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# **GCSE MARKING SCHEME**

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**SUMMER 2022**

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

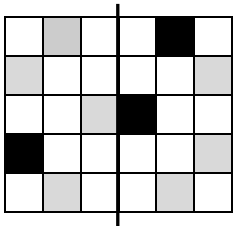
## **INTRODUCTION**

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

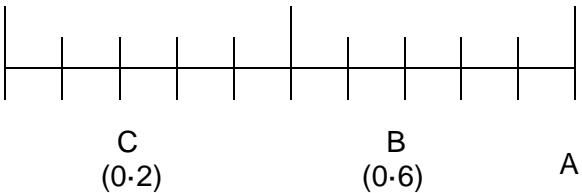
It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

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

**WJEC GCSE MATHEMATICS**  
**SUMMER 2022 MARKING SCHEME**

Unit 1: Foundation Tier	Mark	Comments
1. (a) 2380	B1	
1. (b) 9615	B1	
1. (c) 67	B1	
1. (d) 378	B1	
1. (e) 1257	B1	
2. (a) unlikely	B1	
2. (b) an even chance	B1	
3. 	B1	
4. (a) $(x =) 54^\circ$	B1	Accept $52^\circ$ to $56^\circ$
4. (b) Angle of $147^\circ$ drawn at $B$	B1	Accept $145^\circ$ to $149^\circ$
5.(a) 5 hours 45 minutes OR $5\frac{3}{4}$ hours OR 345 mins	B1	Allow incorrect notation, e.g. 5:45 or 5.45
5.(b) 6 small triangles shaded	B1	
6. (Diameter of the larger circle=) $4 \times 7.5$ (cm) = 30 (cm)	M1 A1	May be seen in parts.
Accuracy of Writing Show all their working which must be in correct mathematical form Include units in the answer	W1	For W1, candidates will be expected to: <ul style="list-style-type: none"> <li>show all their working</li> <li>make few, if any, errors in spelling, punctuation and grammar</li> <li>use correct mathematical form in their working</li> <li>use appropriate terminology, units, etc.</li> </ul>
7.(a) $3a$	B1	
7.(b)(i) $(y=) 63$	B1	Accept embedded answer
7.(b)(ii) $(x=) 12$	B1	Accept embedded answer
7 (c) 6	B1	



<p>11.</p> 	<p>B1 B1 B1</p>	<p>A marked at 1 B marked at 0.6 (accept 0.55 to 0.65 exclusive) C marked at 0.2 (accept 0.15 to 0.25 exclusive)</p>
<p>12. (a) 72</p>	<p>B2</p>	<p>B1 for an appropriate sight of 9 or 8.</p>
<p>12. (b) -31</p>	<p>B1</p>	
<p>12. (c) 42 ISW</p>	<p>B1</p>	<p>Allow 42.0</p>
<p>13. Showing 30% (31%), and 32% OR 30/100, 31/100 and 32/100 OR (0.3), 0.31 and 0.32 OR three correct calculations for a common amount.  0.3 31%, 8/25 in order</p>	<p>B2          B1</p>	<p>B2 for all correct %, OR all correct fractions <u>with a common denominator</u>, OR all correct decimals, OR correct work using a common amount, OR a valid combination that allows full comparison.  B1 for one correct conversion or two correct calculations for a common amount.  Allow any unambiguous indication (e.g. 'converted' values.) <b>Strict FT</b> of 'their work' if at least B1 gained. Correct answer, with <u>no</u> other marks awarded, gains final B1 only.</p>
<p>14. equivalent 360 - 90 - 220 or   50(°) =  (x =) (180 - 50) ÷ 2 or equivalent  65(°) =</p>	<p>M1   A1 M1 A1</p>	<p><i>Answer line takes precedence.</i> Note: 360 - 310 or 270 - 220 or 140 - 90 Award M1 for complete method or intention of complete method provided not contradicted e.g. brackets missing 360 - 90 + 220  May be seen in later working May be seen in stages FT (180 - 'their 50') ÷ 2</p>
<p>14. <u>Alternative method</u>  (Exterior angle = sum of the two opposite interior angles =) 130(°)  (x =) 130 ÷ 2 or equivalent  65(°)</p>	<p>B1  M2 A1</p>	<p><i>Answer line takes precedence.</i>    FT (their '220 - 90') ÷ 2</p>

