



GCSE MARKING SCHEME

AUTUMN 2020

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

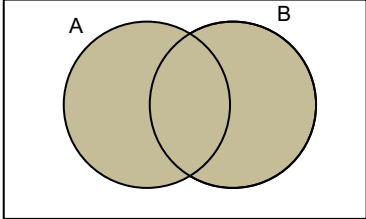
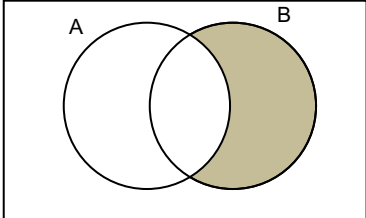
INTRODUCTION

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.

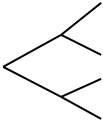
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

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. A smooth curve drawn through their plots.	P1 C1	FT 'their $(-2,9)$ ' and 'their $(2,-7)$ ' Allow \pm '1/2 a small square'. 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. (\pm 1 small square horizontal or vertical.)
3.(c) Line $y = 1$ drawn -0.8 AND 4.8	B1 B1	Must be at least 2cm long. FT intersection of 'their curve' with 'their $y = 1$ ' only if exactly two points of intersection and $y \neq 0$. 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 \pm '1 small square'.

<p>4. (One part =) $(\pounds)210 \div 3$ $= (\pounds)70$</p> <p>(Total amount =) $14 \times (\pounds)70$ OR $(\pounds)210 + 4 \times (\pounds)70 + 7 \times (\pounds)70$ $= (\pounds)980$</p>	<p>M1 A1</p> <p>m1</p> <p>A1</p>	<p>FT 'their $(\pounds)70$' only if M1 gained. Allow m1 for sight of 210 AND 280 AND 490 together as the three shares.</p> <p><i>For $210 \div 3 \times 14$ M3 $= 980$ A1</i></p>												
<p>Organisation and Communication.</p> <p>Accuracy of writing.</p>	<p>OC1</p> <p>W1</p>	<p>For OC1, candidates will be expected to:</p> <ul style="list-style-type: none"> • 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 <p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> • 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 												
<p>5.</p> <table style="display: inline-table; vertical-align: middle;"> <tr><td>4</td><td>5</td><td>11</td><td>12</td></tr> <tr><td>4</td><td>6</td><td>10</td><td>12</td></tr> <tr><td>4</td><td>7</td><td>9</td><td>12</td></tr> </table> <p>OR OR</p>	4	5	11	12	4	6	10	12	4	7	9	12	<p>B3</p>	<p>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).</p>
4	5	11	12											
4	6	10	12											
4	7	9	12											
<p>6.(a)</p> <p>$(x - 4)(x - 3)$ $(x =) 4$ AND $(x =) 3$</p>	<p>B2 B1</p>	<p>B1 for $(x \dots 4)(x \dots 3)$. Ignore '= 0'. <u>Strict FT from their brackets.</u> Allow the following.</p> <p>B2 for $x - 4 (=0)$ AND $x - 3 (=0)$ (B1) $(x =) 4$ AND $(x =) 3$ (B1)</p> <p>B1 for $x + 4 (=0)$ AND $x + 3 (=0)$ (B0) $(x =) -4$ AND $(x =) -3$ (B1) FT</p> <p>B1 if only $(x =) 4$ AND $(x =) 3$ seen. (B1)</p>												
<p>6(b)</p> <p>$25x^2 - 20x + 4$</p>	<p>B2</p>	<p>Otherwise B1 for sight of $25x^2 \pm kx + 4$ (allow $k = 0$) B1 for sight of $25x^2 - 20x - 4$ Mark final answer.</p>												

