GCSE MARKING SCHEME

AUTUMN 2020
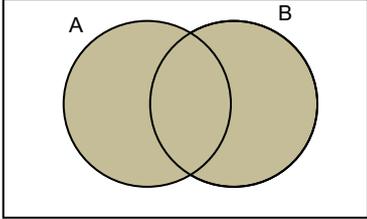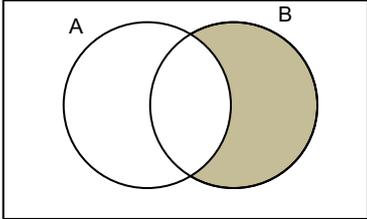
**GCSE
MATHEMATICS – UNIT 1 (HIGHER TIER)
3300U50-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2020 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.
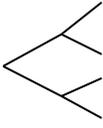
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

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

WJEC GCSE MATHEMATICS

AUTUMN 2020 MARK SCHEME

GCSE *Mathematics* Unit *1*: *Higher* Tier	Mark	Comments
1.(a)　　　5n − 3	B2	B1 for sight of 5n. Mark final answer.
1.(b)　　　　17	B1	
1.(c)　　2n + 2　　OR　　2(n + 1)	B2	If 2n + 2 is not their final answer allow B1 for sight of 2n + 2 in earlier work. B1 for a correct answer not simplified or incorrectly simplified e.g. n + n + 2.
2.(a)(i)	B1	
2.(a)(ii)	B1	
2.(b)　　A valid statement. e.g. 'all multiples of 6 are also multiples of 3' 'because 3 goes into 6', '6 is a multiple of 3'. '3 is a factor of 6'.	E1	Allow e.g. '(set) C is a subset of (set) A'. 'it is a multiple of 3' ' 6, 12, … are also multiples of 3'.
3.(a)　　　9　　　　　−7	B2	B1 for each.
3.(b) At least 6 correct plots and no incorrect plot.	P1	FT 'their (−2,9)' and 'their (2,−7)' Allow ± '½ a small square'.
A smooth curve drawn through their plots.	C1	FT 'their 8 plots'. OR a curve through the 6 given points and (−2,9) and (2,−7). Allow intention to pass through their plots. (± 1 small square horizontal or vertical.)
3.(c)　　　Line y = 1 drawn	B1	Must be at least 2cm long.
−0·8　　AND　　4·8	B1	FT intersection of 'their curve' with 'their y = 1' only if exactly two points of intersection and y ≠ 0. If curve drawn, but no line drawn, allow a FT from intersection of 'their curve' with the line y = 1 only if exactly two points of intersection for B0 B1. Allow ± '1 small square'.

4. (One part =) (£)210 ÷ 3			M1	
		= (£)70	A1	
(Total amount =)				FT 'their (£)70' only if M1 gained.
14 × (£)70 OR (£)210 + 4 ×(£)70 + 7 × (£)70			m1	Allow m1 for sight of 210 AND 280 AND 490 together as the three shares.
		= (£)980	A1	*For 210 ÷ 3 × 14 M3* * = 980 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

5.   4   5   11   12   OR
          4   6   10   12   OR
          4   7   9   12
			B3	May be written in any order.
				B1 for Range = 8.
				B1 for Median = 8.
				B1 for Total = 32.
				Penalise −1 **once only** for repeated values, negatives or fractional answers
				e.g. 4, 8, 8, 12 earns B1 B1 B1 −1 (2 marks),
				      8, 8, 8, 8 earns B0 B1 B1 −1 (1 mark).

6.(a) $(x − 4)(x − 3)$
          $(x =)$ 4 AND $(x =)$ 3
			B2
			B1
				B1 for $(x ... 4)(x ... 3)$. Ignore '= 0'.
				<u>Strict</u> FT from their <u>brackets.</u>
				Allow the following.
				B2 for $x − 4$ (=0) AND $x − 3$ (=0) (B1)
				              $(x =)$ 4 AND $(x =)$ 3 (B1)
				
				B1 for $x + 4$ (=0) AND $x + 3$ (=0) (B0)
				              $(x =)$ −4 AND $(x =)$ −3 (B1) FT
				
				B1 if only $(x =)$ 4 AND $(x =)$ 3 seen. (B1)

6(b) $25x^2 – 20x + 4$			B2	Otherwise B1 for sight of $25x^2 ± kx + 4$ (allow k = 0) B1 for sight of $25x^2 − 20x − 4$ Mark final answer.

