GCSE MARKING SCHEME

AUTUMN 2022

**GCSE
MATHEMATICS
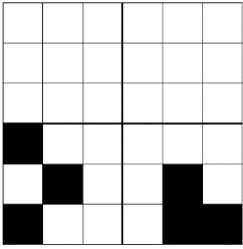UNIT 1 – INTERMEDIATE TIER
3300U30-1**

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.
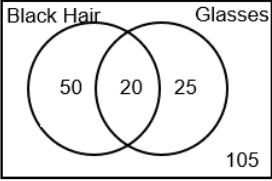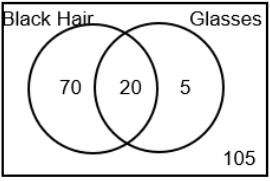
WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.
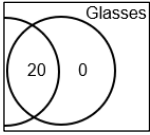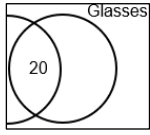
Unit 1: Intermediate Tier	Mark	Comments
1.	B2	B1 for either correct quadrant. Ignore clearly deleted shading.

2. (a) Any valid explanation or counter example
e.g. "2 is a prime"
    "2 is even"
    "2 is not odd"
	E1	Do not accept 2 alone.
		The number 2 must appear in the explanation.

2. (b) Any valid explanation or counter example e.g. "8 is a cube" "64 is even"	E1	Do not accept number alone, but allow e.g. $2^3 = 8$. A numerical example must appear in the explanation. If a numerical example is given it must be correct or not contradicted e.g. "2 × 2 × 2 = 16 is even" would be awarded E0 "2 × 2 × 2 is even" would be awarded E1. If two examples are given, one must be correct for E1. If no marks awarded in (a) and (b), award SC1 for correct number only in **both** parts e.g. 2 in (a) **AND** 8 (or any other even cube) in (b).
3. (a) 33	B1	Answer line takes precedence.
3. (b) 37	B1	Answer line takes precedence. Award B1 for sight of 3 and 37.

4. Choice of length, width and height such that $\qquad$ length $\times$ width $\times$ height $= 12$ $\quad$i.e. $12 \times 1 \times 1$ $\qquad 6 \times 2 \times 1$ $\qquad 4 \times 3 \times 1$ $\qquad 3 \times 2 \times 2$	B1	Must be whole numbers for B1. May be seen in any order. Award B1 if length, width and height are not stated but implied by the cuboid drawn.
$\qquad\qquad\qquad\qquad$ Correct cuboid drawn	B2	Ignore orientation of cuboid. FT 'their length, width and height'. For B2, their cuboid must have edges along or parallel to the 3 directions usually associated with isometric paper (the two diagonals and the vertical). Award B1 for one of the following: • any one edge dealt with correctly for all its three visible occurrences <u>in a cuboid</u> • a cuboid drawn with volume 12cm³ with a different length, width and height stated on answer line (e.g. $3 \times 2 \times 2$ stated on answer lines, but $6 \times 2 \times 1$ cuboid drawn). For any mark to be awarded the line must go 'through the dots' AND have both ends 'on a dot'. Ignore attempt at handling 'hidden lines'.
5. (Andrew =) $\quad$ **5** (£10 notes) $\quad$ **and** $\quad$ **1** (£5 note) $\quad$(Grace =) $\quad$ **2** (£10 notes) $\quad$ **and** $\quad$ **3** (£5 notes) $\quad$(Total =) $\quad$ **7** (£10 notes) $\quad$ **and** $\quad$ **4** (£5 notes) $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ ISW	 B1 B1 B1	For the first two B marks, accept the number of notes, a list of the notes needed, or value of the notes needed for B1. Allow appropriate sight of £50 AND £5 for Andrew for B1. Allow appropriate sight of £20 AND £15 for Grace for B1. Answer line take precedence. FT provided at least B1 previously awarded. Sight of **7** (£10 notes) **and** **4** (£5 notes) implies B1B1B1. A final answer of £70 and £20 is awarded B1B1B0. Note: The below response is awarded B1B0B1 (Andrew =) $\quad$ **5** (£10 notes) $\quad$ **and** $\quad$ **1** (£5 note) $\quad$(Grace =) $\quad$ **3** (£10 notes) $\quad$ **and** $\quad$ **1** (£5 notes) $\quad\quad$(Total =) $\quad$ **8** (£10 notes) $\quad$ **and** $\quad$ **2** (£5 notes) If no marks are awarded, award SC1 for a number of of £10 notes + a number of £5 notes that give a total value of £90.
6.(a) $\qquad\qquad 7p = 63$ $\qquad\qquad\qquad p = 9$	B1 B1	FT from $7p = k$. Unsupported answer of 9 is awarded B1B1. $p = 63/7$ is awarded B1B0. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction (e.g if $7p = 60$, then $p = 60/7$ is awarded B0B1, but $p = 60 \div 7$ is awarded B0B0). Allow B1B1 for a correct embedded answer BUT only B1B0 if contradicted by $p \neq 9$. Mark final answer.