<p>7.(a) Correct framework</p>  <p>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'.</p> <p>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')</p> <p>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)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>Accept any unambiguous wording.</p> <p>Must be consistent with their labelling. Allow this B1 if no headings given, <u>unless</u> contradicted by, or inconsistent with, further labelling.</p> <p>Allow this B1 if no headings given, <u>unless</u> contradicted by, or inconsistent with, further labelling.</p> <p>Allow this B1 if only shown on one set of branches. Provided not contradicted on the other set of branches.</p>
<p>7.(b) 0.7×0.4 or equivalent. $= 0.28$ or equivalent.</p>	<p>M1</p> <p>A1</p>	<p>No FT. M1A0 for a final answer of 0.28%. Mark final answer.</p>
<p>8.(a) PA = 12(cm) AND correct theorem given, e.g. 'tangents from an external point are equal in length'.</p>	<p>E1</p>	<p>Must use the words '<u>tangents</u>' AND '<u>equal (identical/same)</u>'. Do not accept e.g. 'PA = PB'. (E0) Accept alternative correct answers.</p>
<p>8.(b) $\hat{P}AO = 90^\circ$ AND correct theorem given, e.g. 'the tangent at any point on a circle is perpendicular to the radius at that point'.</p>	<p>E1</p>	<p>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)</p>
<p>8.(c) (Area PAOB =) $2 \times \frac{12 \times 4}{2}$ or equivalent. $= 48 \text{ (cm}^2\text{)}$</p>	<p>M1</p> <p>A1</p>	<p>OR FT '<u>their PA</u>' $\times 4 + \frac{12 \times 4}{2}$ M0 for 48×2 or $12 \times 4 \times 2 (= 96)$ An unsupported final answer of 48 gains both marks. If no marks gained allow SC1 for sight of $24 \text{ (cm}^2\text{)}$ OR a correct evaluation of ('their PA' $\times 4) / 2$.</p>
<p>9.(a) $y = 2.5x + 3$</p>	<p>B1</p>	
<p>9.(b) $y = 3x - 5$</p>	<p>B1</p>	
<p>9.(c) Line D</p>	<p>B1</p>	
<p>10.(a) $t \propto 1/g$ OR $t = k/g$ $36 = k/25$ OR $k = 900$ $t = 900/g$</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Allow $t \propto k/g$ FT from $y \propto 1/x^n$ with $n \neq 1, n > 0$ No FT from direct proportion M1 implies B1. May be seen explicitly in part (b). Do not allow $t \propto 900/g$ for the A mark</p>
<p>10.(b) $(900/20 =) 45$ (days)</p>	<p>B1</p>	<p>FT 'their formula' only if non-linear.</p>
<p>10.(c) Sight of 900/40 22 (goats)</p>	<p>M1</p> <p>A1</p>	<p>FT 'their formula' only if non-linear and of equivalent difficulty 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.</p>
<p>11. (a) $(\sqrt[3]{m})^2$</p>	<p>B1</p>	
<p>11. (b) $p^{\frac{1}{4}}$</p>	<p>B1</p>	

<p>12. $6(2x + 1) - 4(3x - 5)$ as a <u>numerator</u> within a single fraction</p> <p>$(3x - 5)(2x + 1)$ as a <u>denominator</u></p> <p>$h26 / (3x - 5)(2x + 1)$</p>	<p>M1</p> <p>M1</p> <p>A1</p>	<p>Allow intention of brackets, e.g. $6 \times 2x + 1 - 4 \times 3x - 5$</p> <p>CAO.</p> <p>Allow $26 / (6x^2 - 7x - 5)$</p> <p>(If expanded, the denominator must be correct.)</p> <p>If M1 M1 A1, penalise further incorrect work -1.</p> <p>If no marks awarded, then SC1 for sight of 26.</p>
<p>13. (Linear scale factor =) $\sqrt[3]{(1280 / 20)} (= 4)$</p> <p>$\sqrt[3]{(1280 / 20)} \times 2.3$</p> <p style="text-align: right;">$= 9.2 \text{ (cm)}$</p> <hr/> <p><i>Alternative method (using reciprocal scale factor)</i> (Linear scale factor =) $\sqrt[3]{(20 / 1280)} (= 1 / 4)$</p> <p>$2.3 \div \sqrt[3]{(20 / 1280)}$ OR $1 / \sqrt[3]{(20 / 1280)} \times 2.3$</p> <p style="text-align: right;">$= 9.2 \text{ (cm)}$</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p>	<p>Or equivalent.</p> <p>Accept a method based on ratios e.g. $1 : 4$ (from $20 : 1280 = 1 : 64 = 1 : 4^3$)</p> <p>FT their derived scale factor (from $\sqrt[3]{}$).</p> <p>SC1 for an answer of 18.4 (using s.f. of 8, from $\sqrt[3]{64}$).</p> <p>Or equivalent.</p> <p>Accept a method based on ratios.</p> <p>FT their derived scale factor (from $\sqrt[3]{}$).</p>
<p>14. (a) $10x = 8.121212\dots$ and $1000x = 812.1212\dots$ <u>with</u> an attempt to subtract on both sides</p> <p style="text-align: center;">$804/990 (= 402/495 = 134/165)$</p> <hr/> <p><i>Alternative method</i> $0.8 + 0.0121212\dots = 8/10 + 12/990$ or equivalent</p> <p style="text-align: center;">$804/990 (= 402/495 = 134/165)$</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Or x and $100x$, or equivalent. Or a <u>complete</u> alternative method.</p> <p>An answer of $80.4/99$ gains M1 only. ISW</p> <p>ISW</p>
<p>14. (b) $6\sqrt{2}$</p>	<p>B1</p>	
<p>14. (c) $7 \times 3 + 7\sqrt{5} - 3 \times 2\sqrt{5} - 2(\sqrt{5})^2$ or equivalent</p> <p style="text-align: center;">$= 11 + \sqrt{5}$</p>	<p>M1</p> <p>A1</p>	<p>Mark final answer.</p> <p>Accept $11 + 1\sqrt{5}$.</p> <p>If no marks awarded, SC1 for 3 correctly simplified terms i.e. $21, 7\sqrt{5}, -6\sqrt{5}, -10$.</p>
<p>15.</p> <ul style="list-style-type: none"> • $FG = HG$ (since G is the midpoint of FH) • EG is a common side • Angle $EGF =$ Angle EGH (since EG and FH are perpendicular) <p>SAS (or two sides and the <u>included</u> angle) so that EFG and EHG are congruent triangles.</p> <hr/> <p><i>Allow alternative method</i></p> <ul style="list-style-type: none"> • $FG = HG$ (since G is the midpoint of FH) • EG is a common side • $EF = EH$ using Pythagoras <p>SSS (or all corresponding sides equal) so that EFG and EHG are congruent triangles.</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>Do not accept indications on the diagram.</p> <p>FT from B2 previously awarded. Must be convincing. Do not allow 'two sides and an angle'.</p> <p>Do not accept indications on the diagram.</p> <p>Must be convincing. An unsupported statement that $EF = EH$, or that triangle is 'isosceles', is insufficient.</p> <p>FT from B2 previously awarded. Allow RHS. Must be convincing.</p>

