each venue, e.g. • (10 people) 5 × 10 + 105 with 207 + 3 × 10 • (110, 115,) 120 with (210, 213,) 216 Includes correctly evaluated trial to attempt to balance costing for the same number of people at each venue provided 'their trial for 30 ≤ the number of people ≤ 70', e.g. correct costing for both venues for 40 people as (FH) (£)305 and (ML) (£)327 From M1, allow 1 slip in the rearrangement of 'their equation' provided 'their equation' is then simplified to ax = b, where a ≠ 0 and b ≠ 0 Sight of cost (£)360 for each venue implies M1 m1 CAO If no marks, award SC1 for finding the number of (whole) people for the same cost at each venue, provided the cost is > (£) 220, e.g.
2. (4(.)40 ÷ 3.3) × 9 ÷ 10 (= $\frac{4(00)}{3} \times \frac{9}{10}$) or ($\frac{9}{10}$ × 4(.)40) ÷ 3.3 (= $\frac{3.96}{3.3}$) or 4 × $\frac{9}{10}$ ÷ 3 (= $\frac{3.60}{3}$) or equivalent full method (£)1.2(0) or 120(p)	M2 A2	<u>Accept equivalent in pence throughout</u> M1 for any one of the following or equivalent: • (1kg Sparkle costs) 4(.)40 ÷ 3.3 (= $\frac{4(00)}{3}$) • (3.3kg Dazzle costs) $\frac{9}{10}$ × 4(.)40 (= 3(.)96) • (3kg Dazzle costs) 4 × $\frac{9}{10}$ (= 3(.)60) • (3kg Sparkle costs) 4(.)00 CAO. If units are given they must be correct Do not award A2 or A1 from incorrect working Award A1 (from M1 or M2) for any one of the following: • (1kg Sparkle costs) $\frac{4(00)}{3}$ or 1.33(…) or 133.(..) • (3.3kg Dazzle costs) 3(.)96 • (3kg Dazzle costs) 3(.)60 Award A1 (from M2) for a correctly evaluated FT, with final answer rounded or truncated to a penny, for any one of the following: • 'their 4(.)40 ÷ 3.3' × $\frac{9}{10}$ • 'their $\frac{9}{10}$ × 4(.)40' ÷ 3.3 • 'their 4 × $\frac{9}{10}$' ÷ 3

3(a)(i) (2.5, 42) stated with a suitable line of best fit drawn through this point	B2	For B2 do not ignore the answer space stating an incorrect point, or giving reverse coordinates Conditions of a suitable line of best fit: • The straight line (accept intention if a ruler is not used) must have points above and below it • The line must be of sufficient length, to illustrate trend for at least 6 points • The trend shows that there are points above and below the line towards each end of the line For B2 the point (2.5, 42) **must** be stated or plotted with a suitable line of best fit through this point. If (2.5, 42) is not stated or plotted, then it is only possible to award a maximum of B1 Allow B2 for one of the following: • a blank answer space with (2.5, 42) plotted with a suitable line of best fit through (2.5, 42) • (2.5, 42) stated in the answer space, but not plotted, with suitable line of best fit passing through (2.5, 42) B1 for sight of any one of the following: • (2.5, 42) stated in the answer space • blank answer space with (2.5, 42) indicated by a correct plot • A suitable line of best fit for the given points: o with no additional point plotted o passing through 'their additional incorrect point' (plotted) o suitable if 'their additional incorrect point' plotted is ignored
3(a)(ii) Reading from line of best fit for number of cups (tolerance to the nearest gridline) for rainfall of 2.0 mm	B1	Answer space takes precedence **STRICT FT** from (a)(i) 'their line of best fit' which must be drawn for negative correlation No mark is awarded if no line of best fit drawn in (a)(i)
3(b) $5 \times 18 + 5 \times 0.5$ or 18.5×5 92.5 (cm)	M1 A1	Allow for $18 <$ 'their 18.5' ≤ 19 CAO If no marks, award SC1 for sight of 18.5 (cm) or 18.4999(... cm) provided clearly a recurring 9 digit
3(c) Selects or unambiguously implies 'No' with a reason, e.g. '(Space) minimum 97.25 (cm) (which is less than 97.3 cm)'	E1	Allow 'No' with a reason, e.g. '97.25 (cm)' '(least) 97.25 and (greatest) 97.75' Do not accept 'No' with the reason, e.g. '97.75 (cm)'

