GCSE MARKING SCHEME

SUMMER 2022

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

INTRODUCTION

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

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

WJEC GCSE MATHEMATICS - NUMERACY

SUMMER 2022 MARKING SCHEME

Unit 1: Higher Tier	Mark	Comments
1(a) 420 ÷ 20 × 17	M2	M1 for any of the following: • 420 ÷ 20 (= 21) • sight of 21
357 (people)	A1	CAO. Allow embedded as 420 : 357 Award A0 for 357 : 420
1(a) <u>Alternative method 1</u> *(420 ÷ 20) × (20 + 17) – 420 (= 777 – 420)*	*M2*	*M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* • *sight of 777*
357 (people)	*A1*	*CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
1(a) <u>Alternative method 2</u> *420 – (20 – 17) × (420 ÷ 20) (=420 – 63)*	*M2*	*M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21* • *sight of 63*
357 (people)	*A1*	*CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
1(a) <u>Alternative method 3</u> *Full ratio method to find 357 people, e.g.* *(20 ×) $\frac{420}{(20)}$: 17 × $\frac{420}{20}$*	*M2*	*Allow seen in stages, including written as an appropriate sum of equivalent ratios, e.g. attempting 17 + 340 (from 20 : 17 and 400 : 340)* *M1 for any of the following:* • *420 ÷ 20 (= 21)* • *sight of 21*
357 (people)	*A1*	*CAO. Allow embedded as 420 : 357* *Award A0 for 357 : 420*
1(b) (Price last year =) (£)4.2(0)	B1	
(Price now =) 4.2(0) + 0.05 × 4.2(0)	M1	FT 'their 4.20'
= (£)4.41	A1	A final answer of (£)4.4(0) (from 4 + 2 × 0.2) implies B1 M0 A0 If no marks awarded SC2 for sight of 4 × 1.1025 SC1 for sight of 4 × 1.05^2

<table>
<tr>
<td>2(a) Lowest common multiple of 2 × 3 × 5 × 5 or 150 seen or implied, e.g.
listing multiples to 150 for nuts and washers and sight of 30 boxes of bolts,
sight of 5 × 30 = 150, 6 × 25 = 150 and sight of 30 boxes of bolts,

Table completed correctly, or sight of correct number of boxes in working, e.g.
<table>
<tr><td>Nuts</td><td>5 boxes</td></tr>
<tr><td>Bolts</td><td>30 boxes</td></tr>
<tr><td>Washers</td><td>6 boxes</td></tr>
</table>
</td>
<td>M2

A1</td>
<td>M1 for a method looking at factors or multiples, e.g.
• sight of 2 × 3 × 5 and 5 × 5
• sight of 6 × 5 and 5 × 5
• 30 with factors 5, 6 and 25 with factors 5, 5
• listing 30, 60, 90 and 25, 50, 75
• a common multiple of 150 (not the lowest) seen or implied, e.g. 300, 450, 600, ...

Answers in the table take precedence, e.g. if correct number of boxes 5 for nuts, 30 for bolts and 6 for washers in working but table incorrect, award M2 A0

If no marks, award SC1 for an answer with whole numbers of nuts, bolts and washers in the ratio 5:30:6, e.g. answers of 10, 60 and 12 respectively</td>
</tr>
<tr>
<td>2(b) 13.5(0 mm)</td>
<td>B2</td>
<td>B1 for sight of any one of:
• 6 × (2 + 0.25)
• 6 × 2 + 6 × 0.25
• sight of 2.25 (mm)
• correct evaluation of ‘6 × (2 + their 0.25)’ provided 0 < ‘their 0.25’ ≤ 0.5</td>
</tr>
<tr>
<td>3(a) Suitable uniform scales on both axes, costs to £110 and number of bottles from 0 to 100

Correct representation of costs for 0 to 100 bottles</td>
<td>B1

B2</td>
<td>Allow for cost axis
• starting from £10
• final label is £100 (rather than £110 or £120)
• suitable for ‘their plotted points’ with increasing costs for increasing number of bottles

