GCSE MARKING SCHEME

AUTUMN 2021

GCSE
MATHEMATICS
UNIT 2 – INTERMEDIATE TIER
3300U40-1

INTRODUCTION

This marking scheme was used by WJEC for the 2021 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 2021 MARK SCHEME

Unit 2: Intermediate Tier	Mark	Comments
1.(a) $7x = 14$ $x = 2$	B1 B1	 FT from $7x = k$. Accept $x = k/7$ (but, if on FT k is a multiple of 7, final answer must be given as a whole number.) B1B0 for '$x = 14/7$' An evaluated FT for $k \div 7$ must be rounded or truncated to at least 2dp. e.g. $7x = 8$ (B0) followed by, $x = 8 \div 7$ (B0) $x = 8/7$ (B1), $x = 1^1/_7$ (B1), $x = 1·14$ (B1), $x = 1·1$ (B0) Mark final answer. Allow 2 marks for embedded answer BUT only 1 mark if contradicted by $x \neq 2$.
1.(b) 10	B2	C.A.O. B1 for sight of 17·4 OR −7·4 Do not accept 17·4f nor −7·4g Do not treat the use of 3·7 for −3·7 as a misread.
2.(a) $\frac{24}{54}$	B1	
2.(b) 23	B1	
2.(c) 1853	B1	
3. (Total number of paper clips =) $200 \times 440 \times n$ where $320 \le n \le 330$. Correct evaluation. (To the nearest ten million) 30 000 000 (paper clips)	M2 A1 B1	M1 for $200 \times n$ OR $440 \times n$ where $320 \le n \le 330$. Allow use of 400 or 450 for 440. *Note* *If n taken to be 225 or 425 treat as a misread and allow M2 but penalise −1 from any further A1, B1 marks gained.* CAO from their numbers if M2 gained. (n=320 gives 28 160 000, n=325 gives 28 600 000, n=330 gives 29 040 000.) FT 'their evaluation' if greater than 5 million. A final answer of 30 million implies M2A1B1. Allow M2A0B0 for an unsupported final answer of 28 000 000 or 29 000 000.
OCW 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) 3	B1	If no answer seen, check table.
4.(b) 15	B1	If no answer seen, check table.

5.(a) (0)7:45 23 (March)	B2	B1 for each. B0 for (0)7:45 p.m.
5.(b) Sight of 5 miles ≡ 8 km or equivalent. Shows 15 miles to be 24 km AND a valid statement e.g. 'yes (it's nearly 25 km'), 'no (it's only 24 km').	B1 B1	Allow a more accurate conversion (5 miles ≡ 8 to 8·05 km). Do not accept 3 miles ≡ 5 km '15 miles is 24 km' with no statement is B1B0. Accept a one word decision of 'Yes' or 'No' as a statement.
Alternative method *Sight of 8 km ≡ 5 miles or equivalent.* *Shows 25 km to be 15·625 miles AND* *a valid statement e.g.* *'yes (it's just over 15 miles'), 'no (it's over 15 miles)'.*	*B1* *B1*	*Allow a more accurate conversion* *(8 km ≡ 4·97 to 5 miles).* *Do not accept 5 km ≡ 3 miles* *'25 km is 15·625 miles' with no statement is B1B0.* *Accept a one word decision of 'Yes' or 'No' as a statement.*
6. Correct strategy of √(Area ABCD – 32) (Area ABCD =) 81 (cm^2) (Area PQRS = 81 – 32 =) 49 (cm^2) (PQ = √49 =) 7 (cm)	S1 B1 B1 B1	 FT 'their stated area of ABCD' – 32. FT √'their stated area of PQRS' but not √32 or √9 A final answer of 7(cm) gains all four marks. May be seen on the diagram. (FT answers must be rounded or truncated to 1dp or more)
7.(a) 1·442	B2	B1 for sight of 1·44(1……) or 1·44(2……)
7.(b) 191	B3	B2 for sight of 190(·5…..) or 190·6 B1 for sight of 280.
8. (P(Gold) =) 1 − 0·68 − 0·22 = 0·1 22 people choose silver AND 10 people choose gold (Profit =) 100 × (£)2 – 22 × (£)3 – 10 × (£)8 = (£)54	M1 A1 B1 M1 A1	 May be seen in the table. FT 100 × 'their 0·1'. The 10 implies previous M1A1. The 22 and 10 may be seen in further work. FT 'their stated number of winners (silver and gold)'.
Alternative method1 *(P(Gold) =) 1 − 0·68 − 0·22* *= 0·1* *22 people choose silver AND 10 people choose gold* *(Profit =) 68 × (£)2 – 22 × (£)1 – 10 × (£)6* *= (£)54*	 *M1* *A1* *B1* *M1* *A1*	 *May be seen in the table.* *FT 100 × 'their 0·1'. The 10 implies previous M1A1.* *The 22 and 10 may be seen in further work.* *FT 'their stated number of winners (silver and gold)'.*
Alternative method 2. *(P(Gold) =) 1 − 0·68 − 0·22* *= 0·1* *(Profit per game =)(£)2 − 0·22 × (£)3 − 0·1 × (£)8* *= (£)0·54* *(Total profit = £0·54 × 100 =) (£)54*	 *M1* *A1* *M1* *A1* *B1*	 *May be seen in the table.* *FT 'their 0·1.* *FT 'their derived £0·54'.*
Alternative method 3. *(P(Gold) =) 1 − 0·68 − 0·22* *= 0·1* *(Profit per game =)0·68×(£)2 − 0·22×(£)1 − 0·1×(£)6* *= (£)0·54* *(Total profit = £0·54 × 100 =) (£)54*	 *M1* *A1* *M1* *A1* *B1*	 *May be seen in the table.* *FT 'their 0·1.* *FT 'their derived £0·54'.*
9.(a) −1·3 0·4 2·1	B2	B1 for two correct in the correct position. OR for −3, −1·3, 0·4.
9.(b) 10(th term)	B1	Allow B1 for 10(th) and 14. B0 if only 14 given in answer space. NOTE: If answer to 9(a) is −3, −1·3, 0·4 then allow an answer of 11(th term)

