GCSE MARKING SCHEME

AUTUMN 2022

GCSE
MATHEMATICS
UNIT 2 – INTERMEDIATE TIER
3300U40-1

INTRODUCTION

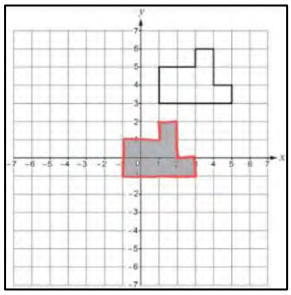
This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' 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

AUTUMN 2022 MARK SCHEME

Unit 2: Intermediate Tier	Mark	Comments
1.(a) Correct enlargement	B2	Allow correct enlargement in any orientation. B1 for three adjacent sides correctly enlarged in the same orientation. SC1 for an enlargement by a factor of 2 or 4.
1.(b) Correct translation. 	B1	Do not award B1 for sight of a correct translation with other shapes on the grid.
2. –36·2	B2	Mark final answer. Award B1 for one of the following: • sight of –64·4 (not –64·4p) • sight of (+)28·2 (not 28·2q and not –28·2) • –36·2 (with additional letters).
3. (Angle *EBC* = 180 – 112 =) 68 (°) (Angle *BED* or Angle *AED* =) 360 – (123 + 110 + 68) or equivalent 59 (°) x = 121 (°)	B1 M1 A1 B1	Check diagram for answers. Award M1 for complete method to find Angle *BED* or intention of complete method provided not contradicted e.g. 360 – 123 + 110 + 68 with 123 + 110 + 68 added incorrectly but attempt to subtract from 360. FT 360 – (123 + 110 + 'their 68'), provided 'their 68': • ≠ 112 • and < 127. FT 180(°) – 'their derived 59(°)', provided < 180 Unsupported answer (may be on diagram) is awarded B1M1A1B1.

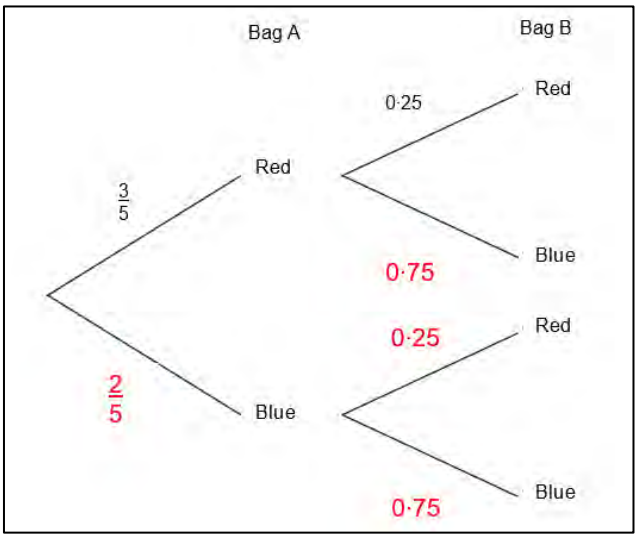
Organisation and Communication. Accuracy of writing.	OC1 W1	For OC1, candidates will be expected to: • present their response in a structured way • explain to the reader what they are doing at each step of their response • lay out their explanation and working in a way that is clear and logical • write a conclusion that draws together their results and explains what their answer means 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) Blue = 45 Yellow = 20 (Angle for Red =) $\frac{25}{90} \times 360$ or equivalent **OR** (Angle for Yellow =) $\frac{20}{90} \times 360$ or equivalent (Angle for Red =) 100(°) (Angle for Yellow =) 80(°)	 B1 B1 M1 A1 B1	Answer boxes take precedence. Number of counters must be whole numbers. FT 90 – 25 – 'their stated 45'. FT '$\frac{\text{their 20'}}{90} \times 360$ or equivalent. FT 360 – 180 – 'their stated 100'.
4.(b) Pie chart drawn correctly and both sectors labelled correctly Angle for Red = 100° Angle for Yellow = 80°	B2	For B2, FT their angles from (a), provided they add up to 180°. Allow tolerance of ±2° for all angles. Award B1 for one of the following: • correct angles but both not correctly labelled (1 or 2 omitted or reversed) • one correct angle (from FT) and correctly labelled.
4.(c) $\frac{70}{90}$ OR $\frac{7}{9}$ OR $\frac{280}{360}$ or equivalent. ISW	B2	FT 'their 45' + 25 or 'their 100°'+ 180°, where possible. Award B1 for one of the following: • a numerator of 70 or 280 in a fraction < 1 • a denominator of 90 or 360 in a fraction < 1 • sight of adding two correct fractions for red and blue. Penalise incorrect notation (e.g. '70 in 90') −1.
5. (a) 0·034	B1	
5. (b) 67 000	B1	
5. (c) $3(4e + 5)$	B1	