With no incorrect points plotted
Joined with dotted or solid straight line
Ignore any additional ‘correct’ points plotted for more than 100 bottles
Examples of points:
<table>
<tr><td>Bottles</td><td>0</td><td>20</td><td>40</td><td>60</td><td>80</td><td>100</td></tr>
<tr><td>Costs £</td><td>10</td><td>30</td><td>50</td><td>70</td><td>90</td><td>110</td></tr>
</table>
B1 for any one of:
• One incorrect plot, that is not (0, 10), on an otherwise correct graph. (0,10) must be plotted and joined
• correct graph for an inclusive range of 50 bottles
• at least 2 correct points plotted, with no incorrect points plotted, ignore vertical lines or ‘line of best fit’. Allow for points not joined

Note: the drawing of a bar chart should only be awarded B1 maximum for the uniform scales</td>
</tr>
<tr>
<td>3(b) 1750 ÷ 1.75 or 1750 × 4/7 or 1750 ÷ 7/4
+ 10
£1010</td>
<td>M1
m1
A1</td>
<td>Allow sight of 1000 provided not from incorrect working (not for 1 litre = 1000 ml)

If no marks, award SC1 for sight of ‘÷ 1.75’ or ‘÷ 7/4’ or ‘× 4/7’ or equivalent</td>
</tr>
</table>

4. (Width of small sticker is) 42 ÷ 14 3 (cm) (Length or width of large sticker) 4 × 14 OR 4 × 3 56 (cm) AND 12 (cm)	M1 A1 M1 A1	 Must be for the small label (check the diagram) FT 'their 42 ÷ 14' (Note: Incorrect logic 42 × 4 = 168 with 168 ÷ 56 = 3 does not give the width of the small label! M0 A0)
4. <u>Alternative method</u>: *(Area of large sticker) 42 × 4² (= 672cm²)* *(Length of large sticker) 14 × 4 (= 56cm)* *(Width of large sticker)* $\frac{42 \times 4^2}{14 \times 4}$ *or* $\frac{672}{56}$ *(Length and width of large sticker)* *56 (cm) AND 12 (cm)*	 *M1* *M1* *M1* *A1*	
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.
5(a)(i) Answer in the range 46 to 48 (cm)	B1	
5(a)(ii) 5 (ray fish)	B1	
5(b)(i) Correct format of a box-and-whisker with at least one of minimum, LQ, median, UQ or maximum correct Showing: Minimum: 1.6 (cm); LQ: 2.4 (cm); Median: 3.2 (cm) UQ at 5.8 (cm) Maximum at 6.8 (cm)	B1 B1 B1 B1	Do not ignore additional lines drawn Do not accept minimum of 0cm or maximum of 7cm End vertical stopper lines omitted can be ignored Must all be shown on the diagram/graph Do not accept plotted points for LQ and median, must be intention to draw lines Must be intention of the minimum, LQ and median, for the median ignore 1 spurious line also drawn Must be shown on the diagram/graph Must be shown on the diagram/graph If no marks for both UQ and maximum, allow SC1 for sight of UQ as 5.8 (cm) or maximum 6.8 (cm) in working
5(b)(ii) 0.75 × 60 or equivalent 45 (guppies)	M1 A1	 If no marks, award SC1 for an answer of 15 (guppies) or for sight of 75% or ¾
5(c) 100 × 9.9 ÷ (100 + 10) or 9.9 ÷ 1.1 or equivalent 9 (kg)	M1 A1	Allow 9.9 – 0.9 provided 0.9 is not from incorrect working CAO. Must be from a correct method. Allow unsupported 9 (kg) for M1, A1