4(a)(i) Entries 146 and 160 in the table and the cumulative frequency diagram completed correctly (correct plots (11, 146) and (13, 160) and all plots joined)	B2	B1 for any one of the following: • 146 and 160 in the table, correct plots but **not** joined • 146 and 160 in the table, with one correct plot and one incorrect plot in completing the **cumulative** frequency diagram with plots joined • one error in the table, including FT 'their 146' + 14 and these **cumulative** entries used correctly to complete the **cumulative** frequency diagram with plots joined • correct cumulative frequency diagram with plots joined, with incorrect, incomplete or not attempted entries in the table
4(a)(ii) 8.2 to 8.4 (minutes)	B1	Answer space takes precedence Allow 8 minutes 12 seconds to 8 minutes 24 seconds FT reading from the graph for 'their median', from ½ × 'their 160', provided 'their 160' ≥ 110, with a tolerance of ½ small square from 'their **cumulative** frequency graph', provided it is possible to read 'their median' from the vertical axis on the graph paper provided
4(a)(iii) 7.2 minutes	B1	Answer space in the statement takes precedence, if blank award for indication of '7.2' (circled) in the list Allow '7' in the answer space provided 7.2 indicated in the list Do not accept '8' in the answer space if 7.2 indicated in the list
4(a)(iv) $\frac{20}{160}$ (× 100) or $\frac{1}{2}$ × 25 (%) or equivalent 12.5 (%) or 12½ (%)	M1 A1	FT for (100 ×) 20/'their 160', provided 'their 160'> 106 On FT allow rounding or truncation to 1 decimal place
4(b) (Costs are 180 + 220) (£) 400 **AND** (Profit is 700 – 180 – 220) (£) 300 **OR** (Receipts / Costs =) $\frac{700}{400}$ (× 100) (Percentage profit is) $\frac{300}{400}$ (× 100) or $\frac{700}{400}$ (× 100) – 1 (× 100) 75 (%)	B1 M1 A1	May be embedded, e.g. 700 – 400 = 300 (= 1.75 or 175%) FT 'their 400' and 700 – 'their 400' provided their costs or profit are ≠ 180, ≠ 220 and ≠ 700 CAO Allow if all costs and the total are consistently multiplied by 3.
4(c) 8(.)40 ÷ 1(.)20 or 8(.)40 – 8(.)40 ÷ 6 or equivalent (£) 7 or 700 (p)	M1 A1	Accept a **complete** and **convincing** method of trial and improvement If units are given they must be correct Sight of 7 + 1.40 = 8.40 is awarded M1 A0 unless (£)7 is selected

5(a)(i) King Edward and 90(g)	B1	

5(a)(ii) (90 – 52 =) 38(g)	B2	Do not award from sight of any incorrect working
		
		B1 for sight of any of the following:
		• 52 **and** 90
		• Sight of 90 and 50 < 'their lowest mass' ≤ 54 **and** 90 – 'their lowest mass' correctly evaluated
		• Answer of 35(g) **and** unambiguous selection of
		  ○ (King Edward) 98 and 63 or
		  ○ (Desiree) 88 and 53

5(b) Selects: Desiree, **and** Interquartile range **and** less than for the other 2 varieties	E1	
6. (Width of poster) $2 \times \frac{26.4}{2.4}$ or 2×11 or equivalent 22 (cm) (Perimeter of poster $2 \times (22 + 26.4) =$) 96.8 (cm) 100 (cm)	M1 A1 A1 B1	 Mark final answer for the width of the poster FT 'their 22' provided M1 previously awarded FT provided 95 < 'their 96.8' <100, as 100 correct to 1 significant figure Accept working in mm or m, units must then be given in the final answer Do not accept an unsupported answer of 100 (cm)
6. Alternative method *(Perimeter of stamp) 8.8 (cm)* ***AND*** *sight of* $\frac{26.4}{2.4}$ *(= 11) or* $\frac{2.4}{26.4}$ $(= \frac{1}{11})$ *(Perimeter of poster)* $(2 + 2.4 + 2 + 2.4) \times \frac{26.4}{2.4}$ *or* $8.8 \times \frac{26.4}{2.4}$ *or* 8.8×11 *or equivalent* *96.8 (cm)* *100 (cm)*	*B1* *M1* *A1* *B1*	 *FT 'their 2 + 2.4 + 2 + 2.4'* *FT provided 95 < 'their 96.8' <100, as 100 correct to 1 significant figure* *Accept working in mm or m, units must then be given in the final answer* *Do not accept an unsupported answer of 100 (cm)*

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.
7(a) $\frac{2 \times 10^3}{2 \times 10^5}$ (× 100) or equivalent	M1	e.g. $\frac{2000}{200\,000}$ (× 100)
= 1 (%)	A1	
7(b) $(0.02 \times 10^5) + (3.98 \times 10^5)$ or 2000 + 398 000 OR $(0.2 \times 10^6) + (1.2 \times 10^6)$ or 200 000 + 1 200 000	M1	Or equivalents
= 400 000 AND 1 400 000	A2	Or equivalents e.g. (4×10^5) AND (1.4×10^6) Note: these do not need to be in correct standard form notation A1 for each
(Fraction that was electrified =) $\frac{400\,000}{1\,400\,000}$ or equivalent	B1	e.g. $\frac{4 \times 10^5}{1.4 \times 10^6}$ Must not involve sums within the numerator or denominator FT 'their 400 000' and 'their 1 400 000' provided not the USA figures *e.g. for use of the rest of the world's data* *B1 for* $\frac{3.98 \times 10^5}{1.2 \times 10^6}$ *or equivalent*
$= \frac{2}{7}$	B1	Mark final answer FT 'their 400 000' and 'their 1 400 000' provided equivalent level of difficulty *e.g. for use of the rest of the world's data* *B1 for* $\frac{199}{600}$ Ignore attempt to convert to a %