6. (b) $4a - 15b$	B2	Must be an expression for B2. Award B1 for one of the following: • sight of $(+)4a$ • sight of $-15b$ • $4a + -15b$. Mark final answer.

7.		B3	For all other 11 different combinations. Ignore repeats. B2 for 8, 9 or 10 different combinations. B1 for 6 or 7 different combinations.

Set Meal		
Starter (M)	**Main Course** (C)	**Dessert** (F)
M	C	Y
M	H	F
M	H	Y
M	P	F
M	P	Y
S	C	F
S	C	Y
S	H	F
S	H	Y
S	P	F
S	P	Y

8.	(value of 6th number =) $6 \times 8{\cdot}5 - 5 \times 7$ $= (51 - 35)$	M2	Award M1 for sight of any one of the following: • 5×7 • 35 • $6 \times 8{\cdot}5$ • 51.
	$(=) 16$	A1	CAO

9.			*Allow answers in pounds or pence.*
	(1 share =) (£)16.8(0) ÷ 8 or equivalent	M1	
	(1 share =) (£)2.1(0) or equivalent	A1	Award M1 A1 for sight of (£)2.1(0) : (£)16.8(0).
	(Total =) (£)18.9(0) or equivalent	A1	If M1 A0, then FT 'their (£)2.1(0)' $\times$ 9 OR 'their (£)2.1(0)' + (£)16.8(0) If units given, then they must be correct e.g. award A1 for 1890 or 1890p but A0 for £1890.

9.	*Alternative method:* (Total =) (£)16.8(0) ÷ 8 × 9 or equivalent	*M2*	*Award M2 for complete method.*
	(Total =) (£)18.9(0)	*A1*	

Organisation and Communication.	OC1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means
Accuracy of 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

10.	$\dfrac{20 \times 60}{400}$ or $\dfrac{20 \times 59}{400}$	M1	May be seen in stages.
	= 3 or 2·95	A1	CAO. Unsupported answer is M0 A0.
11. (a)	17	B1	Mark final answer.
11. (b)	−1	B1	Mark final answer.
12 (a)	$\dfrac{2}{15}$	B2	For B2, the answer must be in its simplest form. Award B1 for sight of $\dfrac{40}{300}$ or equivalent.
12. (b)	YES ticked and a valid explanation e.g. "you would expect to get (approximately) equal frequencies if it was unbiased" "you would expect (approximately) 50 of each number" "6 was thrown a lot of times" "4 was not thrown a lot of times" "the frequencies are not the same" "All the frequencies are different."	E1	Award E1 if Yes or No box ticked but explanation clearly explains that the dice is biased. Allow: "they are not equal" "they are not the same".
12. (c)	$\dfrac{110}{300} \times 2400$ or equivalent	M1	May be shown in stages.
	= 880	A1	$\dfrac{880}{2400}$ gains M1A0. Mark final answer.
13.	(Area of square =) 184 − [15 × 9] = 49 (cm²) (Length of side of square =) 7 (cm) (Perimeter of square = 4 × √49 =) 28 (cm)	M2 A1 A1 B1	Award M1 for sight of 15 × 9 or 135 (cm²). FT from M2 only, √'their 49'. May be embedded or written on diagram. FT 'their derived 7'. May be written on diagram.
14.(a)	 20 AND 105 in correct position Total of 70 for *Black Hair* Overall total of 200	 B1 B1 B1	If 'notches/tallies' are used, penalise −1 once. B0 if any other number written in the same section. FT 'their 50' + 'their 20', provided both are non-zero values. Note: The answer below is awarded B1B0B1.

14.(b)	$\dfrac{45}{200}$ or $\dfrac{9}{40}$ or equivalent. ISW	B2	For B2 or B1, the numerator and denominator must be a whole number.

<table>
<tr><td>14.(b)</td><td>$\dfrac{45}{200}$ or $\dfrac{9}{40}$ or equivalent. ISW</td><td>B2</td><td>For B2 or B1, the numerator and denominator must be a whole number.

FT $\dfrac{\text{'their 20' + 'their 25'}}{200}$ provided both sections not blank.
Award B1 for one of the following:
• a numerator of 45 in a fraction < 1
• FT 'their 20' + 'their 25', provided both sections are not blank, as a numerator in a fraction < 1
• a denominator of 200 in a fraction < 1.