6. 30	B2	Answer line takes precedence. If answer line is left blank allow unambiguous indication of the answer. Award B1 for one of the following as a final answer: 6, 15, 18, 21, 22, 24, 26, 33, 34, 42, 66, 78… (satisfies 2 conditions)
7. 34·3	B2	Mark final answer. Award B1 for one of the following: • 34(·27167.....) • 34·2.
8.(a) 1 – (0·08 + 0·2 + 0·28) or equivalent = 0·44 or equivalent.	M1 A1	For the complete method. If no marks awarded, award SC1 for 55 pupils for Ysgol Bryn.
8.(b) 0·28 × 125 or equivalent. = 35 ISW	M1 A1	Unsupported 35/125 or equivalent implies M1A0.
9.(a) Position of *C* 300° from *B* Position of *C* 7cm from *B*	 B1 B1	 Allow tolerance of ±2°. Allow any unambiguous indication that the correct bearing has been drawn (e.g. dot, cross). Allow tolerance of ±2 mm.
9.(b) (AC =) 53 (km) Bearing = 018°	 B1 B1	 **Strict** FT 'their AC' × 5, with tolerance of ±1 km. **Strict** FT from their diagram. Must be a three-figure bearing. Allow tolerance of ±2°
10.(a) $\frac{21{\cdot}76}{32}$ (× 100%) or equivalent = 68 (%)	M1 A1	Allow 0·68 to imply M1.
10.(b) $5t - 3t = 14 - 3$ OR $3 - 14 = 3t - 5t$ $2t = 11$ OR $-11 = -2t$ $t = \frac{11}{2}$ or equivalent	B1 B1 B1	FT until 2nd error. Mark final answer. Correct answer implies B1B1B1. Do not allow $-t = -11/2$ or $t = -11/-2$. A final answer of '11 ÷ 2' is B1B1B0. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction. Allow B1B1B1 for a correct embedded answer BUT only B1B1B0 if contradicted by $t \neq 11/2$ or equivalent.
11. (Volume of cylinder =) $\pi \times 2{\cdot}3^2 \times 5$ = 83(·095….) (cm^3) or 26·45π (Density of metal =) 423·1 ÷ 83(·095….) Accept an answer between 5 and 5·1 (g/cm^3)	 M1 A1 M1 A1	 May be seen or implied in later working. Accept an answer between 83 and 83·11 inclusive. FT 423·1 ÷ 'their volume of cylinder', provided not 5 or 2·3 (derived or stated). Ignore any attempt to change units (e.g. 423·1 ÷ 83 ÷ 1000). Mark final answer.

