



GCSE MARKING SCHEME

SUMMER 2019

**GCSE
MATHEMATICS – UNIT 1 (FOUNDATION TIER)
3300U10-1**

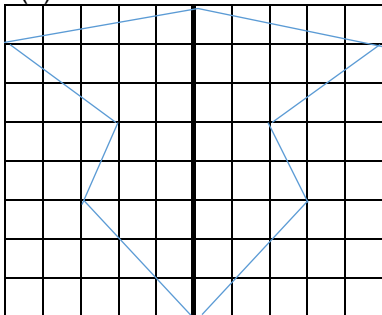
INTRODUCTION

This marking scheme was used by WJEC for the 2019 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.

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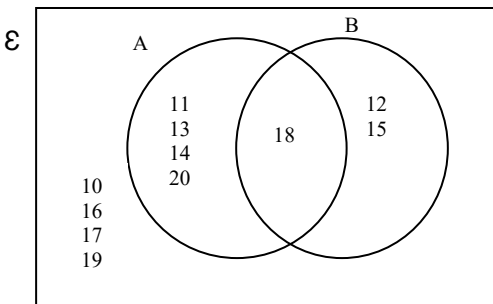
WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

WJEC GCSE MATHEMATICS
SUMMER 2019 MARK SCHEME

GCSE MATHEMATICS Unit 1 Foundation Tier	Mark	Comments
1(a) 4523	B1	
1(b) 168	B1	
1(c) 1, 3, 9, 27	B2	B1 for 2 correct and 0 wrong OR B1 for 3 correct and 0 or 1 wrong OR B1 for 4 correct and 1 wrong
2(a) Evidence of counting squares 32 – 42 inclusive 160 – 210 (cm ²)	M1 A1 B1	FT 'their number of squares' × 5 evaluated correctly Award 3 marks for an unsupported answer between 160 and 210 inclusive. Mark final answer
Accuracy in writing	W1	For W1, candidates will be expected to: <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
2(b) 	B1	
3(a) an even chance	B1	
3(b) impossible	B1	
4(a) Correctly drawn tangent	B1	
4(b) Correctly drawn radius	B1	

5(a) 481·63	B1	Do not accept 481·630
5(b) 64	B1	
5(c) 7	B1	Do not accept 7x7 or 7x7=49 alone.
5(d) (0)·03825	B1	
Ribbon mark 6(a),(b),(c),(d) 6(a) Football	B1	
Ribbon mark 6(a),(b),(c),(d) 6(b) 1/4 or equivalent ISW	B1	Do not accept incorrect notation; e.g. 1 in 4, 1 out of 4, 1:4.
Ribbon mark 6(a),(b),(c),(d) 6(c) $\frac{1}{4} \times 60$ 15	M1 A1	Accept 15 out of 60. Award SC1 only, for a final answer of 15/60
Ribbon mark 6(a),(b),(c),(d) 6(d) Correctly labelled axes. Uniform scale starting from zero. Correct equal width bars for football, swimming and tennis.	B1 B1 B1	Vertical axis labelled 'number (of people)' or ' <i>people</i> ' or 'frequency' AND horizontal axis marked with the sports. Correct heights for 'their scale' (30 and 15) FT their (c) if possible: 'their swimming' = 'their tennis' AND either 'their football' = 2 x 'their tennis' or 'their football' = 60 – 2 x 'their tennis'. If no scale visible, allow final B1 for bars drawn in correct proportions.
7.(Number across = $20 \div 4 =$) 5 OR (Number down = $6 \div 2 =$) 3 (Total number of small rectangles =) 5×3 15	B1 M1 A1	Sight of 5 or 3, not in incorrect statement or working FT 'their stated across and down' CAO
<u>7. Alternative method</u> (Area rectangle A= $2 \times 4 =$) 8 (cm^2) OR (Area rectangle B= $6 \times 20 =$) 120 (cm^2) (No. of rectangle A=) $120 \div 8$ 15	B1 M1 A1	Sight of 8 or 120, not in incorrect statement or working FT 'their stated areas' CAO
Organisation and Communication	OC1	For OC1, candidates will be expected to: <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

8(a) 5p	B1																
8(b) (i) ($x =$) 8	B1	Accept embedded answer															
8(b) (ii) ($y =$) 15	B1	Accept embedded answer															
8(c) 19	B1	Accept $4 \times 19 (= 76)$ or $19 \times 4 (= 76)$															
9. <table><tr><td>$23 - (4 + 2) \times 3 = 5$</td><td>TRUE</td><td></td></tr><tr><td>$7/10 + 2/5 = 9/15$</td><td></td><td>FALSE</td></tr><tr><td>$\frac{1}{2}$ of $1/8 = 1/4$</td><td></td><td>FALSE</td></tr><tr><td>25% of $0.4 = 0.1$</td><td>TRUE</td><td></td></tr><tr><td>$28 - 3 \times 2 + 5 = 55$</td><td></td><td>FALSE</td></tr></table>	$23 - (4 + 2) \times 3 = 5$	TRUE		$7/10 + 2/5 = 9/15$		FALSE	$\frac{1}{2}$ of $1/8 = 1/4$		FALSE	25% of $0.4 = 0.1$	TRUE		$28 - 3 \times 2 + 5 = 55$		FALSE	B3	For all 5 correct B2 for 4 correct. B1 for 3 correct
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10.(a) <table><tr><td>Type</td><td colspan="2">Yellow</td><td colspan="2">Blue</td></tr><tr><td></td><td><100</td><td>≥ 100</td><td><100</td><td>≥ 100</td></tr><tr><td>Num.</td><td>(8)</td><td>7</td><td>4</td><td>6</td></tr></table>	Type	Yellow		Blue			<100	≥ 100	<100	≥ 100	Num.	(8)	7	4	6	B2	For all three correct. B1 for 1 or 2 correct. If no marks awarded allow B1 for all correct tallies seen.
Type	Yellow		Blue														
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Num.	(8)	7	4	6													
10.(b) Any valid statement that indicates that the numbers (in the table) are added (to make 25) e.g. 'add the frequency'.	E1	Allow 'add them up'. Allow sight of ' $8 + 7 + 4 + 6 (= 25)$.'															
10.(c) $\frac{8}{25}$ or equivalent ISW	B2	B1 for $x/25$ with $x < 25$. B1 for $8/y$ with $y > 8$. Penalise incorrect notation -1; e.g. '8 out of 25', $8:25$, '8 in 25'.															
11.(a) -3 1	B1 B1	OR FT 'their -3 ' + 4.															
11.(b)(i) 21	B1																
11.(b)(ii) 191	B1																
11.(c) Divide (the previous number) by 3.	E1	Allow ' $\div 3$ '. Do not accept $n \div 3$.															

12.(a) Any correct total of 2 . e.g. $3 + 3 + 3 - 7$	B1	B0 if any numbers other than 3 and 7 used. B0 if any operation other than + or – used. e.g. 3×3 is not acceptable for $3 + 3 + 3$. Allow multi-digit numbers made from 3 or/and 7. e.g. 33, 37, 373 etc.
12.(b) Any correct total of 8 . e.g. $7 - 3 + 7 - 3$	B1	B0 if any numbers other than 3 and 7 used. B0 if any operation other than + or – used. e.g. 2×7 is not acceptable for $7 + 7$. Allow multi-digit numbers made from 3 or/and 7. e.g. 33, 37, 373 etc.
12.(c) Any correct total of 19 . e.g. $3 + 3 + 3 + 3 + 7$	B1	B0 if any numbers other than 3 and 7 used. B0 if any operation other than + or – used. e.g. 4×3 is not acceptable for $3 + 3 + 3 + 3$. Allow multi-digit numbers made from 3 or/and 7. e.g. 33, 37, 373 etc.
13. \mathcal{E} 	B1 B1 B2	<i>Allow intent of drawing circles and a rectangle.</i> B1 Two <u>intersecting circles</u> AND <u>labelled A and B</u> AND within a <u>rectangle</u> . Allow missing 'E' symbol. B1 For unambiguous indication that the set B consists of 12, 15 and 18 only. B0 if any of these numbers are repeated outside B. B2 All eleven numbers in correct position (with or without a rectangle), with no other or repeated numbers. B1 for six to ten numbers in correct position. Repeated numbers should not be credited. Other numbers may be ignored for this B1 mark.
14.(a)(i) $(x =) 147$	B1	Accept embedded answer. Mark final answer.
14.(a)(ii) $13f - 6f = 5 - 2$ $7f = 3$ $(f =) 3/7$	B1 B1 B1	F.T. until 2 nd error. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction. Mark final answer. Allow 0.43 or 0.428... as a final answer.
14.(b) '5n – 3 can be even or odd' ticked or implied AND a valid explanation given. e.g. '5×3 – 3 = 12 (even) and 5×4 – 3 = 17 (odd)' 'if n is odd you get even (but) if n is even you get odd'	E1	A valid explanation implies '5n – 3 can be even or odd', unless contradicted. Allow e.g. '15 – 3 = 12, 20 – 3 = 17'. Allow a correct sequence shown e.g. 2, 7, 12, Do <u>not</u> accept 'n can be anything', 'n can be odd or even'. Do <u>not</u> accept an explanation that only uses 5n. e.g. '5 × 2 = 10 (even), 5 × 3 = 15 (odd)'

15. (Area of the triangle CDE =) $14 = \frac{4 \times CE}{2}$ (CE =) 7 (cm) (Area ABCE = $7 \times 7 =$) 49 (cm ²) (Area of whole shape = $49 + 14 =$) 63 (cm ²)	M1 A1 B1 B1	<i>Lengths may be shown on the diagram.</i> Accept equivalent e.g. $28 = 4 \times CE$. FT 'their stated or shown length CE'. FT 'their stated or shown area of square' + 14.
15. <u>Alternative method</u> (Area of the triangle CDE =) $14 = \frac{4 \times CE}{2}$ (CE =) 7 (cm) (Area Trapezium ABCD =) $\frac{[(7 + 4) + 7] \times 7}{2}$ = 63 (cm ²)	M1 A1 M1 A1	<i>Lengths may be shown on the diagram.</i> FT 'their stated or shown length CE (=CB)' <u>consistently</u> as 'their 7'.
16. (a =) $\frac{180 - 110}{2}$ or equivalent. = 35(°) b (= $180 - 90 - 35$) = 55(°) c (= $90 + 55$) 145(°) OR c (= $180 - 35$) 145(°)	M1 A1 B1 B1	 OR FT 90 – 'their a'. OR FT 90 + 'their b'. OR FT 180 – 'their a'



GCSE MARKING SCHEME

SUMMER 2019

**GCSE
MATHEMATICS – UNIT 2 (FOUNDATION TIER)
3300U20-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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.