8. 70 $\times\left(\frac{1}{2}+\frac{1}{10}\right)$ or $\times\left(\frac{28}{56}+\frac{1}{10}\right)$ or $\times 0.6$	M2	M2 and M1 can be performed in either order, but have to come from starting with 70 May be embedded within incorrect work M1 for: • $\times\left(\frac{1}{2}+\cdots\right)$ or $\times\left(\frac{28}{56}+\cdots\right)$ OR • $\times\left(\ldots+\frac{1}{10}\right)$
$\div 1.75$ or $\times\frac{4}{7}$ or equivalent	M1	Accept use of ÷ (1.748 to 1.76) or × (0.568 to 0.572)
$\times 11$	m1	FT from at least one M1 previously awarded
= 264 (miles)	A2	CAO A1 for: • sight of 42 (pints) or • sight of 24 (litres) or • a correct answer on FT only from an error in converting to litres Allow (for possibly all marks) one rounding/truncation step from using an accepted conversion from pints to litres e.g. <u>use of × 0.57 for the conversion to litres</u> 42 × 0.57 = 23.94 (possibly rounded to 24) or 42 × 0.57 × 11 = 263.34 (possibly rounded to 263)
*8. <u>Alternative method:</u> 11 *÷ 1.75 or $\times\frac{4}{7}$ or equivalent*	*M1*	*M1 and M2 can be performed in either order, but have to come from starting with 11* *Accept use of ÷ (1.748 to 1.76) or × (0.568 to 0.572)*
$\times\left(\frac{1}{2}+\frac{1}{10}\right)$ or $\times\left(\frac{28}{56}+\frac{1}{10}\right)$ or $\times 0.6$	*M2*	*May be embedded within incorrect work* *M1 for:* • $\times\left(\frac{1}{2}+\cdots\right)$ *or* $\times\left(\frac{28}{56}+\cdots\right)$ *OR* • $\times\left(\ldots+\frac{1}{10}\right)$
× 70	*m1*	*FT from at least one M1 previously awarded*
= 264 (miles)	*A2*	*CAO* *A1 for:* • *sight of $\frac{44}{7}$ (miles per pint) or equivalent* • a correct answer on FT only from an error in converting 11 miles per litre into miles per pint *Allow (for possibly all marks) one rounding/truncation step from using an accepted conversion from pints to litres* *e.g. <u>use of × 0.57 for the conversion to litres</u>* *11 × 0.57 = 6.27 (truncated/rounded to 6.2 or 6.3, **but not 6**) or* *11 × 0.57 × 0.6 = 3.762 (truncated/rounded to 3.7 or 3.8, **but not 4**)*

9(a) 5 $\times \frac{240}{100}$ or $\times 2.4$ or equivalent	M1	<u>A table method altering all 3 in the same manner at the same time is M0</u> M marks may be seen in either order e.g. <u>Time</u> <u>Houses</u> <u>Vans</u> 4 240 12
$\times \frac{4}{3}$ or $\times 1.333\ldots$ or equivalent	M1	FT from M0 previously awarded Must be from use of 5 e.g. if this calculation is performed first <u>Time</u> <u>Houses</u> <u>Vans</u> 3 100 6.66…
= 16 (delivery vans)	A1	CAO
9(a) <u>Alternative method 1:</u> $\frac{100}{4\times5}$ *(=5 houses per hour per van)*	*M1*	
$\frac{240}{100\div(4\times5)\times3}$ *or* $\frac{240}{5\times3}$	*m1*	
= 16 (delivery vans)	*A1*	*CAO*
9(a) <u>Alternative method 2:</u> *<u>Time</u> <u>Houses</u> <u>Vans</u>* *3 75 5 OR* *9.6 (or 9h36m) 240 5*	*M1*	
$5 \times \frac{240}{75}$ OR $5 \times \frac{9.6}{3}$ or 5×3.2 or equivalent	*M1*	*FT from 3 (time), n houses, 5 vans for $5 \times \frac{240}{n}$* *FT from n (time), 240 houses, 5 vans for $5 \times \frac{n}{3}$*
= 16 (delivery vans)	*A1*	*CAO*
9(b)		Allow use of $\pi = 3.14$ to 3.142 for B and M marks, but not for A marks
Sight of $\frac{\text{angle}}{360} \times \pi \times 3^2$ or equivalent	B1	For any of the angles 140(°), 110(°), 70(°), 140+110+70 or 320
$\frac{140}{360}\times\pi\times3^2$ (7π/2) + $\frac{110}{360}\times\pi\times3^2$ (11π/4) + $\frac{70}{360}\times\pi\times3^2$ (7π/4) or equivalent	M2	e.g. $\frac{(140+110+70)}{360}\times\pi\times3^2$ or $\frac{320}{360}\times\pi\times3^2$ or 8π M1 for the sum of any 2 correct terms OR M1 for $\frac{x}{360} \times \pi\times3^2$ where $300 \leq x < 360$ if 140+110+70 not seen The award of M2 or M1 implies the previous B1
$+ 3\times12\times3 + 22\times3$	m1	FT from M1
$= 8\pi + 174$ (cm^2)	A2	CAO. Mark final answer A1 (does not depend on m1 being awarded) for any one of the following seen • $\frac{2880\pi}{360}$ + …. or equivalent • 7π/2 + 11π/4 + 7π/4 + ….. • 3.5π + 2.75π + 1.75π + …. • 8π