An answer of $\dfrac{45}{200}$ gains B2 regardless of 'their Venn diagram'.
Penalise incorrect notation (e.g. '45 in 200') −1.

Note:
 An answer of $\dfrac{20}{200}$ is awarded B2.

 An answer of $\dfrac{20}{200}$ is awarded B1.</td></tr>
<tr><td>15.</td><td></td><td></td><td><u>OVERLAY</u>
Treat reversed angles at A and C MR-1.
Correct construction arcs must be seen and angle drawn.
If B3, penalise -1 if triangle not completed.</td></tr>
<tr><td></td><td>Correct construction of 60° at A</td><td>B1</td><td></td></tr>
<tr><td></td><td>Correct construction of angle 45° at C</td><td>B2</td><td>Award B1 for one of the following:
• correct <u>construction</u> of angle 90° at C
• correct bisection of 90° at C, but their own perpendicular line at C drawn
• any correct bisection of 90° seen.</td></tr>
<tr><td>16. For a correct method that produces 2 prime factors from the set {3, 3, 5, 5, 7} before the 2nd error.</td><td></td><td>M1</td><td>Must be a method that involves only division.</td></tr>
<tr><td></td><td>3, 3, 5, 5, 7</td><td>A1</td><td>CAO for sight of the five correct factors (Ignore 1s)</td></tr>
<tr><td></td><td>$3^2 \times 5^2 \times 7$</td><td>B1</td><td>Do not FT non-primes.
FT 'their <u>primes</u>' provided at least one index form used with at least a square.
Allow $(3^2)(5^2)(7)$ and $3^2.5^2.7$
Do not allow $3^2,5^2,7$.
Inclusion of 1 as a factor gets B0.</td></tr>
</table>

17. (a) $6p^7q^8$		B2	Mark final answer. Award B1 for one of the following: • $6 \times p^7 \times q^8$ • $6p^7 \times q^8$ • $6 \times p^7 q^8$ • $6p^7 q^{\cdots}$ • $6p^{\cdots}q^8$ • kp^7q^8 $(k \neq 0$ or $6)$ • Sight of $6p^7$ **AND** q^8 in an expression (e.g. $6p^7 + q^8$).
17.(b) $\quad 7a^2 + 35a - 6a^2 - 12a + 14$		B2	Award B1 for one of the following: • sight of $7a^2 + 35a$ • sight of $-6a^2 - 12a + 14$ (brackets must be removed). Note: If $7a^2 + 35a \ - \ 6a^2 + 12a - 14 = a^2 + 23a + 14$ is seen, then award B2 B2 (brackets implied).
$\quad = a^2 + 23a + 14$		B2	*FT for B2 if at least two a^2 terms AND at least two a terms to be simplified.* *FT for B1 if at least two a^2 terms OR at least two a terms to be simplified.* Award B2 for $1a^2 + 23a + 14$. If B2 not awarded, award B1 for one of the following: • correct collection of 'a^2 terms' $(1)a^2$ • correct collection of 'a terms' $(+23a)$. This 2nd B2 (or B1) is for their **final** answer. A correct answer must come from correct workings seen, however $7a^2 + 35a \ - \ 6a^2 + 12a - 14 = a^2 + 23a + 14$ is awarded B2 B2 (brackets implied). Mark final answer. Penalise −1 from the final B1 or B2 mark for any one of the following: • incorrect subsequent working • any attempt to equate their expression to zero (and attempting to solve) • incorrectly factorising. Note (sign error): Award B1B2 for $7a^2 + 35a - 6a^2 + 12a - 14 = a^2 + 47a - 14$ $7a^2 + 35a - 6a^2 + 12a + 14 = a^2 + 47a + 14$ $7a^2 + 35a - 6a^2 - 12a - 14 = a^2 + 23a - 14$
18.(a) (i) $\quad\quad\quad\quad$ 4		B1	Accept 4/1 or equivalent. The correct gradient has to be unambiguously shown. $y = 4x - 2$ is B0, but $y = \boxed{4}x - 2$ is B1. Award B0 for a final answer of $4x$.
18.(a) (ii) $\quad\quad\quad y = 4x - 2$		B2	FT 'their gradient' from *(a)* Award B1 for one of the following: • $y = 4x \pm k$ • $y = kx - 2$ $(k \neq 0)$ • $4x - 2$ ('$y =$' missing) • $y = 4x + -2$.