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WJEC GCSE MATHEMATICS (NEW)

SUMMER 2019 MARK SCHEME

GCSE MATHEMATICS Unit 2: Foundation Tier		Mark	Comments
1.	(£)4.67 (£)5.84 (£)7.08 (£)1.45	B1 B1 B1 B1	
2.(a)	Pentagon	B1	
2.(b)	Rhombus	B1	Allow equilateral kite, but not kite or parallelogram.
2.(c)	Cylinder	B1	Allow circular prism.
3.(a)	(47,) 94, 141	B1	Ignore additional multiples.
3.(b)	52	B1	
3.(c)	209	B1	
4.(a)	Midpoint unambiguously indicated	B1	Allow +/- 2 mm.
4.(b)	Unambiguous parallel line drawn through C	B1	Allow +/- 2°.
5.(a)	9 (and) 16	B2	Allow 3^2 (and) 4^2 . B1 for a sum of two square numbers less than 30 seen in workings or two square numbers less than 30 written on the answer line.
5.(b)	Accept suitable explanations, e.g. <ul style="list-style-type: none"> the sum of three even numbers will be even (and 23 is odd) when you add any amount of even numbers the answer is always even (whilst 23 is odd). (23 is odd, but) even + even + even = even 	E1	Allow • even + even = even, • because 23 is odd.
6.	FALSE TRUE FALSE TRUE	B2	For all four correct. B1 for 3 correct.
7.(a)	60 (%)	B2	B1 for equivalent fraction or decimal (0.6, 3/5, 12/20). If B2 not awarded, F.T. their fraction (except for 1/2, 1/4 and 3/4) correctly converted to a percentage for B1.
7.(b)	Multiply by 4	E1	Accept other correct explanations e.g. divide (the number) by 5 then multiply by 20, double (the number) and double (it) again or divide by 1/4.
7.(c)	Accept suitable explanations, e.g. <ul style="list-style-type: none"> 0.125 (is greater than) 0.1 5/40 (is greater than) 4/40 	E1	Award E1 for other correct explanations e.g. a larger denominator means each part of the whole is smaller, or for correct evaluation of 1/8 and 1/10 of a chosen number.
8.(a)	65 (°)	B1	Allow $\pm 2^\circ$
8.(b)	225°	B1	
8.(c)	(Small angle = $180 \div 6 =$) 30(°) (Large angle = $5 \times$ Small angle =) 150 (°)	B1 B1	Check diagram, though answer space takes precedence. F.T. 'their small angle' $\times 5$ or $180 -$ 'their small angle', provided answer is less than 180°. If no marks awarded, award B1 for both correct angles given in reverse.

9. Length of sides in Cuboid B = 5 (cm), 3(cm), 6 (cm) Volume of Cuboid B = $5 \times 3 \times 6$ $= 90 \text{ (cm}^3\text{)}$	B1 M1 A1	Award B1 for (height =) 6 (cm), provided length and width aren't also multiplied by 3. F.T. 'their height' $\times 5 \times 3$												
<u>Alternative method</u> (Volume of Cuboid A =) $5 \times 3 \times 2$ $= 30 \text{ (cm}^3\text{)}$ (Volume of Cuboid B =) $90 \text{ (cm}^3\text{)}$	M1 A1 B1	 <i>F.T. for their stated or derived volume for Cuboid A'</i>												
Organisation and Communication. Accuracy of writing.	OC1 W1	For OC1, candidates will be expected to: <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 For W1, candidates will be expected to: <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 												
10.(a)(i) Subtract six (from the previous term)	B1	Accept 'take away 6' or '(goes) down in 6s'. Allow -6. B0 for n-6												
10.(a)(ii) Double (the previous term)	B1	Accept 'multiply by 2' or 'times by 2'. Allow $\times 2$. B0 for $n \times 2$												
10.(b)(i) $x + 3$	B1	Mark final answer.												
10.(b)(ii) (£)15g	B1	Mark final answer. Accept $15 \times g$												
11.(a) $28 \cdot 34$ or $1417/50$ or $28^{17/50}$ ISW	B2	B1 for sight of $23 \cdot 04$ OR sight of $5 \cdot 3$. If B0 allow SC1 for 28 or $28 \cdot 3$												
11.(b) $34 \cdot 8$ or $174/5$ or $34^{4/5}$ ISW	B1													
12.(a) $(19 - 18 \cdot 2 =)$ 0·8	B2	B1 for sight of 19 OR sight of $-18 \cdot 2$. BUT B0 for $19f - 18 \cdot 2g$. Mark final answer.												
12.(b) $7x = 16$ ($x =$) $16/7$ ($x =$) $2 \cdot 3$ (to 1dp)	B1 B1 B1	FT from $7x = k$. Allow $16 \div 7$ FT from any fraction that requires rounding. Mark final answer. ($x =$) $2 \cdot 2 \dots$ implies B1B1B0. Allow an embedded $2 \cdot 3$, B1B1B0												
13.(a) 4 hours 45 min	B1													
13.(b) 2·4 km	B1													
13.(c) <table border="1"> <tr> <td>7km less than 5 miles</td> <td>TRUE</td> <td></td> </tr> <tr> <td>1kg less than 2lb</td> <td></td> <td>FALSE</td> </tr> <tr> <td>1 litre less than 1 pint</td> <td></td> <td>FALSE</td> </tr> <tr> <td>8 litres less than 900cm^3</td> <td></td> <td>FALSE</td> </tr> </table>	7km less than 5 miles	TRUE		1kg less than 2lb		FALSE	1 litre less than 1 pint		FALSE	8 litres less than 900cm^3		FALSE	B2	For all 4 correct. B1 for 3 correct.
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<p>14. Two relevant (sides of one double the other) rectangles or squares considered.</p> <p>Perimeter AND area of 1st rectangle correctly calculated.</p> <p>Perimeter AND area of 2nd rectangle correctly calculated.</p> <p>Clear statement that the perimeter has been doubled but the area has not been doubled (and that Catrin is incorrect.)</p>	<p>M1</p> <p>B1</p> <p>B1</p> <p>A2</p>	<p>Sketch shown or lengths stated. If M0, only the B marks are available.</p> <p>Ignore missing units BUT penalise –1, once only, for incorrect units. (Applies to these B1 marks.)</p> <p>FT ‘their <u>stated</u> values’ for both perimeter and area.</p> <p>If not A2, then A1 for correct perimeter statement for ‘their values’. OR A1 for correct area statement for ‘their values’. Accept statement that area is 4 times as big.</p> <p>Allow for A2 ‘only the perimeter has been doubled’. (implies that the area has not been doubled.)</p> <p><u>Also for A2.</u> ‘The area is not doubled so Catrin is incorrect’ answers the question. In this case Award SC1 and SC1 (instead of B1 and B1) if areas correctly calculated.</p> <p>Correct statements, for BOTH perimeter and area, with <u>no</u> supporting work gains SC1.</p>
<p>15. (18% of £256 =) 0.18×256 = (£)46.08</p> <p>(Larger share =) $\frac{2 \times 46.08}{3}$ = (£)30.72</p> <p>(To the nearest 10p =) (£)30.7(0)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p>	<p>Allow (£)46.10</p> <p>FT ‘their stated 18%’.</p> <p>If M0 allow SC1 for sight of (£)15.36</p> <p>FT ‘their larger share’ (not ‘their 18%’) and only if rounding required.</p>
<p>15. <u>Alternative method 1</u> (Larger share of £256 =) $\frac{2 \times 256}{3}$ = (£)170.66(..)</p> <p>(18% of £170.66 =) 0.18×170.66 = (£)30.72</p> <p>(To the nearest 10p =) (£)30.7(0)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p>	<p>Allow (£)170.70 If M0 allow SC1 for sight of (£)85.33.</p> <p>FT ‘their stated larger share’.</p> <p>FT ‘their 18%’ (not ‘their larger share’) and only if rounding required.</p>
<p>15. <u>Alternative method 2</u> (Larger share of 18% =) $\frac{2 \times 18}{3}$ = 12(%)</p> <p>(12% of £256 =) 0.12×256 = (£)30.72</p> <p>(To the nearest 10p =) (£)30.7(0)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p>	<p>If M0 allow SC1 for sight of 6(%).</p> <p>FT ‘their derived larger %’.</p> <p>FT ‘their amount’ only if rounding required.</p>



GCSE MARKING SCHEME

SUMMER 2019

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

INTRODUCTION

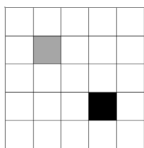
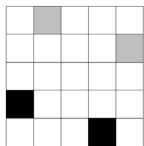
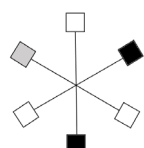
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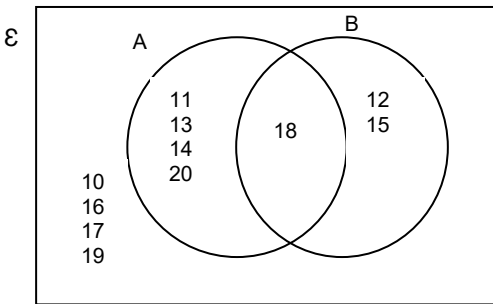
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WJEC GCSE MATHEMATICS

SUMMER 2019 MARK SCHEME

GCSE Mathematics Unit 1: Intermediate Tier			Mark	Comments															
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5.(b) Any correct total of 8 . e.g. $7 - 3 + 7 - 3$	B1	B0 if any numbers other than 3 and 7 used. B0 if any operation other than + or – used. e.g. 2×7 is not acceptable for $7 + 7$. Allow multi-digit numbers made from 3 or/and 7. e.g. 33, 37, 373 etc.
5.(c) Any correct total of 19 . e.g. $3 + 3 + 3 + 3 + 7$	B1	B0 if any numbers other than 3 and 7 used. B0 if any operation other than + or – used. e.g. 4×3 is not acceptable for $3 + 3 + 3 + 3$. Allow multi-digit numbers made from 3 or/and 7. e.g. 33, 37, 373 etc.
6. 	B1 B1 B2	<i>Allow intent of drawing circles and a rectangle.</i> Two <u>intersecting circles</u> AND <u>labelled A and B</u> AND within a <u>rectangle</u> . Allow missing 'E' symbol. For unambiguous indication that the set B consists of 12, 15 and 18 only. B0 if any of these numbers are repeated outside B. All eleven numbers in correct position (with or without a rectangle), with no other or repeated numbers. B1 for six to ten numbers in correct position. Repeated numbers should not be credited. Other numbers may be ignored for this B1 mark.
7.(a) $5(2a - 3)$	B1	Mark final answer.
7.(b)(i) $(x =) 147$	B1	Accept embedded answer. Mark final answer.
7.(b)(ii) $13f - 6f = 5 - 2$ $7f = 3$ $(f =) 3/7$	B1 B1 B1	F.T. until 2 nd error. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction. Mark final answer. Allow 0.43 or 0.429 or 0.428... as a final answer.
7.(c) '5n – 3 can be even or odd' ticked or implied AND a valid explanation given. e.g. '5×3 – 3 = 12 (even) and 5×4 – 3 = 17 (odd)' 'if n is odd you get even (but) if n is even you get odd'	E1	A valid explanation implies '5n – 3 can be even or odd', unless contradicted. Allow e.g. '15 – 3 = 12, 20 – 3 = 17'. Allow a correct sequence shown e.g. 2, 7, 12, Do <u>not</u> accept 'n can be anything', 'n can be odd or even'. Do <u>not</u> accept an explanation that only uses 5n. e.g. '5 × 2 = 10 (even), 5 × 3 = 15 (odd)'