<p>16.</p> <p style="text-align: center;">Sight of $4y^2 = 3 + my^2$</p> <p>$(4 - m)y^2 = 3$ OR $4y^2 - my^2 = 3$ or equivalent</p> <p style="text-align: center;">$y^2 = 3 / (4 - m)$ OR $y^2 = -3 / (m - 4)$</p> <p style="text-align: center;">$y = \pm \sqrt{3 / (4 - m)}$ OR $y = \pm \sqrt{-3 / (m - 4)}$</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>FT until 2nd error for equivalent level of difficulty. Squaring. Allow $2^2 y^2$ or $(2y)^2$ for $4y^2$.</p> <p>Isolating terms in y^2. FT a formula with three or more terms AND with at least two terms in y^2.</p> <p>Isolating y^2.</p> <p>Taking square root. Allow omission of \pm.</p>
<p>17. (a) $y = f(x) + 5$</p>	<p>B1</p>	<p>Correct notation required.</p>
<p>17. (b) $y = -f(x)$</p>	<p>B1</p>	<p>Correct notation required.</p>
<p>18. Sight of $x = (\sqrt{\pi}) \times r$ OR $x = \sqrt{(\pi r^2)}$ or equivalent</p> <p>Convincing concluding argument e.g. x is irrational since π (and therefore $\sqrt{\pi}$) is irrational.</p>	<p>B1</p> <p>E1</p>	<p>Allow an equivalent expression, e.g. $r = x / (\sqrt{\pi})$ or $r = \sqrt{(x^2 / \pi)}$. Allow use of 3.14 for π.</p> <p>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.</p> <p>Consideration of a specific numerical case gains no credit.</p>
<p><u>Allow an alternative method</u> x^2 and πr^2 both seen <u>WITH</u> a related statement about</p> <ul style="list-style-type: none"> • squares of integers, or • rational / irrational numbers, or • (infinite) decimal numbers. <p>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).</p> <p>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.</p>	<p>E1</p> <p>E1</p>	<p>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.</p> <p>Depends on previous E1</p> <p>Consideration of a specific numerical case gains no credit.</p>

19. (a) $1/11 \times 6/10$ or equivalent $= 6/110 (= 3/55)$	M1 A1	ISW
19. (b) $6/11 \times 5/10 + 4/11 \times 3/10$ [+ $1/11 \times 0/10$] $= 42/110 (= 21/55)$	M2 A1	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 $6/11 \times 5/10$ or $4/11 \times 3/10$ ISW If no marks, SC1 for an answer of 53/121 (method with replacement)
19. (c) $1 - 7/11 \times 6/10$ or equivalent $= 68/110 (= 34/55)$	M2 A1	FT use of consistent incorrect denominator e.g. 120 M1 for $7/11 \times 6/10$ ISW
<u>Alternative method 1</u> $1 - [6/11 \times 5/10 + 6/11 \times 1/10 + 1/11 \times 6/10]$ or equivalent $= 68/110 (= 34/55)$	M2 A1	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. ISW
<u>Alternative method 2</u> $4/11 \times 3/10 + 4/11 \times 7/10 + 7/11 \times 4/10$ or equivalent $= 68/110 (= 34/55)$	M2 A1	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: $P(1^{st} \text{ sock green})$ is equivalent to $P(G, G) + P(G, G')$ or to $P(G, G) + P(G', G)$ (i.e. credit cannot be given for <u>only</u> $P(1^{st} \text{ sock green}) = 4/11$ without considering compound events) ISW
<u>Alternative method 3</u> $4/11 \times 3/10 + 4/11 \times 6/10 + 4/11 \times 1/10 + 6/11 \times 4/10 + 1/11 \times 4/10$ or equivalent $= 68/110 (= 34/55)$	M2 A1	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 <ul style="list-style-type: none"> • $P(G, G)$ • $P(G, R) + P(G, Y)$ • $P(R, G) + P(Y, G)$ NB: $P(1^{st} \text{ sock green})$ 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 <u>only</u> $P(1^{st} \text{ sock green}) = 4/11$ without considering compound events) ISW
		If no marks, SC1 for an answer of 72/121 [from $1 - 7/11 \times 7/11$] (method with replacement)