9(c) $\sqrt{9} \times \sqrt{5} + \sqrt{5}$ or $3\sqrt{5} + \sqrt{5}$ $= 4\sqrt{5}$ (cm)	M2 A1	M1 for $\sqrt{45} + \sqrt{5}$ or M1 for sight of $3\sqrt{5}$ CAO
10(a) 62 000 (people)	B2	B1 for • sight of 77000 and 15000 (in workings or in the bars) • (7700 – 1500) × 10 or equivalent, with no more than 1 error in their readings from the vertical axis, and correctly evaluated
10(b) Working from the left of the graph $\frac{360\,000}{2}$ – 4500×20 – 7700×10 OR (from the right) 300×30 + 2200×10 + 3200×10 + 4000×20 + 5000×10 – $\frac{360\,000}{2}$ =13 000 (people needed from the 30-40 bar) (Median for Cardiff =) (30 +) $\frac{13\,000}{50\,000}$ ×10 or equivalent = 32.6 (years)	M1 A1 m1 A1	Allow M1 for either calculation with one error only, (not in the 360 000/2) possibly leading to calculations for the median being in the 20-30 or 40-60 groups CAO FT 'their 13 000' and the possible different calculation if their work is for the median being in the 20-30 or 40-60 groups i.e. (20 +) $\frac{\text{'their 13 000'}}{77\,000}$ × 10 for the 20-30 group or (40 +) $\frac{\text{'their 13 000'}}{80\,000}$ × 20 for the 40-60 group
10(b) Alternative method: *Working from the right of the graph* *$\frac{360\,000}{2}$ – 300×30 – 2200×10 – 3200×10 – 4000×20* *OR (from the left)* *4500×20 + 7700×10 + 5000×10 – $\frac{360\,000}{2}$* *= 37 000 (people needed from the 30-40 bar)* *(Median for Cardiff =)* *(40 –) $\frac{37\,000}{50\,000}$ ×10 or equivalent* *= 32.6 (years)*	*M1* *A1* *m1* *A1*	*Allow M1 for either calculation with one error only, (not in the 360 000/2) possibly leading to calculations for the median being in the 20-30 or 40-60 groups* *CAO* *FT 'their 37 000' and the possible different calculation if their work is for the median being in the 20-30 or 40-60 groups* *i.e. (30 –) $\frac{\text{'their 37 000'}}{77\,000}$ × 10 for the 20-30 group or* *(60 –) $\frac{\text{'their 37 000'}}{80\,000}$ × 20 for the 40-60 group*

11(a) 100 days	B1	
11(b) $\frac{1}{2} \times 40 \times (100 + 60 + 2(100 + 140 + 150 + 110))$	M2	M1 for 1 slip in substitution of values OR M1 for 1 of the vertical readings omitted with all others correct
$= 23\,200$	A1	May be implied in further working FT from M1 is available provided it comes from a calculation with no vertical readings omitted
(Average depth of water =) $23\,200 \div 200$	m1	FT 'their 23 200' provided M1 or M2 previously awarded
$= 116$ (ft)	A1	
11(b) Alternative method: $\frac{(100 + 100)}{2} \times 40 + \frac{(100 + 140)}{2} \times 40 + \frac{(140 + 150)}{2} \times 40 + \frac{(150 + 110)}{2} \times 40 + \frac{(110 + 60)}{2} \times 40$ *[4000 + 4800 + 5800 + 5200 + 3400]*	*M2*	*M1 for the sum of these 5 areas with one error (may be repeated) in the substitution of values OR* *M1 for the sight of 5 correct areas with the intention to add them (possibly omitting one)*
= 23 200	*A1*	*May be implied in further working* *FT from M1 is available provided it comes from the sum of 5 areas*
(Average depth of water =) 23 200 ÷ 200	*m1*	*FT 'their 23 200' provided M1 or M2 previously awarded*
= 116 (ft)	*A1*	*If no marks awarded, the following SC marks can be awarded for work that involves summing the mean of the 2 heights on either side of each bar, and then dividing by 5 to give an answer of 116 (ft):* *SC3 for work detailed above with no errors in substitution leading to 580/5 = 116* *or* *SC2 for work detailed above with only 1 error, either in substitution (may be repeated) OR in an answer to a calculation, to arrive at their answer, allowing truncation/rounding of their final answer* *or* *SC1 for work detailed above with at most 1 error in substitution AND at most 1 error in an answer to a calculation to arrive at their answer, allowing truncation/rounding of their final answer*
11(c) Appropriate tangent drawn at the 60th day	M1	
Difference in y ÷ difference in x	m1	Allow m1A0 if one difference has been incorrectly calculated
Correctly evaluated gradient given in its simplest form and lies within the range 0.3 to 0.8 (ft/day) or equivalent	A1	Mark final answer Accept a correct proper fraction, decimal or percentage If they give a decimal answer, it needs to be correctly evaluated to at least 1 decimal place, rounded or truncated