18 (b) Valid explanation with rearranged equation AND indicating that the gradient is 3 or equivalent e.g. "2y - 6x = 23 is the same as $y = 3x + 11·5$, so the gradient of both lines is 3" "2y = 6x + 23 and 2y = 6x – 16 and the gradient of both lines is 3".	B2	B1 for one of the following: - sight of $y = 3x + k$ ($k \neq 0$ or -8) - sight of $y = \dfrac{6x + 23}{2}$ - showing 2 equivalent equations written in the same format e.g. 2y = 6x + 23 and 2y = 6x – 16 - unsupported statement that both the gradients are 3. Allow "the 3x or 3 show the lines are parallel" as an explanation. Do not allow: "the gradients are the same" unless the '3' is also given or unambiguously shown - gradient = 3x.

19.   (Volume)
              Area
              None
              Volume
              Length
              None
	B3	*Must use the terminology given in the question.*
		B3 for all 5 correct.
		B2 for 3 or 4 correct.
		B1 for 2 correct.
		B0 otherwise.

20.(a) $5(·0) \times 10^6$	B2	Mark final answer. Award B1 for one of the following: - sight of $0·5 \times 10^7$ - sight of 5 000 000 - equivalent correct value but not in standard form - sight of 30 000 AND 0·006 5×10^n ($n \geq 3$, but not 6), following one place value error in one of the given numbers.
20.(b) $4·795(0) \times 10^4$	B2	Mark final answer. B1 for one of the following: - sight of $479·5(0) \times 10^2$ $4·8(0) \times 10^4$ - sight of 47 950 - equivalent correct value but not in standard form - sight of 47 800 AND 150 'their 47 950' is written correctly in standard form, following one place value error in one of the given numbers or in the addition of 47 800 AND 150.
21.(a) $x = \sqrt{25^2 - 10^2}$	B1	
21. (b) $\sin 40° = \dfrac{y}{25}$	B1	

22. $POQ = 180 - (2 \times 38)$	M1	Check diagram for answers.
$104\ (°)$	A1	Award M1A1 for sight of 104.
$x = 52(°)$	B1	FT 'their 104' ÷ 2.
For two valid angle properties appropriately stated with at least one circle property (e.g. two radii make an <u>isosceles triangle</u> AND <u>angle</u> subtended by an arc <u>at the centre</u> of a circle is <u>twice the angle</u> subtended at the <u>circumference</u>).	E1	Award E1 for any one correct appropriate angle property AND any one appropriate correct circle property associated with correct workings. ISW any other incorrect properties. Allow "the angles in a triangle (add to 180°)" for the 'angle' property "angle at the centre (theorem)" "equal radii" for isosceles.
22. <u>Alternative method – angles in a semi-circle</u> Extending the line (PO or QO) to create a right-angled triangle	*S1*	*Shown on diagram.*
180 – 90 – 38	*M1*	*M1 implies S1.*
x = 52(°)	*A1*	
For two valid angle properties appropriately stated with at least one circle property (e.g. the angle subtended at the circumference by a semicircle is a right angle AND that angles in the same segment are equal)	*E1*	

23.	$5n - 7 > n + 26$ or equivalent.	B2	Award B2 for $5n - 7 > n + 19 + 7$. Award B1 for one of the following: • Sight of $5n - 7$ • Sight of $n + 26$ • Sight of $n + 19 + 7$.
	(Least number of apples Twm picked =) 9	B2	An answer must be given following work from an inequality. Award B2 for $n = 9$. FT for B2 or B1, from 'their <u>inequality</u>', if of equivalent difficulty (must be at least 3 terms with at least 2 'n' terms and a constant).

Possible scenarios:

1st B2	2nd B2	
Inequality used	B2 awarded for:	B1 awarded for:
$5n - 7 > n + 26$ B2 awarded	9	Sight of: • $4n > 33$ • $n > \dfrac{33}{4}$ or equiv • $8(\cdot 25)$ One slip in solving the inequality, but final answer rounded correctly
$5n - 7 > n + 19$ B1 awarded	7	Sight of: • $4n > 26$ • $n > \dfrac{26}{4}$ or equiv • $6(\cdot 5)$ One slip in solving the inequality, but final answer rounded correctly
$5n > n + 26$ B1 awarded		
$5n - 7 < n + 26$ B1 awarded		Sight of: • $4n < 33$ • $n < \dfrac{33}{4}$ or equiv

Unsupported answers or no inequality shown
If B0 B0, award SC1 for an unsupported answer of 9 without showing any working or no inequality shown.

Use of equations
If an equation is used throughout, a possible first B1 (see bullet points) and then B0 is awarded.

If B1 for an equation is awarded (see bullet points), a second B2 or B1 could be awarded if there is evidence that the equation has then been turned to an inequality (e.g. $n > 8 \cdot 25$, so answer is 9).

If an inequality is shown and then equation used, B2 B2 is possible.