7.(a) Correct framework 	B1		
Suitable labelling on both 1ˢᵗ pair of branches AND on both of at least one pair of 2ⁿᵈ set of branches. e.g. 'Car', 'No car', 'Before 8', 'After 8'. OR Titles of 'Car' and 'Before 8' with branch endings of 'Yes' and 'No'.	B1	Accept any unambiguous wording.	
Correct probabilities on first pair of branches 0·7 AND 0·3 (for 'Car', 'No car') OR 0·4 AND 0·6 (for 'Before 8', 'After 8')	B1	Must be consistent with their labelling. Allow this B1 if no headings given, <u>unless</u> contradicted by, or inconsistent with, further labelling.	
Correct probabilities on second two sets of branches 0·4 AND 0·6 correctly placed (following 0·7 and 0·3) OR 0·7 AND 0·3 correctly placed (following 0·4 and 0·6)	B1	Allow this B1 if no headings given, <u>unless</u> contradicted by, or inconsistent with, further labelling. Allow this B1 if only shown on one set of branches. Provided not contradicted on the other set of branches.	

7.(b) 0·7 × 0·4 or equivalent. = 0·28 or equivalent.	M1 A1	No FT. M1A0 for a final answer of 0·28%. Mark final answer.
8.(a) PA = 12(cm) AND correct theorem given, e.g. 'tangents from an external point are equal in length'.	E1	Must use the words '<u>tangents' AND 'equal (identical/same)'.</u> Do not accept e.g. 'PA = PB'. (E0) Accept alternative correct answers.
8.(b) PÂO = 90(°) AND correct theorem given, e.g. 'the tangent at any point on a circle is perpendicular to the radius at that point'.	E1	Must use the words '<u>tangent</u>' AND '<u>radius (diameter)</u>' Allow e.g. 'radius and tangent meet at 90'. (E1) Do not accept e.g. 'PA and OA meet at 90'. (E0)
8.(c) (Area PAOB =) 2 × 12 × 4 / 2 or equivalent.	M1	OR FT 'their PA' × 4 + 12 × 4 2 2 M0 for 48 × 2 or 12 × 4 × 2 (= 96)
= 48 (cm²)	A1	An unsupported final answer of 48 gains both marks. If no marks gained allow SC1 for sight of 24(cm²) OR a correct evaluation of ('their PA' × 4) / 2.
9.(a) y = 2·5x + 3	B1	
9.(b) y = 3x − 5	B1	
9.(c) Line D	B1	
10.(a) $t \, \alpha \, 1 / g$ OR $t = k / g$ 36 = k / 25 OR k = 900	B1 M1	Allow $t \, \alpha \, k / g$ FT from $y \, \alpha \, 1 / x^n$ with $n \neq 1$, n>0 No FT from direct proportion M1 implies B1.
t = 900 / g	A1	May be seen explicitly in part *(b)*. Do not allow $t \, \alpha \, 900 / g$ for the A mark
10.(b) (900/20 =) 45 (days)	B1	FT 'their formula' only if non-linear.
10.(c) Sight of 900/40	M1	FT 'their formula' only if non-linear and of equivalent difficulty
22 (goats)	A1	M1 A0 for an answer of 22·5 or 23 For A1, FT for equivalent difficulty i.e. need to round down an answer with a decimal part of 0.5 or over. Allow use of trial and improvement for M1, provided 22 or 23 seen. A0 for incorrect working e.g. 90/4 given as 22.2, leading to 22.
11. (a) $(^3\sqrt{m})^2$	B1	
11. (b) $p^{\frac{1}{4}}$	B1	