<p>8.</p> <p>(Area of the triangle CDE =) $14 = \frac{4 \times CE}{2}$</p> <p>(CE =) 7 (cm)</p> <p>(Area ABCE = 7×7 =) 49 (cm²)</p> <p>(Area of whole shape = $49 + 14$ =) 63 (cm²)</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p>	<p><i>Lengths may be shown on the diagram.</i></p> <p>Accept equivalent e.g. $28 = 4 \times CE$.</p> <p>FT 'their stated or shown length CE'.</p> <p>FT 'their stated or shown area of square' + 14.</p>
<p>8. <u>Alternative method</u></p> <p>(Area of the triangle CDE =) $14 = \frac{4 \times CE}{2}$</p> <p>(CE =) 7 (cm)</p> <p>(Area Trapezium ABCD =) $\frac{[(7 + 4) + 7] \times 7}{2}$</p> <p>= 63 (cm²)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p><i>Lengths may be shown on the diagram.</i></p> <p>FT 'their stated or shown length CE (=CB)' <u>consistently</u> as 'their 7'.</p>
<p>8.OCW 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>9.</p> <p>(a =) $\frac{180 - 110}{2}$ or equivalent.</p> <p>= 35(°)</p> <p>b (= $180 - 90 - 35$) = 55(°)</p> <p>c (= $90 + 55$) 145(°)</p> <p>OR c (= $180 - 35$) 145(°)</p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p>	<p>OR FT 90 – 'their a'.</p> <p>OR FT 90 + 'their b'.</p> <p>OR FT 180 – 'their a'</p>

<p>10.(a) For a method that produces 2 prime factors from the set {3, 3, 5, 7} before the 2nd error.</p> <p>3, 3, 5, 7</p> <p>$3^2 \times 5 \times 7$</p>	<p>M1</p> <p>A1</p> <p>B1</p>	<p>C.A.O. For sight of the four correct factors (Ignore 1s)</p> <p>F.T. 'their primes' provided at least one index form used with at least a square.</p> <p>Allow $(3^2)(5)(7)$ and $3^2.5.7$</p> <p>Inclusion of 1 as a factor gets B0.</p>
<p>10.(b) $42 = 2 \times 3 \times 7$ or equivalent correct strategy.</p> <p>(HCF =) 21</p>	<p>M1</p> <p>A1</p>	<p>M1 for sight of 2, 3, 7 'together'. (Not for 2×21, 3×14 and 6×7.)</p> <p>(Not for <u>just</u> listing all factors 1,2,3,6,7,14,21.)</p> <p>M1A0 for 3×7.</p> <p>FT 'their answer to 10(a)' only if of equivalent difficulty (at least two common prime factors).</p>
<p>11. -13</p> <p>Scale on y-axis '2cm square \equiv 10 units'.</p> <p>At least 7 correct plots and <u>no incorrect</u> plots.</p> <p>A smooth <u>curve</u> drawn through their plots.</p>	<p>B1</p> <p>B1</p> <p>P1</p> <p>C1</p>	<p>F.T. 'their (-2,-13)' AND 'their uniform scale' if possible.</p> <p>Allow $\pm \frac{1}{2}$ a small square'.</p> <p>F.T. 'their 8 plots'. (Only if an uniform scale used.)</p> <p>OR a curve through the 7 given plots and (-2,-13).</p> <p>Allow intention to pass through their plots (within 1 small square, either horizontally or vertically of the point).</p>
<p>12.</p> <p>(Angle AÔB or exterior angle =) $\frac{360(^{\circ})}{8}$</p> <p>= 45(^{\circ})</p> <p>(OÂB =) $\frac{180 - 45}{2}$</p> <p>= 67.5(^{\circ})</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Answers/working may be seen on diagram.</p> <p>Sight of 45 (even e.g. OÂB = 45) gains M1A1.</p> <p>FT 'their 45' (but not 60^{\circ}).</p>
<p>12. <u>Alternative method 1</u></p> <p>(Sum of interior angles =) $(8 - 2) \times 180^{\circ}$ or equivalent</p> <p>= 1080(^{\circ})</p> <p>(OÂB =) $\frac{1}{2} \times (1080 \div 8)$ or equivalent</p> <p>= 67.5(^{\circ})</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>(Interior angle =) 135(^{\circ}) implies M1A1</p> <p>FT 'their interior angle sum' ($\neq 1440$)</p>
<p>12. <u>Alternative method 2</u></p> <p>(Using 16 right-angled triangles.)</p> <p>(Angle at O =) $360 / 16$</p> <p>= 22.5(^{\circ})</p> <p>(OÂB =) $180 - 90 - 22.5$</p> <p>= 67.5(^{\circ})</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>FT 'their 22.5'.</p>

<p>13.</p> <p>Correct construction <u>method</u> for perpendicular bisector with line drawn.</p> <p>Correct construction <u>method</u> for 60° at point A.</p> <p>Correct construction <u>method</u> for bisecting an angle with line drawn.</p> <p>Point P clearly identified</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p><i>Correct construction arcs must be seen for the first three B1 marks.</i></p> <p><u>Two</u> pairs of Intersecting arcs (centres at A and B)</p> <p>Allow if drawn at point B. Allow B1 for correct method (tolerance will be penalised with final B0).</p> <p>FT 'their angle of 60°' drawn at point A or point B.</p> <p>C.A.O. within tolerance. Intersecting lines alone with no indication that this is point P is <u>not sufficient</u> for this B1. Do not penalise if both possible positions shown. Final B1 may be awarded after B0B0B0.</p>
<p><u>13. Alternative method</u></p> <p><i>Correct construction method for 60° at point A (or B).</i></p> <p><i>Correct construction method for bisecting the angle at A (or B) with line drawn.</i></p> <p><i>Repeating the above two stages at B (or A)</i></p> <p><i>Point P clearly identified</i></p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p><i>Correct construction arcs must be seen for the first three B1 marks</i></p> <p><i>Allow B1 for correct method (tolerance will be penalised with final B0).</i></p> <p><i>C.A.O. within tolerance.</i> <i>Intersecting lines alone with no indication that this is point P is <u>not sufficient</u> for this B1.</i> <i>Do not penalise if both possible positions shown.</i> <i>Final B1 may be awarded after B0B0B0.</i></p>
<p>14.</p> <p>Sight of any TWO of 30, 2 or 0.5 OR Sight of any TWO of 30, 8 or 0.5 as appropriate approximations.</p> <p>$\frac{30 \times 8}{0.5}$ or equivalent.</p> <p>= 480</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Allow 30.2 for 30.</p> <p>Equivalent e.g. $\frac{30 \times 2 \times 2 \times 2}{\frac{1}{2}}$ or $\frac{30 \times 2^3}{0.5}$</p> <p>Must be seen, but allow if attempted calculation done in steps. M0 for exact calculation.</p> <p>C.A.O. Allow 483.2 if 30.2 used.</p>

15.(a)	0.32	B1	
15.(b)	<p>Sample number from Anglesey on 2nd day</p> $= 3000 \times 0.42$ $= 1260$ <p>(Rel.Fqu. for two days =) $\frac{640 + 1260}{2000 + 3000}$</p> $= 0.38$	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Allow M1A1 for sight of 1260 e.g. 1260/3000</p> <p>FT 'their 1260'.</p>
15.(c)	<p>'Answer to part (b)' noted AND</p> <p>Valid explanation</p> <p>e.g. 'more people sampled'</p>	E1	<p>Explanation must refer to the sample being the largest.</p> <p>Allow e.g. 'from both days', 'number of people added', 'frequencies are added'.</p> <p>Do <u>not</u> accept 'relative frequencies are added'.</p>
16.(a)(i)	425 kg	B1	
16.(a)(ii)	21.5 s	B1	
16.(a)(iii)	83 people	B1	
16(b)	2.38×10^{-2}	B2	<p>B1 for sight of a correct answer but not in standard form.</p> <p>e.g. 23.8×10^{-3} or 0.0238.</p>
17.(a)	$5n < 3n + 7$ or equivalent ISW	B2	<p>$2n < 7$ OR $n < 7/2$ implies B2.</p> <p>Ignore use of a different letter e.g. $5x < 3x + 7$.</p> <p>Use of '\leq' is B1.</p> <p>B1 for sight of $3n + 7$ in an inequality.</p>
17.(b)	$2n < 7$ OR $n < 7/2$	B1	<p>FT 'their inequality' if of equivalent difficulty.</p> <p>May be seen in part (a).</p>
	<p>(Greatest amount =) (£)3</p>	B1	<p>FT 'their $n < k$'. B0 if they have '$n > k$'.</p> <p>B0 if it leads to $n < 1$</p> <p>An answer of (£)3 gains B1B1 (unless from incorrect algebra work).</p>
18.(a)	<p>0.7 shown for 'Does not go on tour bus'.</p> <p>Use of $0.3 \times \dots = 0.24$</p> <p>P(sees show) = 0.8</p> <p>Second set of branches 0.8, 0.2, 0.8, 0.2</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>Allow M1A1 if 0.8 seen on one of the 'sees show' branches.</p> <p>FT 'their 0.8' only if M1 awarded.</p> <p>(0.24, 0.76, 0.24, 0.76 is M0A0A0)</p>
18.(b)	0.7×0.2	M1	FT 'their values' if both between 0 and 1.
	$= 0.14$ ISW	A1	



GCSE MARKING SCHEME

SUMMER 2019

**GCSE
MATHEMATICS – UNIT 2 (INTERMEDIATE TIER)
3300U40-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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 (NEW)