15. (a) Any $n$ , as a whole number, which results in $7n - 9$ being a multiple of 4	B2	<p>Answer space takes precedence and must not be from incorrect working.</p> <p>Do not ignore crossed-out work for this question.</p> <p>Award B1 for any one of:</p> <ul style="list-style-type: none"><li>any 2 correctly evaluated terms in the sequence <math>7n - 9</math> (i.e. not leading to, or not recognised as leading to, a multiple of 4 for their choice of <math>n</math>) or</li><li>setting up an equation <math>7n - 9 = 4 \times k</math> (where <math>k \geq 1</math> and a whole number) and attempt to solve</li><li>a correct value of <math>n</math> substituted in <math>7n - 9</math>, but contradiction or no answer given on answer line (e.g. <math>7 \times 3 - 9 = 12</math> and 12 written on answer line or answer line left blank)</li></ul> <table><tr><td><math>n</math></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>.....</td></tr><tr><td><math>7n - 9</math></td><td>-2</td><td>5</td><td>12</td><td>19</td><td>26</td><td>33</td><td>40</td><td>47</td><td>54</td><td>61</td><td>68</td><td>.....</td></tr></table> <p>Note: Award B0 for a correct value of <math>n</math> from incorrect working e.g. if <math>7 \times 4 - 9 = 19</math>, then <math>n = 19</math> on the answer line.</p>	$n$	1	2	3	4	5	6	7	8	9	10	11	.....	$7n - 9$	-2	5	12	19	26	33	40	47	54	61	68	.....
$n$	1	2	3	4	5	6	7	8	9	10	11	.....																
$7n - 9$	-2	5	12	19	26	33	40	47	54	61	68	.....																
15. (b) Any $n$ , as a whole number, which results in $3n - 5$ being a prime number	B2	<p>Answer space takes precedence and must not be from incorrect working.</p> <p>Do not ignore crossed-out work for this question.</p> <p>Award B1 for any one of:</p> <ul style="list-style-type: none"><li>any 2 correctly evaluated terms in the sequence <math>3n - 5</math> (i.e. not leading to, or not recognised as leading to, a prime number for their choice of <math>n</math>) or</li><li>setting up an equation <math>3n - 5 = \text{a prime number}</math> and attempt to solve</li><li>a correct value of <math>n</math> substituted in <math>3n - 5</math>, but contradiction or no answer given on answer line (e.g. <math>3 \times 4 - 5 = 7</math> and 7 written on answer line or answer line left blank)</li><li>a correct value of <math>n</math> substituted in <math>3n - 5</math>, but <math>n</math> contradicted for their workings (but <math>n</math> still leads to a prime number) given on answer line (e.g. <math>3 \times 4 - 5 = 7</math> and 12 written on answer line or answer line left blank).</li></ul> <table><tr><td><math>n</math></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>.....</td></tr><tr><td><math>3n - 5</math></td><td>-2</td><td>1</td><td>4</td><td>7</td><td>10</td><td>13</td><td>16</td><td>19</td><td>22</td><td>25</td><td>28</td><td>.....</td></tr></table> <p>Note: Award B0 for a correct value of <math>n</math> from incorrect working e.g. if <math>3 \times 4 - 5 = 13</math>, then <math>n = 13</math> on the answer line.</p>	$n$	1	2	3	4	5	6	7	8	9	10	11	.....	$3n - 5$	-2	1	4	7	10	13	16	19	22	25	28	.....
$n$	1	2	3	4	5	6	7	8	9	10	11	.....																
$3n - 5$	-2	1	4	7	10	13	16	19	22	25	28	.....																
16. (a) (P(green or yellow) =) 0.7 or equivalent (P(yellow) = ) 0.35 or equivalent ISW	B1 B1	<p>FT 'their 0.7' <math>\div 2</math>, provided not 0.3 and less than 1</p> <p>If no marks awarded, award SC1 for <math>P(\text{red}) + P(\text{green}) + P(\text{yellow}) = 1</math></p>																										
16. (b) Any valid explanation e.g. "as there are 10 balls, the only possible probabilities are 0.1, 0.2, 0.3 etc" "(you can't have) 2.5 balls" "a quarter of 10 is not a whole number" "0.25 of 10 = 2.5, you can't have half a ball" "10 is not divisible by 4"	E1	<p>Accept "you can't have half a ball". Allow sight of 2.5 for E1.</p> <p>Do not accept incomplete explanations e.g. "we don't know how many blue (or white) balls there are".</p>																										