12. $6(2x+1) - 4(3x-5)$ as a <u>numerator</u> within a single fraction	M1	Allow intention of brackets, e.g. $6 \times 2x + 1 - 4 \times 3x - 5$
$(3x-5)(2x+1)$ as a <u>denominator</u>	M1	
h26 / $(3x-5)(2x+1)$	A1	CAO. Allow $26 / (6x^2 - 7x - 5)$ (If expanded, the denominator must be correct.) If M1 M1 A1, penalise further incorrect work -1. If no marks awarded, then SC1 for sight of 26.
13. (Linear scale factor =) $\sqrt[3]{(1280 / 20)}$ (= 4)	B1	Or equivalent. Accept a method based on ratios e.g. 1 : 4 (from 20 : 1280 = 1 : 64 = 1 : 4^3)
$\sqrt[3]{(1280 / 20)} \times 2 \cdot 3$ = 9·2 (cm)	M1 A1	FT their derived scale factor (from $\sqrt[3]{}$). SC1 for an answer of 18.4 (using s.f. of 8, from $\sqrt{64}$).
Alternative method (using reciprocal scale factor) *(Linear scale factor =)* $\sqrt[3]{(20 / 1280)}$ *(= 1 / 4)*	*B1*	*Or equivalent.* *Accept a method based on ratios.*
$2 \cdot 3 \div \sqrt[3]{(20 / 1280)}$ *OR* $1 / \sqrt[3]{(20 / 1280)} \times 2 \cdot 3$ *= 9·2 (cm)*	*M1* *A1*	*FT their derived scale factor (from $\sqrt[3]{}$).*
14. (a) $10x = 8 \cdot 121212.....$ and $1000x = 812 \cdot 1212....$ <u>with</u> an attempt to subtract on both sides	M1	Or x and $100x$, or equivalent. Or a <u>complete</u> alternative method.
804/990 (= 402/495 = 134/165)	A1	An answer of 80·4/99 gains M1 only. ISW
Alternative method *$0 \cdot 8 + 0 \cdot 0121212.....$ = 8/10 + 12/990 or equivalent*	*M1*	
804/990 (= 402/495 = 134/165)	*A1*	*ISW*
14. (b) $\quad 6\sqrt{2}$	B1	
14. (c) $7 \times 3 + 7\sqrt{5} - 3 \times 2\sqrt{5} - 2(\sqrt{5})^2$ or equivalent	M1	
$= 11 + \sqrt{5}$	A1	Mark final answer. Accept 11 + 1$\sqrt{5}$. If no marks awarded, SC1 for 3 correctly simplified terms i.e. 21, $7\sqrt{5}$, $- 6\sqrt{5}$, $- 10$.
15. • *FG = HG* (since *G* is the midpoint of *FH*) • *EG* is a common side • Angle *EGF* = Angle *EGH* (since *EG* and *FH* are perpendicular)	B1 B1 B1	Do not accept indications on the diagram.
SAS (or two sides and the <u>included</u> angle) so that EFG and EHG are congruent triangles.	B1	FT from B2 previously awarded. Must be convincing. Do not allow 'two sides and an angle'.
Allow alternative method • *FG = HG (since G is the midpoint of FH)* • *EG is a common side* • *EF = EH using Pythagoras*	*B1* *B1* *B1*	*Do not accept indications on the diagram.* *Must be convincing. An unsupported statement that EF = EH, or that triangle is 'isosceles', is insufficient.*
SSS (or all corresponding sides equal) *so that EFG and EHG are congruent triangles.*	*B1*	*FT from B2 previously awarded. Allow RHS.* *Must be convincing.*