SUMMER 2019 MARK SCHEME

GCSE Mathematics Unit 2: Intermediate Tier	Mark	Comments												
1.(a)(i) $28 \cdot 34$ or $1417/50$ or $28^{17/50}$ ISW	B2	B1 for sight of $23 \cdot 04$ OR sight of $5 \cdot 3$. If B0 allow SC1 for 28 or $28 \cdot 3$												
1.(a)(ii) $34 \cdot 8$ or $174/5$ or $34^{4/5}$ ISW	B1													
1.(a)(iii) 125	B2	B1 for sight of $1/8$ or $0 \cdot 125$ or $1000/8$ or $1000 \div 8$												
1.(b) 440	B1	B0 for $440 \cdot 0$												
2.(a) $(19 - 18 \cdot 2 =)$ 0·8	B2	B1 for sight of 19 OR sight of $-18 \cdot 2$. BUT B0 for $19f - 18 \cdot 2g$. Mark final answer.												
2.(b) $7x = 16$ $(x =) 16/7$ $(x =) 2 \cdot 3$ (to 1dp)	B1 B1 B1	FT from $7x = k$. Allow $16 \div 7$ FT from any fraction that requires rounding. Mark final answer. $(x =) 2 \cdot 2 \dots$ implies B1B1B0. Allow an embedded $2 \cdot 3$, B1B1B0												
3.(a) 4 hours 45 min	B1													
3.(b) 2·4 km	B1													
3.(c) <table border="1"> <tr> <td>7km less than 5 miles</td> <td>TRUE</td> <td></td> </tr> <tr> <td>1kg less than 2lb</td> <td></td> <td>FALSE</td> </tr> <tr> <td>1 litre less than 1 pint</td> <td></td> <td>FALSE</td> </tr> <tr> <td>8 litres less than 900cm^3</td> <td></td> <td>FALSE</td> </tr> </table>	7km less than 5 miles	TRUE		1kg less than 2lb		FALSE	1 litre less than 1 pint		FALSE	8 litres less than 900cm^3		FALSE	B2	For all 4 correct. B1 for 3 correct.
7km less than 5 miles	TRUE													
1kg less than 2lb		FALSE												
1 litre less than 1 pint		FALSE												
8 litres less than 900cm^3		FALSE												
4. Two relevant (sides of one double the other) rectangles or squares considered. Perimeter AND area of 1 st rectangle correctly calculated. Perimeter AND area of 2 nd rectangle correctly calculated. Clear statement that the perimeter has been doubled but the area has not been doubled (and that Catrin is incorrect.)	M1 B1 B1 A2	Sketch shown or lengths stated. If M0, only the B marks are available. Ignore missing units BUT penalise -1, once only, for incorrect units. (Applies to these B1 marks.) FT 'their <u>stated</u> values' for both perimeter and area. If not A2, then A1 for correct perimeter statement for 'their <u>values</u> '. OR A1 for correct area statement for 'their <u>values</u> '. Accept statement that area is 4 times as big. Allow for A2 'only the perimeter has been doubled'. (implies that the area has not been doubled.) <u>Also for A2.</u> 'The area is not doubled so Catrin is incorrect' answers the question. In this case Award SC1 and SC1 (instead of B1 and B1) if areas correctly calculated. Correct statements, for BOTH perimeter and area, with no supporting work gains SC1.												

<p>5. (18% of £256 =) 0.18×256 $= (£)46.08$</p> <p>(Larger share =) $\frac{2 \times 46.08}{3}$ $= (£)30.72$</p> <p>(To the nearest 10p =) (£)30.7(0)</p>	<p>M1 A1</p> <p>M1 A1 B1</p>	<p>Allow (£)46.10</p> <p>FT 'their stated 18%'.</p> <p>If M0 allow SC1 for sight of (£)15.36</p> <p>FT 'their larger share' (not 'their 18%') and only if rounding required.</p>
<p>5. <u>Alternative method 1</u> (Larger share of £256 =) $\frac{2 \times 256}{3}$ $= (£)170.66(\dots)$</p> <p>(18% of £170.66 =) 0.18×170.66 $= (£)30.72$</p> <p>(To the nearest 10p =) (£)30.7(0)</p>	<p>M1 A1</p> <p>M1 A1 B1</p>	<p>Allow (£)170.70 If M0 allow SC1 for sight of (£)85.33.</p> <p>FT 'their stated larger share'.</p> <p>FT 'their 18%' (not 'their larger share') and only if rounding required.</p>
<p>5. <u>Alternative method 2</u> (Larger share of 18% =) $\frac{2 \times 18}{3}$ $= 12(\%)$</p> <p>(12% of £256 =) 0.12×256 $= (£)30.72$</p> <p>(To the nearest 10p =) (£)30.7(0)</p>	<p>M1 A1</p> <p>M1 A1 B1</p>	<p>If M0 allow SC1 for sight of 6(%)</p> <p>FT 'their derived larger %'.</p> <p>FT 'their amount' only if rounding required.</p>
<p>5.OCW 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>6.(a) $a(7b+11)$</p>	<p>B1</p>	<p>Allow $1a(7b + 11)$</p>
<p>6.(b) $x(x-8)$</p>	<p>B1</p>	<p>Allow $1x(x - 8)$</p>
<p>6.(c) $8y - 12y^2$</p>	<p>B2</p>	<p>Must be an expression for B2. B1 for sight of $8y$ or $-12y^2$. Mark final answer.</p>
<p>7.(a)</p> <p>$a = -6$ $b = -5$</p>	<p>B1 B1</p>	<p>Values may be seen on the diagram.</p>
<p>7.(b) Correct shape in correct position.</p>	<p>B3</p>	<p>B2 for a correct enlargement in incorrect position. B1 for one correct side in correct position. If no marks allow SC1 for showing <u>all</u> the 'rays' from (1,2).</p>

<p>8. $P(\text{Alison chooses letter R}) = 2/10$ or equivalent. $P(\text{Sarfraz chooses letter R}) = 1/4$ or equivalent.</p> <p>Use of $2/10 \times 100$ OR $1/4 \times 100$</p> <p>20 AND 25 clearly implying that Sarfraz is the most likely to choose letter R</p>	<p>B1 B1 M1 A1</p>	<p>B1 for sight of $2/10$ if unambiguously for Alison. B1 for sight of $1/4$ if unambiguously for Sarfraz. As probability not asked for, allow e.g. '2 chances in 10' and 'one chance in four'. B1 marks may be implied in subsequent work. Calculation may be done in stages.</p> <p>There is no requirement to tick the box as long as there is no contradiction. Do <u>not</u> accept, on its own, e.g. 'Sarfraz has less letters to choose from' for the A1.</p>
<p><u>8. Alternative method</u> $P(\text{Alison chooses letter R}) = 2/10$ or equivalent. $P(\text{Sarfraz chooses letter R}) = 1/4$ or equivalent.</p> <p>Attempting to give probabilities in a common format.</p> <p>Correct common format e.g. $4/20$ AND $5/20$ or 0.2 AND 0.25 clearly implying that Sarfraz is the most likely to choose letter R</p>	<p>B1 B1 M1 A1</p>	<p>B1 for sight of $2/10$ if unambiguously for Alison. B1 for sight of $1/4$ if unambiguously for Sarfraz. As probability not asked for, allow e.g. '2 chances in 10' and 'one chance in four'</p> <p>There is no requirement to tick the box as long as there is no contradiction. Do <u>not</u> accept, on its own, e.g. 'Sarfraz has less letters to choose from' for the A1.</p>
<p>9.(a) $3n + 5$ or equivalent</p>	<p>B2</p>	<p>B1 for sight of $3n$. B0 for $-3n$ Mark final answer.</p>
<p>9.(b) $3t = r + 8$ or $r + 8 = 3t$ or $-3t = -r - 8$ $t = \frac{r+8}{3}$ or $\frac{r+8}{3} = t$ or $t = \frac{-r-8}{-3}$</p>	<p>B1 B1</p>	<p>F.T. only from $3t = \pm r \pm 8$, stated or implied. ($3t = r + 8$ will have already gained the previous B1.) B1B0 for $-t = \frac{-r-8}{3}$ or equivalent. Mark final answer. <u>Note</u> Allow B1B0 for $t = (r + 8) \div 3$ with or without brackets. Allow B1B0 for $\frac{r+8}{3}$ ('t' missing)</p>
<p>9.(c) $6x + 4 = 46$ OR $3x + 2 = 23$</p> <p>$6x = 42$ OR $3x = 21$</p> <p>($x =$) 7</p>	<p>B2 B1 B1</p>	<p>B1 for $(x + 5) + (2x - 3) + (x + 5) + (2x - 3) = 46$ or equivalent e.g. $(x + 5) + (2x - 3) = 23$</p> <p>FT collection of 'their terms' if of equivalent difficulty. (linear equation only.)</p> <p>FT <u>only</u> from $ax = b$. Allow a fraction from a FT value unless x is a whole number. ($x =$) 7 gains all four marks. Each B mark implies all previous B marks. Mark final answer.</p>
<p><u>9.(c) Alternative method</u> A trial showing correct values and understanding of perimeter. (e.g. $2(4 + 5) + 2(2 \times 4 - 3) = 28$) An <u>improved</u> trial.</p> <p>($x =$) 7</p>	<p>B1 B1 B2</p>	<p>Consistent use of x AND correct evaluation.</p> <p>Dependent on first B1. If 1st trial is using '7' award B1B1 followed by B1 if left embedded but B2 if shown as $x = 7$. B1 for an implied / embedded '$x = 7$' but not shown as $x = 7$. ($x =$) 7 gains all four marks. Mark final answer.</p>