<p>17.</p> $8x + 3x = 17 + 38 \quad \text{OR} \quad -17 - 38 = -8x$ $-3x$ $11x = 55 \quad \text{OR} \quad -55 = -11x$ $x = 5$	<p>B1 B1 B1</p>	<p>FT until 2<sup>nd</sup> error.</p> <p>Mark final answer. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction. Allow B1B1B1 for a correct embedded answer BUT only B1B1B0 if contradicted by <math>x \neq 5</math></p>
<p>18.</p> <p>(Area of rectangle) <math>48 = 8 \times x</math> (width of rectangle, <math>x = 48/8 =</math>) 6 (m)</p> <p>(Area of trapezium <math>=</math>) <math>\frac{(5 + 9) \times (6 \times 2)}{2}</math> or equivalent</p> <p><math>= 84 \text{ (m}^2\text{)}</math></p>	<p>M1 A1  M1   A1</p>	<p><i>Lengths may be shown on the diagrams.</i></p> <p>Allow an embedded 6 e.g. <math>8 \times 6 = 48</math> for M1A1.</p> <p>Sight of 12(m) implies the previous M1A1. FT 'their stated <math>x</math>' <math>\times 2</math>. Allow M1 for correct intent <u>seen</u>. e.g. <math>5 + 9 \times 12 \div 2</math></p>
<p>19.</p> <p>7, 7, 10, 12 (in any order)</p>	<p>B3</p>	<p><i>Numbers shown <b>in</b> number boxes take precedence.</i></p> <p>The four conditions:</p> <ul style="list-style-type: none"> <li>• All numbers between 1 and 15 inclusive.</li> <li>• <b>Unique</b> mode = 7.</li> <li>• Median = 8.5.</li> <li>• Total = 36.</li> </ul> <p>B2 for three conditions met. B1 for two conditions met.</p> <p>FOUR numbers must be shown, otherwise B0. Award B1 only for 7, 7,10,10 OR 7, 7,11,11 (not a unique mode).</p>



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# **GCSE MARKING SCHEME**

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**SUMMER 2022**

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



## **INTRODUCTION**

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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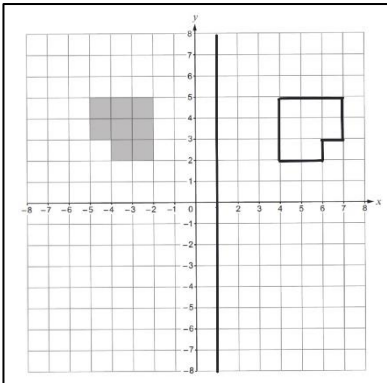
**WJEC GCSE MATHEMATICS**  
**SUMMER 2022 MARKING SCHEME**