10. $4(3a - 7) + 2(5a + 4)$ or equivalent. $= 12a - 28 + 10a + 8$ or equivalent. $= 22a - 20$ (cm) or $2(11a - 10)$ (cm)	B1 B1 B1	For a correct expression for the perimeter. For removal of brackets FT only from $2(3a - 7) + (5a + 4)$ or equivalent OR $2(3a - 7) + 2(5a + 4)$ or equivalent. For collection of terms FT if of equivalent difficulty. Mark final answer.
Alternative approach *$2[2(3a - 7) + (5a + 4)]$* *$= 12a - 28 + 10a + 8$ or $2(6a - 14 + 5a + 4)$* *$= 22a - 20$ (cm) or $2(11a - 10)$ (cm)*	 *B1* *B1* *B1*	. *For a correct expression for the perimeter.* *For removal of brackets (within 'square brackets')* *FT only from* *$2[2(3a - 7) + 2(5a + 4)]$ or equivalent.* For collection of terms *FT only from* *$2[2(3a - 7) + 2(5a + 4)]$ or equivalent.* *FT if of equivalent difficulty.* *Mark final answer*
11. (number of part-time in North Wales =) $\frac{90}{360} \times 96$ OR (number of full-time in North Wales =) $\frac{144}{360} \times 150$ (number of part-time in North Wales =) 24 (number of full-time in North Wales =) 60 (Probability from North Wales =) $\frac{84}{246}$ or equivalent ISW	M1 A1 A1 A1	Or equivalent *Answers may be seen on the diagram.* An answer (or sight) of 24 implies M1. An answer (or sight) of 60 implies M1. FT ('their 24' + 'their 60') /246 provided M1 gained and ('their 24' + 'their 60') < 246. Penalise incorrect notation −1. e.g. '84 in 246'.
12. One correct evaluation $2 \le x \le 3$ 2 correct evaluations $2{\cdot}25 \le x \le 2{\cdot}45$, one < 20, one > 20. 2 correct evaluations $2{\cdot}25 \le x \le 2{\cdot}35$, one < 20, one > 20. $x = 2{\cdot}3$	 B1 B1 M1 A1	*Correct evaluation regarded as enough to identify if <20 or >20. If evaluations not seen accept 'too high' or 'too low'.* *Look out for testing $x^3 + 3x - 20 = 0$* <u>*x*</u> <u>*$x^3 + 3x$*</u> 2 14 2·1 15·561 2·2 17·248 2·25 18·140…. **2·3** **19·067** **2·35** **20·027….** **2·4** **21·024** 2·45 22·056…. 2·5 23·125 2·6 25·376 2·7 27·783 2·8 30·352 2·9 33·089 3 36 <u>*Note*</u> *Evidence for M1 must be* ***<u>seen</u>*** *before A1 can be awarded.*