10. Intent to square at least two of the three values. Comparing $(25.6)^2$ with $(12.8)^2 + (22.7)^2$ or Any intent to compare any other relevant values. (e.g. $(25.6)^2 - (22.7)^2$ with $(12.8)^2$ or $\sqrt{[(12.8)^2 + (22.7)^2]}$ (with 25.6)) Correct evaluation of value(s) to be compared. (e.g 'sight of 655.36 WITH 679.13' or 'sight of 140.07 WITH 163.84' or 'sight of 26.06 (WITH 25.6)') Statement that it is NOT possible	S1 M1 A1 A1	(Note: $12.8^2 = 163.84$, $22.7^2 = 515.29$ and $25.6^2 = 655.36$) The comparison attempted must show <u>both</u> intended calculations e.g. $(25.6)^2$ AND $(12.8)^2 + (22.7)^2$ unless intention is to compare with a given side e.g. $\sqrt{[(12.8)^2 + (22.7)^2]}$ with 25.6 C.A.O. but allow evaluated answers to be given to the nearest whole number. e.g. 655 WITH 679. Allow FT if M1 awarded. <i>If all marks gained ISW.</i>																																			
10. <u>Alternative method 1</u> Intent to use two right-angled trig ratios using 2 different pairs of given sides Correct right-angled trig ratio used twice, using 2 different given sides , in order to compare <ul style="list-style-type: none">the values of the same angle orthe sum of the two angles with 90°. Correct evaluation of value(s) to be compared. e.g. sight of any two of 30° , $27.5\dots^\circ$ and $29.4\dots^\circ$ OR sight of 30° and $60.58\dots^\circ$ (and the sum to be compared with 90°) Statement that it is NOT possible	S1 M1 A1	i.e. In order to find the value of either the same angle OR two different angles, whilst sufficient to show that it isn't a right-angled triangle. CAO <table border="1"><thead><tr><th>Ratio</th><th>Opp</th><th>Adj</th><th>Hyp</th><th>Angle</th></tr></thead><tbody><tr><td>Sin</td><td>12.8</td><td></td><td>25.6</td><td>30°</td></tr><tr><td>Cos</td><td></td><td>22.7</td><td>25.6</td><td>$27.5\dots^\circ$</td></tr><tr><td>Tan</td><td>12.8</td><td>22.7</td><td></td><td>$29.4\dots^\circ$</td></tr><tr><td>Sin</td><td>22.7</td><td></td><td>25.6</td><td>$62.46\dots^\circ$</td></tr><tr><td>Cos</td><td></td><td>12.8</td><td>25.6</td><td>60°</td></tr><tr><td>Tan</td><td>22.7</td><td>12.8</td><td></td><td>$60.58\dots^\circ$</td></tr></tbody></table> If comparing the sum of two angles (with 90°), the sum must be shown. Allow FT if M1 awarded. <i>If all marks gained ISW.</i>	Ratio	Opp	Adj	Hyp	Angle	Sin	12.8		25.6	30°	Cos		22.7	25.6	$27.5\dots^\circ$	Tan	12.8	22.7		$29.4\dots^\circ$	Sin	22.7		25.6	$62.46\dots^\circ$	Cos		12.8	25.6	60°	Tan	22.7	12.8		$60.58\dots^\circ$
Ratio	Opp	Adj	Hyp	Angle																																	
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Cos		12.8	25.6	60°																																	
Tan	22.7	12.8		$60.58\dots^\circ$																																	
10. <u>Alternative method 2 (using the cosine rule)</u> $(\cos A =) (12.8^2 + 22.7^2 - 25.6^2) / (2 \times 12.8 \times 22.7)$ (= 2377/58112 or 0.0409..) (A =) $87.6557\dots^\circ$ Statement that it is NOT possible	M2 A1 A1	<u>NOTE</u> The cosine rule is not on the intermediate tier specification, but as it is a common question, it may be seen by Higher tier candidates. M1 for $25.6^2 = 12.8^2 + 22.7^2 - 2 \times 12.8 \times 22.7 \times \cos A$ <i>If all marks gained ISW.</i>																																			
11.(a) $A \cap B$	B1																																				
11.(b) B'	B1																																				
12 Four numbers with a range of 10. Four numbers with a total of 36. Four numbers with a median of 8. Possible answers for all three marks are 5.5.11.15 or 5.6.10.15 or 5.7.9.15 or 5.8.8.15	B1 B1 B1	B0 if all four original numbers used.																																			

13. (number of females in Porth =) $\frac{90}{360} \times 128$ OR (number of males in Porth =) $\frac{120}{360} \times 72$ (number of females in Porth =) 32 (number of males in Porth =) 24 (Probability from Porth =) $\frac{56}{200}$ or equivalent ISW	M1 A1 A1 A1	Or equivalent <i>Answers may be seen on the diagram.</i> An answer of 32 implies M1. An answer of 24 implies M1. FT ('their 32' + 'their 24') /200 provided M1 gained. Penalise incorrect notation –1. e.g. '56 in 200'.																																						
14. $\sin(QPR) = \frac{9.6}{16.7}$ (QPR =) $\sin^{-1}(9.6/16.7)$ or $\sin^{-1}(0.57..)$ = 35.1(°) or 35.09(°) or 35.089(...°)	M1 m1 A1	Implies M1. Allow any answer that rounds to 35(°)																																						
14. <u>Alternative method.</u> Correct use of 'two-step' method. (x) = 35.1(°) or 35.09(°) or 35.089(...°)	M2 A1	A partial trigonometric method is M0. Allow any answer that rounds to 35(°)																																						
15. $7x + 2y = (£)41.5(0)$ AND $4x + 3y = (£)29.75$ Method to eliminate variable (Attempt at equal coefficients and subtraction) First variable found $x = (£) 5$ or $y = (£)3.25$. Substitute to find the 2 nd variable. Second variable found.	B1 M1 A1 m1 A1	Allow use of other letters to denote variables. B0 for using 4150 and 2975. FT 'their equations' if of equal difficulty. Allow 1 error in one term, not one with equal coefficients. C.A.O. (for their equations if FT.) F.T. their '1 st variable'. FT answers should be given to the nearest penny (rounded or truncated). If M0, award SC2 (with possible B1) for <u>both</u> answers of (£) 5 AND (£)3.25.																																						
16. One correct evaluation $1 \leq x \leq 2$ 2 correct evaluations $1.55 \leq x \leq 1.75$, one < 0, one > 0. 2 correct evaluations $1.55 \leq x \leq 1.65$, one < 0, one > 0. $x = 1.6$	B1 B1 M1 A1	<i>Correct evaluation regarded as enough to identify if 'too high' or 'too low'. If evaluations not seen accept 'too high' or 'too low'.</i> <table><tr><td>x</td><td>$2x^3 + x - 10$ (or check $2x^3 + x = 10$)</td></tr><tr><td>1</td><td>-7</td></tr><tr><td>1.1</td><td>-6.238</td></tr><tr><td>1.2</td><td>-5.344</td></tr><tr><td>1.3</td><td>-4.306</td></tr><tr><td>1.4</td><td>-3.112</td></tr><tr><td>1.5</td><td>-1.75</td></tr><tr><td>1.6</td><td>-0.208</td></tr><tr><td>1.7</td><td>1.526</td></tr><tr><td>1.8</td><td>3.464</td></tr><tr><td>1.9</td><td>5.618</td></tr><tr><td>2</td><td>8</td></tr></table> <table><tr><td>1.45</td><td>-2.452...</td></tr><tr><td>1.55</td><td>-1.002...</td></tr><tr><td>1.65</td><td>0.634...</td></tr><tr><td>1.75</td><td>2.468...</td></tr><tr><td>(1.62</td><td>0.123..)</td></tr><tr><td>(1.63</td><td>0.291..)</td></tr><tr><td>(1.64</td><td>0.461..)</td></tr></table>	x	$2x^3 + x - 10$ (or check $2x^3 + x = 10$)	1	-7	1.1	-6.238	1.2	-5.344	1.3	-4.306	1.4	-3.112	1.5	-1.75	1.6	-0.208	1.7	1.526	1.8	3.464	1.9	5.618	2	8	1.45	-2.452...	1.55	-1.002...	1.65	0.634...	1.75	2.468...	(1.62	0.123..)	(1.63	0.291..)	(1.64	0.461..)
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17. $85\% \equiv 6154$ $\frac{6154 \times 100}{85}$ OR $\frac{6154}{0.85}$ = 7240	B1 M1 A1	Accept any indication. Implies the B1.																																						
18. $x = 54(^{\circ})$ <u>Opposite angles</u> (of a <u>cyclic quad.</u> (add up to 180°). $y = 108(^{\circ})$ <u>Angle at the centre</u> (is twice the angle at the circumference).	B1 E1 B1 E1	Dependent on an attempt at 180 – 126. FT 2 × 'their 54' only if less than 360° Dependent on an attempt at 2 × 'their 54'.																																						



GCSE MARKING SCHEME

SUMMER 2019

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

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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

SUMMER 2019 MARK SCHEME

GCSE MATHEMATICS Unit 1: Higher Tier	Mark	Comments
<p>1.(a) For a method that produces 2 prime factors from the set {3, 3, 5, 7} before the 2nd error.</p> <p style="text-align: center;">3, 3, 5, 7</p> <p style="text-align: center;">$3^2 \times 5 \times 7$</p>	<p>M1</p> <p>A1</p> <p>B1</p>	<p>C.A.O. For sight of the four correct factors (Ignore 1s)</p> <p>FT 'their primes' provided at least one index form used with at least a square.</p> <p>Allow $(3^2)(5)(7)$ and $3^2.5.7$</p> <p>Inclusion of 1 as a factor gets B0.</p>
<p>1.(b) $42 = 2 \times 3 \times 7$ or equivalent correct strategy.</p> <p style="text-align: center;">(HCF =) 21</p>	<p>M1</p> <p>A1</p>	<p>M1 for sight of 2, 3, 7 'together'. (Not for 2×21, 3×14 and 6×7.)</p> <p>(Not for <u>just</u> listing all factors 1,2,3,6,7,14,21.)</p> <p>M1A0 for 3×7.</p> <p>FT 'their answer to 1(a)' only if of equivalent difficulty (at least two common prime factors).</p>
<p>2. -13</p> <p>Scale on y-axis '2cm square \equiv 10 units'.</p> <p>At least 7 correct plots and <u>no incorrect</u> plots.</p> <p>A smooth <u>curve</u> drawn through their plots.</p>	<p>B1</p> <p>B1</p> <p>P1</p> <p>C1</p>	<p>FT 'their (-2, -13)' AND 'their uniform scale' if possible.</p> <p>Allow \pm '½ a small square'.</p> <p>FT 'their 8 plots'. (Only if an uniform scale used.)</p> <p>OR a curve through the 7 given plots and (-2, -13).</p> <p>Allow intention to pass through their plots (within 1 small square, either horizontally <u>or</u> vertically of the point).</p>