Unit 2 Foundation Tier	Mark	Comments
1.(a) 65 011	B1	
1.(b) five million six thousand four hundred and three	B1	
2.       (>) < = <	B2	B1 for 2 correct.
3.(a)(i) Kite	B1	
3.(a)(ii) Parallelogram	B1	
3.(b) Sphere	B1	
4.(a) 48, 96, 144, 192	B1	Condone inclusion of 240 if 48 is omitted.
4.(b) 3	B1	
4.(c) 39	B1	
5.(a) 16 and 25	B2	Answer space takes precedence. Accept $4^2$ and $5^2$ . B1 for writing <ul style="list-style-type: none"> <li>two numbers with a difference of 9, one of which is square, or</li> <li>two different square numbers in their answer space, or</li> <li>listing at least three square numbers in their workings.</li> </ul> If no marks, award SC1 for an unsupported answer of 4 and 5.
5.(b) No, AND correct reason stated e.g. <ul style="list-style-type: none"> <li>(two odd numbers) add to give an even number (and 37 is odd).</li> <li>only an even and an odd number can add to make 37.</li> <li>only an even and an odd number can add to make an odd number.</li> </ul>	E1	E0 if incorrect box is ticked, even if the correct reason is given. If none of the boxes are ticked, 'no' may be implied by their reason. Accept equivalent reasons. Accept the use of 'make' or 'and' instead of 'add'. Allow 'there are no two odd numbers which add to make 37' or 'the answer will always be even'. Exemplifying two odd numbers adding to an even number by itself is insufficient.
6.(a) _____ circumference	B1	
6.(b) _____ $270^\circ$	B1	
6.(c) (Smaller angle =) $75^\circ$ (Larger angle =) $105^\circ$	B2	B1 for two angles which add to $180^\circ$ , provided neither angle is $90^\circ$ or $0^\circ$ .
7.(a) Subtract fourteen (from the previous term)	B1	Accept 'take away fourteen', 'goes down in fourteens' and '-14'. B0 for 14 alone or 'there is 14 between each number'.
7.(b) 736	B1	
7.(c) $n - 4$ (grapes)	B1	Mark final answer
8.                               0.7                               70(%) $\frac{1}{20}$ 0.05 (20)	B4	B1 for each correct response.
9. 9.65       ISW	B1	Allow $\frac{193}{20}$ or $9\frac{13}{20}$ B0 for $193 \div 20$ .
10. 303	B2	Mark final answer. B1 for sight of 245 or 58 (but not 245x or 58y) OR B1 for an unsupported final answer of 303x, or similar.



13.	$2.73 \text{ (pints)} \div 1.75 \text{ or } 2.73 \text{ (pints)} \times \frac{4}{7}$ $1.56 \text{ (litres)}$ $1.615(0) \text{ (litres)}$ $1.25 + 1.56 + 1.615$ $\div 3$ $1.475 \text{ (litres) or } 1.47 \text{ (litres) or } 1.48 \text{ (litres)}$	M1 A1  B1  M1  m1 A1	<b>Answer lines take precedence</b> Allow use of 568ml or 570ml $\approx$ 1 pint leading to an answer of 1.55 or 1.56  (= 4.425) FT 1.25 + 'their 1.56' + 'their 1.615' Award M1 for 1.25 + 2.73 + 1.615  Allow 1.5 (litres) from correct working.  Note: An answer of (1618.98/3 =) 539.66 or 540 or 539.6 or 539.7 implies M1m1A1.																										
14. (a)	<table><tr><td colspan="2" rowspan="2"></td><th colspan="4">Square spinner</th></tr><tr><th>2</th><th>4</th><th>6</th><th>8</th></tr><tr><th rowspan="3">Triangular Spinner</th><th>1</th><td>2</td><td>(4)</td><td>6</td><td>(8)</td></tr><tr><th>3</th><td>(6)</td><td>12</td><td>(18)</td><td>(24)</td></tr><tr><th>5</th><td>10</td><td>(20)</td><td>30</td><td>40</td></tr></table>			Square spinner				2	4	6	8	Triangular Spinner	1	2	(4)	6	(8)	3	(6)	12	(18)	(24)	5	10	(20)	30	40	B1	All six entries correct.
				Square spinner																									
		2	4	6	8																								
Triangular Spinner	1	2	(4)	6	(8)																								
	3	(6)	12	(18)	(24)																								
	5	10	(20)	30	40																								
14. (b) Valid explanation given e.g. "odd $\times$ even = even" "because it's odd times even" "even times any whole number is always even"	E1	Do not accept "because all the numbers on the square spinner are even"  Allow "as they are multiplied by even numbers which make even numbers" "because it's multiplied with an even number"																											
14. (c)	$\frac{7}{12} \text{ ISW}$	B2	FT 'their fully completed table'. Award B2 for unsupported 58.3(333...)%. Penalise -1 for <u>only</u> words (7 out of 12) or <u>only</u> ratio (7:12). B1 for $x/12$ if $x < 12$ . B1 for $7/y$ if $y > 7$ (FT 'their 7'). B1 for unsupported 58%.																										
14. (d) (Amount taken = $228 \times £2.50 =$ ) (£)570  (Expected number of winners = $\frac{7}{12} \times 228$ ) 133 (winners)  (Expected prize money = $133 \times £3.50 =$ ) (£)465.5(0)  (Expected profit = $228 \times £2.50 - 133 \times £3.50 =$ ) (£)104.5(0)	B1  B1  B1  B1	If $\frac{7}{12}$ or correct % or decimal seen in part (c), it must be used for this B1. FT $228 \times$ 'their $\frac{7}{12}$ ' provided less than 1 Allow 133/228 or '133 out of 228'. Must be whole number. Award B0 for $\frac{7}{12} \times 228 = 0.58(333...) \times 228 = 132$ winners. Award B0 for $\frac{7}{12} \times 228 = 0.6 \times 228 = 136$ or 137 winners.  FT $£3.50 \times$ 'their 133' (provided $< 228$ ).  (£)570 – (£)465.5(0) FT 'their (£)570' – 'their (£)465.5(0)'  Award B1B1B1B0 for sight of $228 \times £2.50 - 133 \times £3.50$ with an incorrect final answer.  If the FT results in a loss, the 'Loss' must be stated, or the answer left as a negative.																											