13. $5x - 17 + 2x + 9 + x + 20 = 180$ $8x = 168$ $x = 21$ Substituting $x = 21$ into at least one expression. $(5x - 17 =)\ 88(°)\ (2x + 9 =)\ 51(°)\ (x + 20 =)\ 41(°)$ (So not a right-angled triangle)	M1 A1 A1 M1 A1	 F.T. from ax = b. Allow all 3 marks for x = 21. If $x \neq 21$ FT 'their derived value of x'. F.T. for this A1 if $x \geq 4$. Any **two** of these expressions correctly evaluated with no incorrect evaluation, provided the sum of the two found is > 90. (statement not required). *Note* *If further work indicates that the values found are not treated as angles (e.g. showing $51^2 + 41^2 \neq 88^2$) then award final M0A0.*
Alternative method *$5x - 17 = 90$ OR $2x + 9 = 90$ OR $x + 20 = 90$* *$x = 21{\cdot}4$ AND $x = 40{\cdot}5$ AND $x = 70$* *Then verifying:* *If $x = 21{\cdot}4$: $5x - 17 + 2x + 9 + x + 20 = 183.2$* *AND* *If $x = 40{\cdot}5$: $5x - 17 + 2x + 9 + x + 20 = 336$* *AND* *If $x = 70$: $5x - 17 + 2x + 9 + x + 20 = 572$* *(So not a right-angled triangle)*	 *M1* *A2* *A2*	 *Award A1 for any one of these:* *$x = 21{\cdot}4$ OR $x = 40{\cdot}5$ OR $x = 70$* *Award A1 for any one of these:* *If $x = 21{\cdot}4$: $5x - 17 + 2x + 9 + x + 20 = 183.2$* *OR* *If $x = 40{\cdot}5$: $5x - 17 + 2x + 9 + x + 20 = 336$* *OR* *If $x = 70$: $5x - 17 + 2x + 9 + x + 20 = 572$*
14. (AB =) $13{\cdot}8 \times \cos 41$ OR $13{\cdot}8 \times \sin 49$ $= 10{\cdot}4(\ldots)$ (cm)	M2 A1	M1 for $\cos 41 = \frac{AB}{13{\cdot}8}$ OR $\sin 49 = \frac{AB}{13{\cdot}8}$
Alternative method: ***Correct** use of 'two-step' method.* *(AB) $= 10{\cdot}4(\ldots)$(cm)*	 *M2* *A1*	 *A partial trigonometric method is M0.* *Accept an answer that rounds to $10{\cdot}4$(cm)*
15.a(i) $x^3 + 7x$	B2	B1 for sight of $x^3 +$ ……. OR ……$+ 7x$. Do not accept $x \times x \times x + x \times 7$ etc. Mark final answer.
15(a)(ii) $3x^2 - 4x - 15x + 20$ $3x^2 - 19x + 20$	B1 B1	Must be an expression. FT from an error in only one term (out of 4) only if of the form $ax^2 \pm bx \pm cx \pm d$.
15.(b)(i) $5n - 27 < n$ OR $n > 5n - 27$	B2	Allow B2 for an equivalent correct inequality. e.g. $4n - 27 < 0$. B1 if ≤ or ≥ used in a 'correct' inequality. OR B1 for $5n - 27 > n$ OR $n < 5n - 27$
15.(b)(ii) $4n < 27$ $n < \frac{27}{4}$ (Greatest number of clocks =) 6	B1 B1 B1	FT 'their inequality' if of equivalent difficulty. FT only from an < b OR an ≤ b OR an > b OR an ≥ b. FT only from n < c where c is positive OR n ≤ d where d is positive and not an integer An answer of 6 gains all 3 marks.

16.(a) $N \div 1{\cdot}04$	B1	
16.(b) $248{\cdot}832$	B2	Allow B2 if 248·832 <u>seen</u> then corrected to a <u>final answer</u> of 249 or 248·8(..). If B2 not awarded, B1 for <u>final answer</u> of 249 or 248·(…) i.e. 248·832 not seen. B1 for sight of $100 \times 1{\cdot}2^5$ or for equivalent calculations, e.g. $144 \times 1{\cdot}2^3$ or $100\times1{\cdot}2\times1{\cdot}2\times1{\cdot}2\times1{\cdot}2\times1{\cdot}2$ (may be seen in stages) B1 for a final answer of 298·5984.
17. $(x-6)(x+2)$ $(x =)\ 6$ AND $(x =)\ -2$	B2 B1	B1 for $(x \ldots 6)(x \ldots 2)$. Strict F.T. from their <u>brackets.</u> Penalise change of letter −1. Allow the following. B2 for $x - 6\ (=0)$ AND $x + 2\ (=0)$ (B1) $(x =)\ 6$ AND $(x =)\ -2$ (B1) B1 for $x + 6\ (=0)$ AND $x - 2\ (=0)$ (B0) $(x =)\ -6$ AND $(x =)\ 2$ (B1) FT B1 if only $(x =)\ 6$ AND $(x =)\ -2$ seen. (B1) Use of quadratic formula would only lead to this B1. Mark final answer.