<p>3.</p> <p>(Angle AÔB or exterior angle =) $\frac{360(^{\circ})}{8}$ = 45(^{\circ})</p> <p>(OÂB =) $\frac{180 - 45}{2}$ = 67.5(^{\circ})</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p><i>Answers/working may be seen on diagram.</i></p> <p>Sight of 45 (even e.g. OÂB = 45) gains M1A1.</p> <p>FT 'their 45' (but not 60^{\circ}).</p>
<p><u>3. Alternative method 1</u></p> <p>(Sum of interior angles =) $(8 - 2) \times 180^{\circ}$ or equivalent = 1080(^{\circ})</p> <p>(OÂB =) $\frac{1}{2} \times (1080 \div 8)$ = 67.5(^{\circ})</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>(Interior angle =) 135(^{\circ}) implies M1A1</p> <p>FT 'their interior angle sum' ($\neq 1440$)</p>
<p><u>3. Alternative method 2</u></p> <p>(Using 16 right-angled triangles)</p> <p>(Angle at O =) $360 / 16$ = 22.5(^{\circ})</p> <p>(OÂB =) $180 - 90 - 22.5$ = 67.5(^{\circ})</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>FT 'their 22.5'.</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>4.</p> <p>Correct construction <u>method</u> for perpendicular bisector with line drawn.</p> <p>Correct construction <u>method</u> for 60° at point A.</p> <p>Correct construction <u>method</u> for bisecting an angle with line drawn.</p> <p>Point P clearly identified</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p><i>Correct construction arcs must be seen for the first three B1 marks.</i></p> <p>Two pairs of intersecting arcs (centres at A and B).</p> <p>Allow if drawn at point B. Allow B1 for correct method (tolerance will be penalised with final B0).</p> <p>FT 'their angle of 60°' drawn at point A or point B.</p> <p>C.A.O. within tolerance. Intersecting lines alone with no indication that this is point P is <u>not sufficient</u> for this B1. Do not penalise if both possible positions shown. Final B1 may be awarded after B0B0B0.</p>
<p><u>4. Alternative method</u></p> <p><i>Correct construction method for 60° at point A (or B).</i></p> <p><i>Correct construction method for bisecting the angle at A (or B) with line drawn.</i></p> <p><i>Repeating the above two stages at B (or A)</i></p> <p><i>Point P clearly identified</i></p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p><i>Correct construction arcs must be seen for the first three B1 marks</i></p> <p><i>Allow B1 for correct method (tolerance will be penalised with final B0).</i></p> <p><i>C.A.O. within tolerance.</i> <i>Intersecting lines alone with no indication that this is point P is <u>not sufficient</u> for this B1.</i> <i>Do not penalise if both possible positions shown.</i> <i>Final B1 may be awarded after B0B0B0.</i></p>
<p>5. Sight of any TWO of 30, 2 or 0.5 OR Sight of any TWO of 30, 8 or 0.5 as appropriate approximations.</p> <p>$\frac{30 \times 8}{0.5}$ or equivalent.</p> <p>= 480</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Allow 30.2 for 30.</p> <p>Equivalent e.g. $\frac{30 \times 2 \times 2 \times 2}{\frac{1}{2}}$ or $\frac{30 \times 2^3}{0.5}$ Must be seen, but allow if attempted calculation done in steps. M0 for exact calculation.</p> <p>C.A.O. Allow 483.2 if 30.2 used.</p>
<p>6.(a) 0.32</p>	<p>B1</p>	
<p>6.(b) Sample number from Anglesey on 2nd day = 3000 × 0.42 = 1260</p> <p>(Rel.Fqu. for two days =) $\frac{640 + 1260}{2000 + 3000}$ = 0.38</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Allow M1A1 for sight of 1260 e.g. 1260/3000</p> <p>FT 'their 1260'.</p>
<p>6.(c) 'Answer to part (b)' noted AND Valid explanation e.g. 'more people sampled'</p>	<p>E1</p>	<p>Explanation must refer to the sample being the largest. Allow e.g. 'from both days', 'number of people added', 'frequencies are added'. Do <u>not</u> accept 'relative frequencies are added'.</p>

7.(a)(i) 425 kg	B1	
7.(a)(ii) 21.5 s	B1	
7.(a)(iii) 83 people	B1	
7.(b) 2.38×10^{-2}	B2	B1 for sight of a correct answer but not in standard form e.g. 23.8×10^{-3} or 0.0238.
8.(a) 0.7 shown for 'Does not go on tour bus'. Use of $0.3 \times \dots = 0.24$ $P(\text{sees show}) = 0.8$ Second set of branches 0.8, 0.2, 0.8, 0.2	B1 M1 A1 A1	Allow M1A1 if 0.8 seen on one of the 'sees show' branches. FT 'their 0.8' only if M1 awarded. (0.24, 0.76, 0.24, 0.76 is M0A0A0)
8.(b) 0.7×0.2 $= 0.14$ ISW	M1 A1	FT 'their values' if both between 0 and 1.
9.(a) $5n < 3n + 7$ or equivalent ISW	B2	$2n < 7$ OR $n < 7/2$ implies B2. Ignore use of a different letter e.g. $5x < 3x + 7$. Use of ' \leq ' is B1. B1 for sight of $3n + 7$ in an inequality.
9.(b) $2n < 7$ OR $n < 7/2$ (Greatest amount =) (£)3	B1 B1	FT 'their inequality' if of equivalent difficulty. May be seen in part (a). FT 'their $n < k$ '. B0 if they have ' $n > k$ '. B0 if it leads to $n < 1$. An answer of (£)3 gains B1B1 (unless from incorrect algebra work).
10. Lines $x = -2$, $y + x = 1$ and $2y = x$ all correct. Correct region identified.	B2 B1	B1 for any 2 correct lines. If $x = -2$ and any other vertical or horizontal line shown e.g. $y = \pm 2$ or $x = 2$, do not award a mark unless $x = -2$ is selected for the region or clearly labelled. FT provided region is closed and B1 awarded. Accept indication by 'shading out'.
11. $cx - 4x = d + 3$ or $-3 - d = 4x - cx$ $x(c - 4) = d + 3$ or $-3 - d = x(4 - c)$ $x = (d + 3)/(c - 4)$ or $x = (-3 - d)/(4 - c)$ or equivalent	B1 B1 B1	FT until 2 nd error provided equivalent difficulty. Collecting x terms. Factorising. Dividing. Mark final answer.
12. Values given for any two missing angles. Explanation that the triangles are congruent due to angle, side, angle or ASA or equivalent.	B1 E1	(Check diagrams) Missing angle(s) is/are 32° or 83° and 65° If all three angles are given, they must all be correct. Or equivalent. No FT from incorrect angles. Dependent on at least one correct angle found.
13. (a) $x = 0.248888\dots$ $10x = 2.48888\dots$ <u>with</u> an attempt to subtract $224/900$ or $112/450$ or $56/225$ or equivalent e.g. $2464/9900$	M1 A1	Or $1000x$ and $100x$, or equivalent. An answer of $2.24/9$ or $22.4/90$ gains M1 only. ISW.
<u>Alternative method</u> ($0.24 + 0.00888\dots = 24/100 + 8/900$ or equivalent $224/900 (= 56/225)$)	M1 A1	ISW
13. (b) 9	B2	B1 for $729^{\frac{1}{3}}$ or $\sqrt[3]{729}$ or $(729/1)^{\frac{1}{3}}$ or 3^2 or $(1/9)^{-1}$ or $1/(1/9)$ Allow B1 for $1/9$ or -9 .

14.	$EBC \text{ or } ECB = (180 - 58) / 2$ $= 61(^{\circ})$ $BAC = 61(^{\circ})$ $ABC (= 180 - 35 - 61) = 84(^{\circ})$	M1 A1 B1 B1	Check diagram. Angles in an isosceles triangle. Alternate segment theorem. FT 'their EBC or ECB '. FT $180 - 35 -$ 'their BAC '.
<u>Alternative method 1</u> $EBC \text{ or } ECB = (180 - 58) / 2$ $= 61(^{\circ})$ $DBA = 35(^{\circ})$ $ABC (= 180 - 35 - 61) = 84(^{\circ})$	M1 A1 B1 B1	Check diagram. Angles in an isosceles triangle. Alternate segment theorem. Angles on a straight line FT $180 -$ 'their EBC ' – 'their DBA '.	
<u>Alternative method 2</u> $EBC \text{ or } ECB = (180 - 58) / 2$ $= 61(^{\circ})$ $ACF (=180 - 35 - 61) = 84(^{\circ})$ $ABC = 84(^{\circ})$	M1 A1 B1 B1	Check diagram. Angles in an isosceles triangle. Angles on a straight line. FT $180 - 35 -$ 'their ECB '. Alternate segment theorem. FT 'their ACF '.	
<u>Alternative method 3</u> (using isosceles triangle BOC , where O is the centre of the circle) $BOC = 360 - 90 - 90 - 58$ $= 122$ $BAC = 61$ $ABC (= 180 - 35 - 61) = 84(^{\circ})$	M1 A1 B1 B1	Check diagram. Angles in kite $BOCE$ Use of angle in the centre FT 'their BOC ' $\div 2$ FT $180 - 35 -$ 'their BAC '	
15. (a) $3\sqrt{5}$	B1		
15. (b) $4 \times \sqrt{49} - 2\sqrt{7} \times 3 - 2\sqrt{7} \times 3 + \sqrt{9}$ or $4 \times 7 - 2\sqrt{21} - 2\sqrt{21} + 3$ or equivalent $31 - 4\sqrt{21}$	M1 A1	Allow one incorrect term. $\sqrt{7}\sqrt{7}$ is insufficient for $\sqrt{49}$. $\sqrt{3}\sqrt{3}$ is insufficient for $\sqrt{9}$. Allow $\sqrt{7}\sqrt{3}$ or $\sqrt{3}\sqrt{7}$ for $\sqrt{21}$. $\sqrt{7}\sqrt{3}$ or $\sqrt{3}\sqrt{7}$ is insufficient for $\sqrt{21}$.	
16. $\frac{4\pi R^3}{3} = \frac{\pi r^3}{6}$ $24R^3 = 3r^3$ or $R = \sqrt[3]{(\pi r^3/6)/(4\pi/3)}$ or $R^3 = (\pi r^3/6)/(4\pi/3)$ or equivalent $R = \frac{r}{2}$	M2 m1 A1	Equating volumes Award M1 for sight of: (Volume of cylinder $=$) $\pi r^2 \times r/6$ or equivalent $\frac{4\pi R^3}{3} = \frac{\pi r^3}{6}$ is awarded M1. Award m1 for clearing fractions AND cancelling π or for isolating R or for isolating R^3 . FT if M1 awarded and if equivalent difficulty CAO	
17. (a) $y = f(x) + 2$	B1		
17. (b) $y = f(-x)$	B1		