16. Sight of $4y^2 = 3 + my^2$	B1	FT until 2nd error for equivalent level of difficulty. Squaring. Allow $2^2 y^2$ or $(2y)^2$ for $4y^2$.
$(4 - m) y^2 = 3$ OR $4y^2 - m y^2 = 3$ or equivalent	B1	Isolating terms in y^2. FT a formula with three or more terms AND with at least two terms in y^2.
$y^2 = 3 / (4 - m)$ OR $y^2 = -3 / (m - 4)$	B1	Isolating y^2.
$y = \pm \sqrt{[3 / (4 - m)]}$ OR $y = \pm \sqrt{[-3 / (m - 4)]}$	B1	Taking square root. Allow omission of $\pm$.
17. (a) $y = f(x) + 5$	B1	Correct notation required.
17. (b) $y = -f(x)$	B1	Correct notation required.
18. Sight of $x = (\sqrt{\pi}) \times r$ OR $x = \sqrt{(\pi r^2)}$ or equivalent	B1	Allow an equivalent expression, e.g. r = $x / (\sqrt{\pi})$ or r = $\sqrt{(x^2 / \pi)}$. Allow use of 3.14 for π.
Convincing concluding argument e.g. x is irrational since π (and therefore $\sqrt{\pi}$) is irrational.	E1	E1 depends on B1. Accept e.g. multiplying an integer by $\sqrt{\pi}$ will not produce another integer; multiplying an integer by $\sqrt{\pi}$ will produce an infinite decimal. Do not accept a reason based on $\sqrt{\pi}$ not being a whole number. Consideration of a specific numerical case gains no credit.
Allow an alternative method *x^2 and πr^2 both seen <u>WITH</u> a related statement about* • *squares of integers, or* • *rational / irrational numbers, or* • *(infinite) decimal numbers.* *e.g.* *πr^2 (or 3.14 r^2) cannot be a square number;* *multiplying an integer by π (or 3.14) cannot produce a square number;* *πr^2 is irrational;* *π times an integer (squared) is a decimal (or cannot be an integer).*	*E1*	*For $x^2 = \pi r^2$, allow an equivalent equation,* *e.g. $r^2 = x^2 / \pi$.* *Allow use of 3.14 for π.* *Do not accept a statement that 3.14 r^2 is not an integer or that 3.14 r^2 is irrational.*
Convincing concluding argument leading to x (not x^2) being a non-integer *e.g. x is irrational since x^2 is irrational;* *x is not an integer since x^2 is a decimal.*	*E1*	*Depends on previous E1* *Consideration of a specific numerical case gains no credit.*

19. (a) 1/11×6/10 or equivalent	M1	
= 6/110 (= 3/55)	A1	ISW
19. (b) 6/11×5/10 + 4/11×3/10 [+ 1/11×0/10]	M2	FT use of consistent incorrect denominator e.g. 120 Full method for finding P(R, R) + P(G, G) [+ P(Y,Y)] M1 for sight of 6 /11×5/10 or 4/11×3/10
= 42/110 (= 21/55)	A1	ISW If no marks, SC1 for an answer of 53/121 (method with replacement)
19. (c) 1 – 7/11×6/10 or equivalent	M2	FT use of consistent incorrect denominator e.g. 120 M1 for 7/11×6/10
= 68/110 (= 34/55)	A1	ISW
Alternative method 1 *1 – [6/11×5/10 + 6/11×1/10 + 1/11×6/10]* *or equivalent*	M2	*FT use of consistent incorrect denominator e.g. 120* *Full method for finding* *1 – [P(R,R) + P(R,Y) + P(Y,R)].* *Allow M1 if any one of the three subtracted products is omitted.*
= 68/110 (= 34/55)	A1	*ISW*
Alternative method 2 *4/11×3/10 + 4/11×7/10 + 7/11×4/10 or equivalent*	M2	*FT use of consistent incorrect denominator e.g. 120* *Full method for finding* *P(G,G) + P(G,G') + P(G',G).* *Allow M1 for the **sum** of any two of these three products* *NB: P(1st sock green) is equivalent to P(G,G) + P(G,G') or to P(G,G) + P(G',G)* *(i.e. credit cannot be given for only P(1st sock green)=4/11 without considering compound events)*
= 68/110 (= 34/55)	A1	*ISW*
Alternative method 3 *4/11×3/10 + 4/11×6/10 + 4/11×1/10 + 6/11×4/10 + 1/11×4/10 or equivalent*	M2	*FT use of consistent incorrect denominator e.g. 120* *Full method for finding* *P(G,G) + P(G,R) + P(G,Y) + P(R,G) + P(Y,G).* *Allow M1 for the **sum** of any two of the following* • *P(G,G)* • *P(G,R) + P(G,Y)* • *P(R,G) + P(Y,G)* *NB: P(1st sock green) is equivalent to P(G,G)+P(G,R)+P(G,Y) or to P(G,G)+P(R,G)+P(Y,G)* *(i.e. credit cannot be given for only P(1st sock green)=4/11 without considering compound events)*
= 68/110 (= 34/55)	A1	*ISW*
		If no marks, SC1 for an answer of 72/121 [from 1 – 7/11×7/11] (method with replacement)