11. <u>Alternative method:</u> *(Density of metal =)* $\frac{423{\cdot}1}{\pi \times 2{\cdot}3^2 \times 5}$ *Accept an answer between 5 and 5·1 (g/cm³)*	*M2* *A2*	*Award M1 for sight of* $\pi \times 2{\cdot}3^2 \times 5$. A1 for sight of 423.1/26.45π or 15.9(96…)/π or any other simplified fraction with **one** step left to carry out.
12. One correct evaluation $1 \le x \le 2$ 2 correct evaluations $1{\cdot}15 \le x \le 1{\cdot}35$, (one value < 0, one value > 0) 2 correct evaluations $1{\cdot}15 \le x \le 1{\cdot}25$, (one value < 0, one value > 0) $x = 1{\cdot}2$	B1 B1 M1 A1	*Correct evaluation regarded as enough to identify if < 0 or > 0.* *Look out for testing* $x^3 + 5x = 8$ *or equivalent* *If evaluations not seen accept 'too high' or 'too low'.* x | $x^3 + 5x - 8$ 1 | -2 1.1 | -1.169 **1.2** | **-0.272** **1.3** | **0.697** 1.4 | 1.744 1.5 | 2.875 1.6 | 4.096 1.7 | 5.413 1.8 | 6.832 1.9 | 8.359 2 | 10 1.15 -0.72913 1.22 -0.08415 1.23 0.010867 1.24 0.106624 **1.25 0.203125** 1.35 1.210375
13. <u>(Length of AB)</u> $18^2 = AB^2 + 10^2$ OR $(AB^2 =)\ 18^2 - 10^2$ or equivalent $(AB^2 =)$ 224 $(AB =)$ 14·9(66…) or 15 or $4\sqrt{14}$ or $\sqrt{224}$ (cm) (Area of the circle =) $\pi \times 9^2$ (Area of the triangle =) ½ × 10 × 14·9(66…) or equivalent 254.4(69…) (cm²) or 81π **AND** 74·8(33..) or $20\sqrt{14}$ (cm²) (Area of the shaded region = 254.4(69) – 74·8(33..) =) 179 to 180 (cm²)	M1 A1 A1 M1 M1 A1 B1	note: $(AB^2 =)$ 324 – 100 FT √'their 224' provided M1 gained for M1A0A1. *Alternative method to find AB* *A correct and complete method that would lead to a correct answer (using trigonometric relationships). M2* *(AB =) 14·9(66…) or 15 or 4√14 or √224 (cm) A1* Award M1 for sight of 75 or $20\sqrt{14}$. FT ½ × 10 × 'their *AB',* provided not 18 or 10. Accept any valid method that leads to a correct answer. An answer between 254·3 and 254·51 (cm²). Allow 254. Allow 75. Allow rounded or truncated answers. FT 'their area of a circle' – 'their triangle' (not 'their *AB*') provided at least one area M1 awarded previously.

14.(a) $3y \times (y + a)$ or $3y^2 + 3ay$ or equivalent	B1	Award B1 for intention of width × length. Allow $3y \times y + a$ for B1.
$(a =)$ 4	B2	Award B1 for one of the following: • $3y^2 + 3ay = 3y^2 + 12y$ • $3a = 12$ • $3ay = 12y$. Award B1B2 for unsupported answer of $(a =)$ 4. Allow B1B2 for a correct embedded answer BUT only B1B1 if contradicted by $a \neq 4$ or equivalent.
14.(a) <u>Alternative Method</u> (Area =) $3y\ (y + 4)$	*B2*	*Accept $3y(1y + 4)$.* *Award B1 for one of the following:* • $3y(y \pm .....)$ • $3y(..... + 4)$ • $3(y^2 + 4y)$ • $y(3y + 12)$
$(a =)$ 4	*B1*	*CAO*
14.(b) (i) Valid written explanation referring to negative values **representing sides** e.g. " $(4 \times 2 - 10 = -2)$ you can't have a negative value for a side" "x must be greater than 2·5 to have a positive value for the side"	E1	Allow "you can't have a negative length". Do not allow • calculations only • "it can't be negative" • "the value can't be negative".
14.(b)(ii) $14x - 4 - 2 \times (4x - 10)$ OR $14x - 4 - 8x + 20$ or equivalent	M2	May be seen on diagram. Award M1 for intention for a method e.g. $4x - 10 + 4x - 10 + \mathbf{?} = 14x - 4$ e.g. $14x - 4 = \mathbf{?} + 2 \times (4x - 10)$ e.g. incorrect use of brackets but a clear attempt at the correct calculation is seen: $14x - 4 - 8x - 20$.
(sum of both lengths=) $6x + 16$	A1	FT from M1: $14x - 4$ – 'their $2 \times [4x - 10]$' or equivalent, provided 'their $8x - 20$' can be expressed in the form $ax + b$, with a & b ≠ 0. Note: $14x - 4 - 8x - 20 = 6x - 24$ is awarded M1A1.
(length=) $3x + 8$	B1	May be seen on diagram. Mark final answer. FT 'their $6x + 16$' ÷ 2, provided in the form $ax + b$, with a & $b \neq 0$. Unsupported $3x + 8$ is awarded M2 A1 B1. If no marks awarded, award SC1 for a final answer of: • $3x + c$ $(c \neq 8)$ • $kx + 8$ $(k \neq 3$ and positive).