18. (a) $\frac{4}{10} \times \frac{3}{9} \times \frac{6}{8}$ or equivalent $\frac{72}{720}$ (= $\frac{1}{10}$) or equivalent	M1 A1	Accept e.g. $\frac{6}{10} \times \frac{4}{9} \times \frac{3}{8}$ or $(6 \times 4 \times 3)/(10 \times 9 \times 8)$ ISW
18. (b) $1 - P(\text{three red})$ or $1 - P(\text{no yellow})$ $= 1 - [\frac{6}{10} \times \frac{5}{9} \times \frac{4}{8}]$ $(= 1 - \frac{120}{720} \text{ or } 1 - \frac{1}{6})$ $= \frac{600}{720}$ (= $\frac{5}{6}$) or equivalent	S1 M1 A1	May be implied by subsequent working. <u>Complete</u> method. ISW FT from part (a) consistent use of a wrongly calculated denominator. If no other marks awarded, SC1 for sight of $\frac{784}{1000}$ or equivalent (from a method 'with replacement')
<u>Alternative method</u> <i>P(YRR or RYR or RRY or YYR or YRY or RYY or YYY) or equivalent (allow up to two of these terms to be missing or incorrect for this mark)</i> $= \frac{4}{10} \times \frac{6}{9} \times \frac{5}{8} \times 3 + \frac{4}{10} \times \frac{3}{9} \times \frac{6}{8} \times 3 + \frac{4}{10} \times \frac{3}{9} \times \frac{2}{8}$ or equivalent <i>(complete method required for this mark)</i> $= \frac{600}{720}$ (= $\frac{5}{6}$) or equivalent ISW	S1 M1 A1	 FT $\frac{4}{10} \times \frac{6}{9} \times \frac{5}{8} \times 3 + \text{'their part (a)'} \times 3 + \frac{4}{10} \times \frac{3}{9} \times \frac{2}{8}$
19. (a) $\frac{a}{x(x-a)}$ or $\frac{a}{x^2 - ax}$	B2	B1 for correct numerator - <u>not</u> from incorrect work – use of brackets may be implied. B1 for correct denominator in a single fraction (accept equivalent) If B2, penalise -1 for incorrect subsequent work
19. (b) $x - 1 + 2x(4x + 3) [= 0]$ or $x - 1 + 8x^2 + 6x [= 0]$ or $x - 1 = -2x(4x + 3)$ $8x^2 + 7x - 1 [= 0]$ $(8x - 1)(x + 1) [= 0]$ $x = \frac{1}{8}$ or $x = -1$	M1 A1 B2 B1	Clearing fraction Allow e. g. $\frac{x - 1 + 2x(4x + 3)}{x(4x + 3)} = 0$ Allow M1 for $x - 1 = 2x(4x + 3)$ Collecting terms and re-arranging quadratic equation Ignore presence of denominator (provided correct). B1 for $(8x \dots 1)(x \dots 1)$ FT their quadratic equation, provided of equivalent difficulty. Both answers required. Strict FT 'their <u>derived</u> brackets'. <u>Using quadratic formula</u> FT their quadratic equation, provided of equivalent difficulty. $(x =) \frac{-7 \pm \sqrt{7^2 - 4(8)(-1)}}{2(8)} \quad M1$ For M1, allow one error, in sign or substitution, but not in formula. $x = \frac{-7 \pm \sqrt{81}}{16} \quad A1$ $x = \frac{1}{8}$ or $x = -1$ (both answers required) A1 No marks for a trial and improvement method.



GCSE MARKING SCHEME

SUMMER 2019

**GCSE
MATHEMATICS – UNIT 2 (HIGHER TIER)
3300U60-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2019 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

SUMMER 2019 MARK SCHEME

GCSE MATHEMATICS Unit 2 : Higher Tier	Mark	Comments
1.(a) $3n + 5$ or equivalent	B2	B1 for sight of $3n$. B0 for $-3n$ Mark final answer.
1.(b) $3t = r + 8$ or $r + 8 = 3t$ or $-3t = -r - 8$ $t = \frac{r+8}{3}$ or $\frac{r+8}{3} = t$ or $t = \frac{-r-8}{-3}$	B1 B1	F.T. only from $3t = \pm r \pm 8$, stated or implied. ($3t = r + 8$ will have already gained the previous B1.) B1B0 for $-t = \frac{-r-8}{3}$ or equivalent. Mark final answer. <u>Note</u> Allow B1B0 for $t = (r + 8) \div 3$ with or without brackets. Allow B1B0 for $\frac{r+8}{3}$ ('t' missing)
1.(c) $6x + 4 = 46$ OR $3x + 2 = 23$ $6x = 42$ OR $3x = 21$ (x =) 7	B2 B1 B1	B1 for $(x + 5) + (2x - 3) + (x + 5) + (2x - 3) = 46$ or equivalent e.g. $(x + 5) + (2x - 3) = 23$ FT collection of 'their terms' if of equivalent difficulty. (linear equation only.) B1 FT <u>only</u> from $ax = b$. Allow a fraction from a FT value unless x is a whole number. (x =) 7 gains all four marks. Each B mark implies all previous B marks. Mark final answer.
1.(c) <u>Alternative method</u> A trial showing correct values and understanding of perimeter. (e.g. $2(4 + 5) + 2(2 \times 4 - 3) = 28$) An <u>improved</u> trial. (x =) 7	B1 B1 B2	Consistent use of x AND correct evaluation. Dependent on first B1. If 1 st trial is using '7' award B1B1 followed by B1 if left embedded but B2 if shown as $x = 7$. B1 for an implied / embedded ' $x = 7$ ' but not shown as $x = 7$. (x =) 7 gains all four marks. Mark final answer.

<p>2. Intent to square at least two of the three values.</p> <p>Comparing $(25.6)^2$ with $(12.8)^2 + (22.7)^2$ or Any intent to compare any other relevant values. (e.g. $(25.6)^2 - (22.7)^2$ with $(12.8)^2$ or $\sqrt{[(12.8)^2 + (22.7)^2]}$ (with 25.6))</p> <p>Correct evaluation of value(s) to be compared. (e.g 'sight of 655.36 WITH 679.13' or 'sight of 140.07 WITH 163.84' or 'sight of 26.06 (WITH 25.6)')</p> <p>Statement that it is NOT possible</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>(Note: $12 \cdot 8^2 = 163 \cdot 84$, $22 \cdot 7^2 = 515 \cdot 29$ and $25 \cdot 6^2 = 655 \cdot 36$)</p> <p>The comparison attempted must show <u>both</u> intended calculations e.g. $(25.6)^2$ AND $(12.8)^2 + (22.7)^2$ unless intention is to compare with a given side e.g. $\sqrt{[(12.8)^2 + (22.7)^2]}$ with 25.6</p> <p>C.A.O. but allow evaluated answers to be given to the nearest whole number. e.g. 655 WITH 679.</p> <p>Allow FT if M1 awarded. If all marks gained ISW.</p>																																			
<p><u>2. Alternative method 1</u> Intent to use two right-angled trig ratios using 2 different pairs of given sides</p> <p>Correct right-angled trig ratio used twice, using 2 different given sides, in order to compare</p> <ul style="list-style-type: none">the values of the same angle orthe sum of the two angles with 90°. <p>Correct evaluation of value(s) to be compared. e.g. sight of any two of 30°, $27.5\dots^\circ$ and $29.4\dots^\circ$ OR sight of 30° and $60.58\dots^\circ$ (and the sum to be compared with 90°)</p> <p>Statement that it is NOT possible</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>i.e. In order to find the value of either the same angle OR two different angles, whilst sufficient to show that it isn't a right-angled triangle.</p> <p>CAO</p> <table><tr><th>Ratio</th><th>Opp</th><th>Adj</th><th>Hyp</th><th>Angle</th></tr><tr><td>Sin</td><td>12.8</td><td></td><td>25.6</td><td>30°</td></tr><tr><td>Cos</td><td></td><td>22.7</td><td>25.6</td><td>$27.5\dots^\circ$</td></tr><tr><td>Tan</td><td>12.8</td><td>22.7</td><td></td><td>$29.4\dots^\circ$</td></tr><tr><td>Sin</td><td>22.7</td><td></td><td>25.6</td><td>$62.46\dots^\circ$</td></tr><tr><td>Cos</td><td></td><td>12.8</td><td>25.6</td><td>60°</td></tr><tr><td>Tan</td><td>22.7</td><td>12.8</td><td></td><td>$60.58\dots^\circ$</td></tr></table> <p>If comparing the sum of two angles (with 90°), the sum must be shown. Allow FT if M1 awarded. If all marks gained ISW.</p>	Ratio	Opp	Adj	Hyp	Angle	Sin	12.8		25.6	30°	Cos		22.7	25.6	$27.5\dots^\circ$	Tan	12.8	22.7		$29.4\dots^\circ$	Sin	22.7		25.6	$62.46\dots^\circ$	Cos		12.8	25.6	60°	Tan	22.7	12.8		$60.58\dots^\circ$
Ratio	Opp	Adj	Hyp	Angle																																	
Sin	12.8		25.6	30°																																	
Cos		22.7	25.6	$27.5\dots^\circ$																																	
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Sin	22.7		25.6	$62.46\dots^\circ$																																	
Cos		12.8	25.6	60°																																	
Tan	22.7	12.8		$60.58\dots^\circ$																																	
<p><u>2. Alternative method 2</u> (using the cosine rule)</p> <p>$(\cos A =) (12.8^2 + 22.7^2 - 25.6^2) / (2 \times 12.8 \times 22.7)$ (= 2377/58112 or 0.0409..)</p> <p>(A =) $87.6557\dots^\circ$</p> <p>Statement that it is NOT possible</p>	<p>M2</p> <p>A1</p> <p>A1</p>	<p><u>NOTE</u> The cosine rule is not on the intermediate tier specification, but as it is a common question, it may be seen by Higher tier candidates. M1 for $25.6^2 = 12.8^2 + 22.7^2 - 2 \times 12.8 \times 22.7 \times \cos A$</p> <p>If all marks gained ISW.</p>																																			

Organisation and Communication	OC1	For OC1, candidates will be expected to: <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
Accuracy of writing.	W1	For W1, candidates will be expected to: <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
3.(a) $A \cap B$	B1	
3.(b) B^I	B1	
4 Four numbers with a range of 10. Four numbers with a total of 36. Four numbers with a median of 8. Possible answers for all three marks are 5,5,11,15 or 5,6,10,15 or 5,7,9,15 or 5,8,8,15	B1 B1 B1	B0 if all four original numbers used.
5. (number of females in Porth =) $\frac{90}{360} \times 128$ OR (number of males in Porth =) $\frac{120}{360} \times 72$ (number of females in Porth =) 32 (number of males in Porth =) 24 (Probability from Porth =) $\frac{56}{200}$ or equivalent ISW	M1 A1 A1 A1	Or equivalent <i>Answers may be seen on the diagram.</i> An answer of 32 implies M1. An answer of 24 implies M1. FT ('their 32' + 'their 24') /200 provided M1 gained. Penalise incorrect notation –1. e.g. '56 in 200'.
6. $\sin(QPR) = \frac{9.6}{16.7}$ (QPR =) $\sin^{-1}(9.6/16.7)$ or $\sin^{-1}(0.57...)$ = 35.1(°) or 35.09(°) or 35.089(...°)	M1 m1 A1	 Implies M1. Allow any answer that rounds to 35(°)
<u>6.Alternative method.</u> Correct use of 'two-step' method. (x) = 35.1(°) or 35.09(°) or 35.089(...°)	M2 A1	<i>A partial trigonometric method is M0.</i> Allow any answer that rounds to 35(°)
7. $7x + 2y = (£)41.5(0)$ AND $4x + 3y = (£)29.75$ Method to eliminate variable (Attempt at equal coefficients and subtraction) First variable found $x = (£) 5$ or $y = (£)3.25$. Substitute to find the 2 nd variable. Second variable found.	B1 M1 A1 m1 A1	Allow use of other letters to denote variables. B0 for using 4150 and 2975. FT 'their equations' if of equal difficulty. Allow 1 error in one term, not one with equal coefficients. C.A.O. (for their equations if FT.) F.T. their '1 st variable'. FT answers should be given to the nearest penny (rounded or truncated). If M0, award SC2 (with possible B1) for <u>both</u> answers of (£) 5 AND (£)3.25.