GCSE MARKING SCHEME

AUTUMN 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

AUTUMN 2023 MARKING SCHEME

GCSE Numeracy **Unit 2: Higher Tier**	Mark	Comments
1. (Number of revolutions is) $\frac{1000}{\pi \times 29 \div 12}$ or $\frac{1000 \times 12}{\pi \times 29}$ or equivalent	M3	Complete method May be seen in stages M2 for any one of the following, or equivalents: • $\pi \times 29 \div 12$ • $\frac{1000}{\pi \times 29}$ • $\frac{\pi \times 29}{1000 \times 12}$ • $\frac{1000}{\pi \times (29 \div 2) \div 12}$ • $\frac{1000}{\pi \times (2 \times 29) \div 12}$ M1 for any one of the following, that may be embedded in other working: • $29 \div 12$ (= 2.4(1666…)) • 1000×12 (= 12000) • $\pi \times 29$ (= 91.06 to 91.118) • $\frac{1000}{\pi \times n \div 12}$ where $n \neq 0$, e.g. $1000 \times 12 \div (\pi \times 29^2)$ • $\frac{1000}{29 \div 12}$ (= 413.79…) • $1000 \times 12 \div 29$ (= 413.79…)
Answer in the inclusive range 131 to 132 (revolutions)	A1	CAO

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

2(b) (Total number of dogs 20 + 30 + 45 + 25 + 7 + 4 =) 131	B1	May be implied by the sight of ((20 + 30 + 45 + 25 + 7 + 4) ÷ 6 =) 21.8(33….)
10×20 + 20×30 + 30×45 + 40×25 + 50×7 + 60×4 (= 200 + 600 + 1350 + 1000 + 350 + 240) (= 3740)	M1	Ignore any additional products seen FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups e.g. use of • lower bounds of each group gives 3085 • upper bounds of each group gives 4395
÷ 131	m1	FT an error in summing 20, 30, 45, 25, 7 and 4
(28.5(496.... kg) so) 3.95 (kg) (less)	A2	CAO ISW further rounding or truncation Allow 4 (kg) from correct working Accept (29 (kg) and) 3.5 (kg) from correct working Award A1 for any of the following as the final answer • 28.5(496.... kg) • 29 (kg) (from correct working) OR Award A1 on FT from M1 m1 previously awarded for a correct evaluation of 'their estimate mean' e.g. use of lower bounds gives (3085/131 =) 23.54…
2(b) <u>Alternative MS if Glanafon's last 2 points used for possible award of B1 M1 m1 only</u>		
(Sight of 20 + 30 + 45 + 25 + 10 +7 =) 137	*B1*	*May be implied by the sight of* *((20 + 30 + 45 + 25 + 10 + 7) ÷ 6 =) 22.8(33….)*
10×20 + 20×30 + 30×45 + 40×25 + 50×10 + 60×7 *(= 200 + 600 + 1350 + 1000 + 500 + 420)* *(= 4070)*	*M1*	*Ignore any additional products seen* *FT 'their midpoints' provided at least 5 are within or at the bounds of the relevant groups* *e.g. use of* • *lower bounds of each group gives 3385* • *upper bounds of each group gives 4755*
÷ 137	*m1*	*FT an error in summing 20, 30, 45, 25, 10 and 7*

3(a) (Difference 60 million – 41 000 000 =) 19 000 000 or 19 million (Underspend) $\frac{19\,000\,000}{60\,000\,000}$ (× 100) or equivalent 31.67(%)	B1 M1 A1	May be implied in further working Allow 19 m(il) FT 'their 60 million – 41 000 000' including if a place value error made CAO (must be 2 d.p.) Answer space takes precedence
3(a) <u>Alternative method</u> *(Underspend)* *(100 -)* $\frac{41\,000\,000}{60\,000\,000}$ *(× 100) or equivalent* *31.67(%)*	*M1* *A2*	*Allow place value error* *CAO (must be 2 d.p.)* *Answer space takes precedence* *A1 for 31.6(6…%), 31.7(%), 32(%) or 68.33(%)*
3(b) 4×10^6	B1	

3(c) (Change to $) 350 × 1.25 ($)437.5(0) (Only $10 and $50 notes available so he can buy) ($)430 (Fewest number of notes making up $430) **8** $50 (notes) and **3** $10 (notes) (Cost in £ to buy $430 is) 430 ÷ 1.25 or 350 – 7.5(0) ÷ 1.25 (= 350 – 6) (£)344	 M1 A1 A1 A1 M1 A1	*Do not penalise slips in giving incorrect use of £ for $* FT 'their ($)437.5(0)' (provided not a multiple of 10) rounded down to nearest multiple of 10 Accept stated or implied as ($)7.50 can't be converted ($)430 implies previous M1 A1, provided not from incorrect working FT 'their $430' provided it is a multiple of 10 (and provided M1 previously awarded) Must be fewest number of notes, that may be listed Sight of correct number of notes with no incorrect working implies previous A1, unless contradicted FT 'their whole number multiple of $10' ÷ 1.25 Ignore attempt at any further calculation if 430 ÷ 1.25 seen Must be <(£)350 **and** depends on M1 M1 previously awarded Mark final answer If final M0 A0, then award SC1 for (£) 6 (left) or similar on FT, provided not from incorrect or inappropriate working
3(c) <u>Alternative method</u> *£40 = $50 and £8 = $10* *8 $50 notes, 3 $10 notes* *(Cost to buy £350 is)* 8 × 40 + 3 × 8 *(£)344*	*M1* *A3* *M1* *A1*	*A2 for 8 $50 notes* ***and** sight of 350 – 8 × 40 or equivalent* *OR* *A1 for 8 $50 notes*
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.