Alternative method: *Sight of an appropriate* $7x - 2$ $7x - 2 - 4x + 10$ *(length=)* $3x + 8$	*B1* *M2* *A1*	*May be seen on diagram.* Award M1 for intention for a method e.g. $4x - 10 + \mathbf{?} = 7x - 2$ *$[14x - 4] \div 2 - [4x - 10]$ or equivalent* *e.g. incorrect use of brackets but a clear attempt at the correct calculation is seen* *May be seen on diagram.* Mark final answer. *Allow FT from M1.* Unsupported $3x + 8$ is awarded B1 M2 A1. If no marks awarded, award SC1 for a final answer of: • $3x + c$ ($c \neq 8$) • $kx + 8$ ($k \neq 3$ and positive).
15. $YZ = \frac{7}{\cos 41(°)}$ or $7 \div \cos 41(°)$ = 9·27(…) or 9·28 (cm) or 9.3 (cm)	M2 A1	Award M2 for $YZ = 7 \div \sin 49$ (×sin90) or $\frac{7 (\times \sin 90)}{\sin 49}$ Award M1 for one of the following: • $\cos 41 = \frac{7}{YZ}$ • $\sin 49 = \frac{7}{YZ}$ • $\frac{YZ}{\sin 90} = \frac{7}{\sin 49}$. Accept 9 (cm) from correct working. CAO.
15. Alternative method: ***Correct** use of 'two-step' method.* *= 9·27(…) or 9·28 (cm) or 9.3 (cm)*	*M2* *A1*	*A partial trigonometric method is M0.* *Accept 9 (cm) from correct working.*
16. 25·55 (seconds) – 12·35 (seconds) OR 25·5 (seconds) – 12·4 (seconds) + 2 × 0·05 (sec) = 13·2 (seconds)	M2 A1	Award M2 for **USE** of the correct bounds. If many attempts are offered without a method/answer being identified, then mark the final attempt. If M2 not gained, award M1 A0 for correct **USE** of values $12{\cdot}3 \leq t < 12.4$ and $25.5 < t \leq 25{\cdot}6$. [Note: 25·54$\dot{9}$ is equivalent to 25·55 and with an answer of 13.2 (seconds) gains all 3 marks] CAO. Mark final answer. Unsupported 13·2 is awarded M2 A1.
17. $\frac{64}{160} \times 100$ OR $\frac{64}{1{\cdot}6}$ or equivalent = 40	M1 A1	Do not award M1 for 160% = 64. Award M1A1 for an embedded answer (e.g. $40 \times 1{\cdot}6 = 64$ or $\frac{64}{40} \times 100 = 160$), BUT only M1A0 if contradicted by stating original amount $\neq 40$. Unsupported 40 is awarded M1 A1. Unsupported 40% is awarded M0 A0.

18. (a) Complete diagram  	B2	Award B1 for **one** of the following: • 2/5 or equivalent on 'Blue' Bag A branch • 0·75 or equivalent on a correct 'Blue' Bag B branch.
18. (b)		Check diagram for answers. FT 'their 2/5' from bag A blue branch, only if between 0 and 1. FT 'their 0.75' from bag B blue branch, only if between 0 and 1.
Sight of $\frac{3}{5} \times 0{\cdot}25$ **OR** $\frac{2}{5} \times 0{\cdot}75$ or equivalent	B1	Award B1 for sight of 0·15 **OR** 0·3 or equivalent.
$\frac{3}{5} \times 0{\cdot}25$ **+** $\frac{2}{5} \times 0{\cdot}75$ or equivalent	M1	Award M1 for 0·15 + 0·3.
0·45 or 9/20 or equivalent ISW	A1	Only FT, provided answer is less than 1.
19.		
Method to eliminate one variable e.g. equal coefficients **AND** appropriate intention to add or subtract or use a method of substitution.	M1	Allow one error in one term (not the term with equal coefficients).
First variable found $x = -4$ or $y = 2$	A1	CAO. Answer must be whole number (e.g. not $x = -12/3$)
Substitute to find the 2nd variable.	m1	FT substitution of their '1st variable' if M1 gained.
Second variable found.	A1	If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction. No marks for 'trial and improvement'. No marks for an unsupported answer.