6. 5.1×10^8	B2	Allow $5.10(00....) \times 10^8$ B1 for the correct value written in index form, e.g. 51×10^7 or 510×10^6 or B1 for the sight of either of the following • 51 000 000 and 5.1×10^7 • 5 100 000 000 and 5.1×10^9 • 5×10^8
7. (Capacity of original enclosure =) $5 \times 8 \times 3 + \frac{1}{3} \times 5 \times 8 \times 1.5$ (120) (20) $= 140\ (m^3)$	M2 A1	M1 for $5 \times 8 \times 3 + n \times 5 \times 8 \times 1.5$ where $0 < n \leq 1$ CAO
(Volume of wooden cuboid = $4 \times 3.5 \times 0.5$ =) $7\ (m^3)$	B1	May be implied by 'their original capacity' – 7
(Percentage =) $\frac{140 - 7}{140}$ (× 100) OR $100 - \frac{7}{140} \times 100$ $= 95\ (\%)$	M1 A1	FT 'their derived 140' and 'their $4 \times 3.5 \times 0.5$' On FT, their answer needs to be correctly calculated with any slips only being allowed in the decimal part of the percentage, provided it would round to the appropriate whole number. If their division not seen, their rounded answer needs to be correct for their division.
8(a) $40 \times 0.3 + 10 \times 1$ OR $80 - (10 \times 1.8 + 15 \times 1.6 + 20 \times 0.8)$ = 22 (trees)	M1 A1	12 + 10 OR 80 – (18 + 24 + 16) If no marks awarded, SC1 for sight of 58 (trees greater than 50cm) from $10 \times 1.8 + 15 \times 1.6 + 20 \times 0.8$
8(b)(i) 60 cm	B1	
8(b)(ii) Search for the lower quartile *(Working fwds from 40)* *(Working bwds from 50)* $1x = 20 - 40 \times 0.3$ OR $1x = 10 - 10 \times 0.8$ $x = 8$ OR $x = 2$ Search for the upper quartile *(Working fwds from 60)* *(Working bwds from 75)* $1.6y = 20$ OR $1.6y = 20 - 20 \times 0.8$ $y = 12.5$ OR $y = 2.5$ (Inter-quartile range =) (60 + 12.5) – (40 + 8) or equivalent OR (75 − 2.5) – (50 − 2) or equivalent = 24.5 (cm)	 M1 A1 M1 A1 M1 A1	 OR $\frac{8}{10} \times 10$ OR $\frac{2}{10} \times 10$ Needs to be unambiguous work leading towards their lower quartile Lower quartile of 48 implies M1A1 OR $\frac{20}{15 \times 1.6} \times 15$ $\left(= \frac{20}{24} \times 15\right)$ OR $\frac{20 - 20 \times 0.8}{15 \times 1.6} \times 15$ $\left(= \frac{4}{24} \times 15\right)$ Needs to be unambiguous work leading towards their upper quartile Allow improper fractions Upper quartile of 72.5 implies M1A1 72.5 – 48 FT 'their 12.5' or 'their 2.5' AND FT 'their 8' or 'their 2' in an appropriate calculation provided one of the quartiles is correct and the other quartile is in the correct group (40-50 or 60-75) CAO

9(a) $\frac{4}{3} \times \pi \times \text{radius}^3 = 128\pi$ or equivalent	M1	If an equation is not seen, only award if appropriate calculations with 128, 4 and 3 seen Note: simplifying the cube root of 128 alone does not imply M1
$(\text{radius}^3 =) \frac{128\pi \times 3}{4 \times \pi}$ or equivalent	m1	
$\text{radius}^3 = 96$ OR $(\text{radius} =) \sqrt[3]{96}$	A1	
$(\text{radius} =) 2\sqrt[3]{12}$ (mm)	B1	Must be from correct working FT 'their derived 96' provided their answer can be written the form $a\sqrt[3]{12}$ An unsupported $2\sqrt[3]{12}$ (mm) is awarded M0m0A0B0
9(b) (Total surface area =) $\pi \times 8 \times 12 + 2 \times \frac{4 \times \pi \times 4^2}{2}$ or equivalent	M2	M1 for sight of • $\pi \times 8 \times 12$ (96π) or • $2 \times \frac{4 \times \pi \times 4^2}{2}$ (64π)
$= 160\pi$ (mm^2)	A1	CAO
10(a) Appropriate tangent drawn at a time between t=5.7 and t=5.9 seconds	M2	Note: A tangent that follows the curve between t=6 and t=7 is not appropriate i.e. it should not pass through (7, 10) or below M1 for a tangent drawn at any other time
Difference in y ÷ difference in x	m1	FT from M1 previously awarded Award m1A0 if only 1 correct difference in the division
Correctly evaluated gradient from a tangent drawn at a time between t=5.7 and t=5.9 seconds, given in its simplest form	A1	FT for a tangent drawn at any time from t=5.6 onwards Mark final answer Accept a correct improper fraction (unless it gives a whole number), mixed number or decimal If a decimal answer is given, it needs to be correctly evaluated to at least 1 decimal place, rounded or truncated If no marks awarded, SC1 for a final answer of 3/2 or $1\frac{1}{2}$ or 1.5 from convincing work that they are calculating the average acceleration (12/8) over the 8 seconds