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

4(c)(i) (Height of the tree =) 21 × tan 39 17.(…. m)	M2 A1	*OR alternative full method* M1 for tan 39 = $\frac{\text{height of tree}}{21}$ CAO
4(c)(i) Alternative method 1 *Hypotenuse = 21/cos39 (= 27.02…)* ***AND** Height =* $\sqrt{(27(.02)^2 - 21^2)}$ 16.9(7…) (m) to 17.(0..m)	*M2* *A1*	*M1 for Hypotenuse = 21/cos39 (= 27.02…)* ***AND** Height*^{2} = 27(.02)^2 – 21^2 *CAO*
4(c)(i) Alternative method 2 *(Angle of elevation)* $\tan^{-1}\frac{17}{21}$ *38.9(9...°) or 39(°)*	*M2* *A1*	*M1 tan (elevation)* = $\frac{17}{21}$ *CAO*
4(c)(i) Alternative method 3 *(Horizontal distance)* $\frac{17}{\tan 39}$ *20.9(98…m) or 21m*	*M2* *A1*	*M1 for tan 39 =* $\frac{17}{\text{distance}}$ *CAO*
4(c)(ii) diameter = $\frac{1.75}{\pi}$ or (radius =) $\frac{1.75}{2 \times \pi}$ (Area of cross section =) π × (1.75 ÷ 2π)^2 × 17 ÷ 2 (Volume) answer in the range 2.07 (m^3) to 2.15 (m^3)	M2 M1 m1 A1	M1 for any one of the following: • 1.75 = π × diameter • 1.75 = 2 × π × radius (Note: radius = $\frac{7}{8\pi}$ m, radius ≈ 0.28m) FT for 'their derived radius' provided it is from a calculation involving the use of π (Note: area of cross section = $\frac{49}{64\pi}$ m^2 area of cross section ≈ 0.24 m^2) FT provided previous M1 awarded CAO, accept an answer of 2 (m^3) from correct working without sight of premature approximation leading to an answer outside the range
5. 2500 × (1 – 0.23) × (1 – 0.04)^{39} × (1 + 0.14)^{10} or 2500 × 0.77 × 0.96^{39} × 1.14^{10} or equivalent (£) 1452(.30)	M3 A1	May be seen in stages M2 for a product with any 3 correct terms OR M1 for a product with any 2 correct terms CAO, ignore premature rounding in working provided answer is (£) 1452.(…), allow rounded to (£)1450 from correct working Note: **2500 × 0.77 = (£) 1925** 2500 × 0.96^{39} = (£) 508.766…. 2500 × 1.14^{10} = (£) 9268.053… 0.77 × 0.96^{39} = 0.15669… 0.77 × 1.14^{10} = 2.854… 0.96^{39} × 1.14^{10} = 0.7544… **2500 × 0.77 × 0.96^{39} = (£) 391.7498…** 2500 × 0.77 × 1.14^{10} = (£) 7136.401… 2500 × 0.96^{39} × 1.14^{10} = (£)1886.108… 0.77 × 0.96^{39} × 1.14^{10} = 0.5809… Values may differ by rounding at individual stages

6(a) 150 ÷ (22+3) × 22 OR 150 ÷ (22+3) × 3 (Volume of copper =) 132 (cm^3) AND (Volume of tin =) 18 (cm^3)	M1 A1	May be implied in further working
(Mass of statue =) 132×8.96 + 18×7.31 (1182.72 + 131.58)	m1	Allow m1, but A0, for use of rounded or truncated values of 8.96 and 7.31 FT 'their 132' and 'their 18'
(Mass of statue =) 1314(.3) (g)	A1	ISW FT provided one of their volumes is correct. Accept 1.3(143) kg from sight of 1314(.3) (g) or 1.314(3) (kg)
6(a) <u>Alternative method calculating mass directly:</u> *(Mass of statue =)* *150÷(22+3)×22×8.96 + 150÷(22+3)×3×7.31*	*M2*	*Allow M2, and possible A1 only, for use of rounded or truncated values of 8.96 and 7.31* *M1 for 150÷(22+3)×22×8.96 (=1182.72) OR 150÷(22+3)×3×7.31 (=131.58)*
(Mass of statue =) 1314(.3) (g)	*A2*	*ISW* *Accept 1.3(143) kg from sight of 1314(.3) (g) or 1.314(3) (kg)* *Award A1 for* • *1182.7(2) or 1183 OR* • *131.5(8) or 131.6 or 132*
6(b) (Volume factor =) $\left(\frac{21.6}{12}\right)^3$ OR $\left(\frac{12}{21.6}\right)^3$ or 1.8^3 OR $0.555\ldots^3$ (=5.832) (=0.171…)	B1	or $\left(\frac{9}{5}\right)^3$ OR $\left(\frac{5}{9}\right)^3$
(Volume of bigger statue =) $150 \times \left(\frac{21.6}{12}\right)^3$ OR $150 \div \left(\frac{12}{21.6}\right)^3$	M1	Implies the previous B1
= 874(.8) or 875 (cm^3)	A1	