8.	<p>One correct evaluation $1 \leq x \leq 2$ 2 correct evaluations $1.55 \leq x \leq 1.75$, one < 0, one > 0. 2 correct evaluations $1.55 \leq x \leq 1.65$, one < 0, one > 0.</p> <p>$x = 1.6$</p>	<p><i>Correct evaluation regarded as enough to identify if 'too high' or 'too low'. If evaluations not seen accept 'too high' or 'too low'.</i></p> <p>x $2x^3 + x - 10$ (or check $2x^3 + x = 10$)</p> <p>B1 1 -7</p> <p>B1 1.1 -6.238</p> <p>M1 1.2 -5.344</p> <p> 1.3 -4.306</p> <p> 1.4 -3.112 1.45 - 2.452...</p> <p>A1 1.5 -1.75 1.55 - 1.002...</p> <p> 1.6 -0.208 1.65 0.634...</p> <p> 1.7 1.526 1.75 2.468...</p> <p> 1.8 3.464 (1.62 0.123..)</p> <p> 1.9 5.618 (1.63 0.291..)</p> <p> 2 8 (1.64 0.461..)</p>
9.	<p>$85\% \equiv 6154$ $\frac{6154}{85} \times 100$ OR $\frac{6154}{0.85}$ = 7240</p>	<p>B1 Accept any indication. M1 Implies the B1. A1</p>
10.	<p>$x = 54(^{\circ})$ <u>Opposite angles</u> (of a) <u>cyclic quad.</u> (add up to 180°).</p> <p>$y = 108(^{\circ})$ <u>Angle at the centre</u> (is twice the angle at the circumference).</p>	<p>B1 Dependent on an attempt at $180 - 126$. E1</p> <p>B1 FT $2 \times$ 'their 54' only if less than 360° E1 Dependent on an attempt at $2 \times$ 'their 54'.</p>
11.	Correct enlargement	<p>B2 Otherwise B1 for 2 correct vertices within a triangle. OR for 3 correct vertices in the correct location not joined to form the triangle OR triangle of correct shape, size and orientation in incorrect position OR consistent correct use of an incorrect negative scale factor.</p>
12(a).	$(9p + 1)(9p - 1)$	B2 B1 for $(9p \dots 1)(9p \dots 1)$
12(b).	$(7t - 2)(t + 3)$	B2 B1 for $(7t \dots 2)(t \dots 3)$
13.	<p>Sight of 297.5 AND 6.5 $297.5 \div 6.5$ = 45.77(km/h)</p>	<p>B1 Accept 6 hours 30 minutes, but not 6.3 hours. M1 If other calculations shown, then the relevant calculation must be identified. Award M1 for their values provided $295 \leq d < 300$ AND $6 < t \leq 7$ (but not 6 hours 30 minutes). A1 CAO. Correct answer must be clearly identified.</p>
14.	<p>$\sin BAD = (2 \times 70) / (8 \times 19)$ or equivalent</p> <p>(BAD=) $67(.08 \dots ^{\circ})$</p> <p>(Area of sector ABD=) $67(.08 \dots) / 360 \times \pi \times 8^2$</p> <p>Accept answers in the range $37.4(\text{cm}^2)$ to $37.5(\text{cm}^2)$ OR $37(\text{cm}^2)$</p>	<p>M2 Allow any unambiguous indication of angle BAD. M1 for the <u>correct use</u> of the formula when $\sin BAD$ is not the subject, for example: $70 = 1/2 \times 8 \times 19 \times \sin BAD$.</p> <p>A1 Allow any answer that rounds to $67(^{\circ})$.</p> <p>M1 Accept $292.9(\dots) / 360 \times \pi \times 8^2$ OR $293 / 360 \times \pi \times 8^2$ for the area of the major sector ABD. FT their derived or stated value of angle BAD.</p> <p>A1 Accept an answer in the range $163.5(\text{cm}^2)$ to $163.7(\text{cm}^2)$ OR $164(\text{cm}^2)$ for the area of the major sector ABD.</p>

<p>15.</p> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <p>Graph</p> </div> <div style="text-align: center;"> <p>Equation</p> <p>$y = (x + 1)(x - 4)$</p> <p>$y = (x - 4)^2$</p> <p>$y = x(x + 4)$</p> <p>$y = (x - 1)(x + 4)$</p> <p>$y = (x - 2)(x + 2)$</p> <p>$y = x(x - 4)$</p> <p>$y = (x + 1)(4 - x)$</p> <p>$y = (1 - x)(x + 4)$</p> <p>$y = (x + 4)^2$</p> </div> </div>	B2	B1 for any 1 or 2 correct.
<p>16.(a) General sine curve with appropriate orientation and position.</p> <p>-1 and 1 indicated on the y-axis, curve passes through $(-180^\circ, 0)$, $(0^\circ, 0)$ and $(180^\circ, 0)$ and approximately $(-90^\circ, -1)$ and $(90^\circ, 1)$.</p>	M1 A1	Ignore curve shown for values $x < -180^\circ$ or $x > 180^\circ$.
<p>16(b). -30° AND -150°</p>	B2	<p>Accept embedded answers. Penalise further incorrect answer(s) -1. Ignore further answer(s) outside of the range.</p> <p>Award B1 for sight of an answer -30° or -150° (but not for sight of -30 as part of working).</p>
<p>17.(a) $\frac{3}{100} \times \frac{1}{99}$ $= \frac{3}{9900} \left(= \frac{1}{3300} \right)$ ISW</p>	M1 A1	<p>Allow $3(.03...) \times 10^{-4}$ OR $0.0003(03...)$ or equivalent. A0 for $0.0003(03...) \%$. An unsupported $0.000303(...)$ gains M1A1. An unsupported $3/10000$ OR 0.0003 gains no marks.</p>
<p>17(b) $2 \times \frac{3}{100} \times \frac{1}{99} \left(= \frac{6}{9900} = \frac{1}{1650} \right)$ $+ \frac{3}{100} \times \frac{2}{99} \left(= \frac{6}{9900} = \frac{1}{1650} \right)$ OR $\frac{4}{100} \times \frac{3}{99}$ $= \frac{12}{9900} \left(= \frac{1}{825} \right)$ ISW</p>	M2 A1	<p>M1 for sight of $\left(\frac{3}{100} \times \frac{1}{99} \right) + \left(\frac{3}{100} \times \frac{1}{99} \right)$ OR $\left(\frac{3}{100} \times \frac{1}{99} \right) + \left(\frac{1}{100} \times \frac{3}{99} \right)$ OR $2 \times \frac{3}{100} \times \frac{1}{99}$ OR $\left(\frac{3}{100} \times \frac{1}{99} \right) + \left(\frac{3}{100} \times \frac{2}{99} \right)$</p> <p>A1 Allow $1(.21...) \times 10^{-3}$ OR $0.001(21...)$ or equivalent. An unsupported answer of $0.00121(2...)$ gains M2A1. A0 for $0.001(21...) \%$. SC1 for working with replacement leading to an answer of $12/10000$ ($3/2500$) OR $0.001(2)$ [may be unsupported].</p>

<p>17.(b) <u>Alternative method</u></p> $1 - \left[\left(\frac{96}{100} \times \frac{95}{99} \right) + \left(2 \times \frac{3}{100} \times \frac{96}{99} \right) + \left(2 \times \frac{1}{100} \times \frac{96}{99} \right) \right]$ $= \frac{12}{9900} \left(= \frac{1}{825} \right) \text{ ISW}$	<p>M2</p> <p>A1</p>	<p>M1 for sight of:</p> $\left[\left(\frac{96}{100} \times \frac{95}{99} \right) + \left(2 \times \frac{3}{100} \times \frac{96}{99} \right) + \left(2 \times \frac{1}{100} \times \frac{96}{99} \right) \right] \text{ OR}$ $1 - \left[\left(\frac{96}{100} \times \frac{95}{99} \right) + \left(\frac{3}{100} \times \frac{96}{99} \right) + \left(\frac{1}{100} \times \frac{96}{99} \right) \right]$ <p>Allow $1(.21...) \times 10^{-3}$ OR $0.001(21...)$ or equivalent. An unsupported answer of $0.00121(2...)$ gains M2A1. A0 for $0.001(21...) \%$. SC1 for working with replacement leading to an answer of $12/10000$ ($3/2500$) OR $0.001(2)$ [may be unsupported].</p>
<p>18. $(\cos \text{CAB} =) (13^2 + 17^2 - 23^2) / (2 \times 13 \times 17)$ $(= -71/442 \text{ OR } -0.16(06...))$ $(\text{CAB} =) 99(.2...^\circ)$</p>	<p>M2</p> <p>A1</p>	<p>M1 for $23^2 = 13^2 + 17^2 - 2 \times 13 \times 17 \times \cos \text{CAB}$</p> <p>SC1 for the correct evaluation of either of the two other angles. $\text{ABC} = 33(.9...)$ and $\text{ACB} = 46(.8...)$.</p>
<p>19. Sight of $9x^2 - 6x - 6x + 4$ Sight of $x^2 + x + 2x + 2$ $8x^2 - 15x + 2 = 0$</p> $x = \frac{-(-15) \pm \sqrt{(-15)^2 - 4 \times 8 \times 2}}{2 \times 8}$ $x = \frac{15 \pm \sqrt{161}}{16}$ <p>$x = 1.73$ with $x = 0.14$ (answers to 2dp)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>Or equivalent.</p> <p>Or equivalent.</p> <p>FT expansions of equivalent level of difficulty provided B1 previously awarded. ' = 0 ' required, but may be implied by an attempt to use the quadratic formula or if $a = 8, b = -15, c = 2$ used in the quadratic formula.</p> <p>This substitution into the formula must be seen for M1. FT 'their derived quadratic equation' equated to zero of equivalent difficulty (a, b and c must be non-zero). Allow one slip in substitution for M1 only, but must be correct formula.</p> <p>Can be implied from at least one correct value of x evaluated.</p> <p>CAO for their quadratic equation but not if complex roots. M0A0A0 if trial and improvement used or for unsupported answers.</p>
<p>20. Volume scale factor: $(\sqrt{199/47})^3 (= 8.712...)$ OR $(\sqrt{47/199})^3 (= 0.114...)$ or equivalent.</p> <p>Volume of larger solid $350 \times (\sqrt{199/47})^3$ OR $350 \div (\sqrt{47/199})^3$ or equivalent.</p> <p>$3049(.305... \text{cm}^3)$</p>	<p>B2</p> <p>M1</p> <p>A1</p>	<p>May be seen in parts. Award B1 for a linear scale factor: $\sqrt{(199/47)} (= 2.057...)$ OR $\sqrt{(47/199)} (= 0.485...)$ or equivalent OR Award B1 for $(199/47)^3 (= 75.904...)$ OR $(47/199)^3 (= 0.013...)$.</p> <p>CAO. Not from premature approximation.</p>