10(b) e.g. x = 0.72727… and 100x = 72.72727… or equivalent AND an attempt to subtract (x =) $\frac{72}{99}$ or $\frac{7272}{9999}$ or $\frac{8}{11}$ or equivalent	M1 A1	 ISW
10(c) $\frac{1}{2} \times 2 \times (0 + 12 + 2(1.5 + 3 + 6))$ or equivalent = 33 (m)	M2 A1	Allow use of 5.7 ≤ speed ≤ 6.3 for 6, leading to e.g. : use of 5.7 leads to 32.4(m) use of 5.8 leads to 32.6 (m) use of 5.9 leads to 32.8 (m) use of 6.1 leads to 33.2 (m) use of 6.2 leads to 33.4 (m) use of 6.3 leads to 33.6 (m) M1 only if 1 reading incorrect FT from M1
10(c) Alternative method: $\frac{0 + 1.5}{2} \times 2 + \frac{1.5 + 3}{2} \times 2 + \frac{3 + 6}{2} \times 2 + \frac{6 + 12}{2} \times 2$ *[1.5 + 4.5 + 9 + 18]* *= 33 (m)*	*M2* *A1*	*Allow use of 5.7 ≤ speed ≤ 6.3 for 6 leading to e.g.:* *use of 5.7 leads to (1.5 + 4.5 + 8.7 + 17.7 =) 32.4 (m)* *use of 5.8 leads to (1.5 + 4.5 + 8.8 + 17.8 =) 32.6 (m)* *use of 5.9 leads to (1.5 + 4.5 + 8.9 + 17.9 =) 32.8 (m)* *use of 6.1 leads to (1.5 + 4.5 + 9.1 + 18.1 =) 33.2 (m)* *use of 6.2 leads to (1.5 + 4.5 + 9.2 + 18.2 =) 33.4 (m)* *use of 6.3 leads to (1.5 + 4.5 + 9.3 + 18.3 =) 33.6 (m)* *M1 for the sum of these 4 areas with one error (possibly repeated) in reading the scale OR* *M1 for 3 of the 4 areas (1.5, 4.5, 9, 18) shown in a sum where not all calculations shown* *FT from M1*
10(d) $\frac{1}{2}\times(12 + v)\times(16-8) + \frac{1}{2}\times(v + v + 1)\times(48-16) = 550$ or equivalent 48 + 4v + 16v + 16v + 16 = 550 or equivalent (Speed at t = 16 seconds is) 13.5 or $13\frac{1}{2}$ (m/s)	M2 m1 A1	Accept any letter or symbol for v v is speed at t = 16 seconds M1 for • ½×(12 + v)×8 (+ ….) = 550 OR • (…. +) ½×(v + v + 1)×32 = 550 OR • ½×(12 + v)×8 + ½×(v + v + 1)×32 e.g. 96 + 8v + 32v + 32v + 32 = 1100 FT from M1 For appropriately expanding the brackets, and dealing with the fractions CAO. An unsupported answer of 13.5 (m/s) is awarded M0m0A0