7(a) (Monthly payments =) $\frac{\frac{0.033}{12} \times 18000}{1-\left(1+\frac{0.033}{12}\right)^{-4\times12}}$ OR $\frac{0.00275 \times 18000}{1-(1+0.00275)^{-48}}$ or equivalent = (£)400.81	M2 A1	<u>The correct answer alone, without any workings is awarded M0A0, since it is given in the question</u> M1 for an expression with only 1 (possibly repeated) incorrect substitution, but do not allow use of r = 3.3 Accept (£)400.80(89843…) Convincing working must be seen
7(b) (Saving =) 362.05×5×12 − 400.81×4×12 (− 2000) or 362.05×60 − 400.81×48 (− 2000) = (£)484.12	M1 A2	Use of accurate values of (£)362.05 and/or (£)400.81 can be accepted FT if more accurate values used e.g. • (£)484.17 or (£)484.16(8755) from use of accurate Option B monthly payment • (£)483.95 or (£)484.94(84006) from use of both accurate monthly payments A1 for sight of any one of the following: • an answer of (£)484 to (£)485 as a result of premature rounding • (£) 2484.12 • (£)2484.17 or (£)2484.16(8755) from use of accurate Option B monthly payment • (£)2483.95 or (£)2484.94(84006) from use of both accurate monthly payments
8(a) $\frac{360-15}{360} \times \pi \times 60$ (+60) = 241 (mm)	M1 A2	A1 for any one of the following: • answer of 240.5(5) to 240.7 • answer of $\frac{115}{2}\pi + 60$ or $57.5\pi + 60$ • sight of (180.5(5) to 180.7) + 'their 60' correctly rounded to the nearest mm • sight of 181

8(b)		<u>An answer of 68 tins does not imply full marks should be awarded, as it can be a result of inaccuracy in workings</u>
(Greatest possible area of a part =) $\pi\times80.5\times30.25 + \frac{4\times\pi\times30.25^2}{2}$ (7646.2 to 7651.2) (5746.59 to 5750.3)	M3	M2 for • $\pi\times80.5\times30.25 + 4\times\pi\times30.25^2$ OR • $\pi\times$'their 80.5'$\times$'their 30.25' + $\frac{4\times\pi\times\text{'their } 30.25^2\text{'}}{2}$ where 80 < 'their 80.5' $\leq$ 81 and 30 < 'their 30.25' $\leq$ 30.5 and where 'their 30.25' could have different values in the two terms, but both have to be in the range shown M1 for • the sum of 2 terms with 1 correct and with bounds in the same ranges as for M2 OR • $\pi\times80\times30 + \frac{4\times\pi\times30^2}{2}$ $(= 4200\pi)$
= 13392.79 to 13401.5 or 4265.25π (mm^2)	A1	CAO. May be implied by sight of 267 857 600 to 268 028 400 (total surface area of 20 000 parts)
(Minimum number of tins needed =) 20 000 × 13399.678.. ÷ 3 950 000	M1	FT 'their 13399.678…' provided it has come from the use of 'their upper bounds' of 80mm and 60mm if bounds used Allow M1 only for 20 000 × 13399.678.. ÷ 'their 3 950 000' where 3 900 000 $\leq$ 'their 3 950 000' < 4 000 000
= 68 (tins)	A1	A0 for 67.8…tins If no marks awarded, and from a misinterpretation of the question, SC3 for an **answer of 65** tins from $20000\times(\pi\times79.5\times29.75 + \frac{4\times\pi\times29.75^2}{2}) \div 4\,050\,000$ OR SC2 for an **answer of 64(.1...)** tins from $20000\times(\pi\times79.5\times.29.75 + \frac{4\times\pi\times29.75^2}{2}) \div 4\,050\,000$ OR SC1 for a correct evaluation (rounded, truncated or unrounded) of the calculation $20000\times(\pi\times79.5\times29.75 + \frac{4\times\pi\times29.75^2}{2}) \div 4\,050\,000$ where 79 $\leq$ 'their 79.5' < 80 and 29.5 $\leq$ 'their 29.75' < 30 and 4 000 000 < 'their 4 050 000' $\leq$ 4 100 000 OR If no marks awarded, SC1 for use of 80.5 and 30.25

8(c) Statements required: • Number the parts from (0000)1 to 20000 • Consider successive 5-digit numbers • Use numbers in the range e.g. Use numbers from (0000)1 to 20000 or Do not use 0000 or numbers > 20000 • Ignore repeats (Working in rows would give parts) (0)1325, 18266, ~~(0)1325~~, (0)5929, 10429, (0)2891 OR (Working in columns would give parts) (0)5929, (0)1325, 10429, ~~(0)1325~~, (0)2891, 18266	E2 B1	All 4 needed for E2 E1 for any 2 or 3 correct statements Allow an equivalent numbering system e.g. (0000)0 to 19 999 Their numbering system can be implied by the range of numbers they state they will choose from Allow the 2nd statement to be implied by their numbering of the parts (from 00001) AND their use of 5-digit numbers in their answer OR 5-digit numbers used in their answer and e.g. 01325 seen Do not allow 'Use numbers less than 20000' if they have numbered the parts from 00001 to 20000 ISW. Part numbers can be given in any order
8(c) <u>Alternative method:</u> *Statements required:* • *Number the parts from (0000)1 to 20000* • *Consider successive 5-digit numbers* • *Divide each number by 20000 and use the remainder to choose a part* • *If the 5-digit number is 00000, then part 20000 is chosen, and ignore repeats.* *(Working in rows would give parts)* *(0)6923, (0)1325, 18552, ~~(0)6923~~, (0)8925, 12712* *OR* *(Working in columns would give parts)* *(0)6923, (0)8925, 15775, (0)5929, ~~(0)8925~~, (0)1325*	*E2* *B1*	*All 4 needed for E2* *E1 for any 2 or 3 correct statements* *Allow an equivalent numbering system e.g. (0000)0 to 19 999* *Their numbering system can be implied by the range of numbers they state they will choose from* *Allow the 2nd statement to be implied by their numbering of the parts (from 00001) AND their use of 5-digit numbers in their answer OR* *5-digit numbers used in their answer and e.g. 06923 seen* *If (0000)0 to 19 999 used, when the remainder is 0, part (0000)0 is selected* *ISW*

9(a) 160 + 20 + 73 or 180 + 73 or 180 – 73 = 107 AND 360 – 107	B1	Allow 160 + 93
9(b) (Distance Swansea to Port Talbot =) $\sqrt{11^2 + 7.5^2 - 2 \times 11 \times 7.5 \times cos93(°)}$ (=$\sqrt{185.885\ldots}$) = 13.6(339…) (km)	M2 A1	FT 'their 93(º)' M1 for $11^2 + 7.5^2 - 2\times11\times7.5\times\cos93(º)$ CAO. Mark final answer
$(N\hat{S}P =)\ sin^{-1}\left(\frac{sin93(°)}{13.6(339\ldots)} \times 7.5\right)$ OR $(N\hat{S}P =)\ cos^{-1}\left(\frac{11^2 + 13.6(339\ldots)^2 - 7.5^2}{2\times11\times13.6(339\ldots)}\right)$ OR $(N\hat{P}S =)\ sin^{-1}\left(\frac{sin93(°)}{13.6(339\ldots)} \times 11\right)$ OR $(N\hat{P}S =)\ cos^{-1}\left(\frac{7.5^2 + 13.6(339\ldots)^2 - 11^2}{2\times7.5\times13.6(339\ldots)}\right)$ $(N\hat{S}P =)$33(.321…(º)) OR $(N\hat{P}S =)$ 53.6(781…) or 53.7 or 54(º) (Bearing =) 286(º)	M2 A1 A1	FT 'their derived 13.6(339…)' and 'their 93(º)' M1 for $\frac{\sin \text{angle}}{7.5} = \frac{\sin 93(º)}{13.6(339\ldots)}$ or equivalent OR M1 for $7.5^2 = 11^2 + 13.6(339\ldots)^2 - 2\times11\times13.6(339\ldots)\times\cos NSP$ or equivalent OR M1 for $\frac{\sin \text{angle}}{11} = \frac{\sin 93(º)}{13.6(339\ldots)}$ or equivalent OR M1 for $11^2 = 7.5^2 + 13.6(339\ldots)^2 - 2\times7.5\times13.6(339\ldots)\times\cos NPS$ or equivalent e.g. FT use of 13.6 leads to $(N\hat{S}P =)$ 33.4(160…(º)) with $(N\hat{P}S =)$ 53.8(732…(º)) Accept 286(.32…) (º) FT from second M2 only FT 180 + 73 + 'their $N\hat{S}P$' OR FT 360 – 20 – 'their $N\hat{P}S$'
10. $10.97^2 + (7.32\div2)^2$ OR $(7.32\div2)^2 + 2.44^2$ OR $2.44^2 + 10.97^2$ or $\sqrt{10.97^2 + (7.32\div2)^2}$ OR $\sqrt{(7.32\div2)^2 + 2.44^2}$ OR $\sqrt{2.44^2 + 10.97^2}$ (Distance from penalty spot to A =) $\sqrt{10.97^2 + (7.32\div2)^2 + 2.44^2}$ (Distance from penalty spot to A =) 11.82 (m) or an answer in the range 11.814 to 11.821 (m)	M1 M2 A1	May be embedded within incorrect work and possibly in stages May be seen in stages Implies previous M1 M1 for $10.97^2 + (7.32\div2)^2 + 2.44^2$ Allow 11.8 or 11.81 (m) Needs to come from use of √139.5872 to √139.7332 if method done in stages with premature rounding