<p>14. (d) <u>Alternative Method 1</u></p> <p>(Expected number of winners = <math>7/12 \times 228</math>) 133 (winners)</p> <p>(Expected number that don't win = <math>228 - 133</math>) 95 (non-winners)</p> <p>(Amount taken = <math>95 \times £2.50 =</math>) (£)237.5(0)</p> <p>(Expected profit = <math>95 \times £2.50 - 133 \times £1 =</math>) (£)104.5(0)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>If 7/12 or correct % or decimal seen in part (c), it must be used for this B1. FT 'their 7/12' if less than <math>1 \times 228</math> Allow 133/228 or '133 out of 228' Must be whole number Award B0 for <math>7/12 \times 228 = 0.58(333...) \times 228 = 132</math> winners. Award B0 for <math>7/12 \times 228 = 0.6 \times 228 = 136</math> or 137 winners.</p> <p>FT 228 – 'their 133' (provided &lt; 228)</p> <p>FT £2.50 × 'their 95' provided &lt; 133</p> <p>(£)237.5(0) – (£)133 FT 'their (£)237.5(0)' – 'their (£)133'</p> <p>Award B1B1B1B0 for sight of <math>95 \times £2.50 - 133 \times £1</math> with an incorrect final answer.</p> <p>If the FT results in a loss, the 'Loss' must be stated, or the answer left as a negative.</p>
<p>14. (d) <u>Alternative Method 2</u></p> <p>Working with 12 players</p> <p>(Amount taken = <math>12 \times £2.50 =</math>) (£)30(.00)</p> <p>(Expected prize money = <math>7 \times £3.50 =</math>) (£)24.5(0)</p> <p>(Expected profit for 12 players = (£)30(.00) - (£)24.5(0) =) (£)5.5(0)</p> <p>(Expected profit for 228 players <math>= \frac{228}{12} \times (£)5.5(0) =</math>) (£)104.5(0)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>FT 'their 7' (provided &lt; 12)</p> <p>FT 'their (£)30(.00)' – 'their (£)24.5(0)'</p> <p>FT <math>19 \times</math> 'their (£)5.5(0)'</p> <p>If the FT results in a loss, the 'Loss' must be stated, or the answer left as a negative.</p>

15.	<div>length = 2 × width</div> <div>Area = width × length</div> <div>Area correctly evaluated AND &gt; 60 (cm<sup>2</sup>)</div> <div>Perimeter = 2 × (width + length) or equivalent</div> <div>Perimeter correctly evaluated AND &lt; 40 (cm)</div>	<div>B1</div> <div>M1</div> <div>A1</div> <div>M1</div> <div>A1</div> <div>If answer space is left blank:<ul style="list-style-type: none"><li>award full marks if correct length, width, area and perimeter clearly identified in working space or</li><li>penalise -1 if correct length, width, area and perimeter not clearly identified in working space.</li></ul></div> <div>Penalise -1 if area and perimeter are reversed on the answer line but correct area and perimeter clearly identified in working space.</div> <div>Note: (W and L need not be whole numbers)</div> <table><tr><td>W</td><td>L</td><td>Area</td><td>Perimeter</td></tr><tr><td>6</td><td>12</td><td>72</td><td>36</td></tr></table>	W	L	Area	Perimeter	6	12	72	36
W	L	Area	Perimeter							
6	12	72	36							
16.	<div>Correct reflection in <math>x = 1</math>.</div> <div></div>	<div>B2</div> <div>B1 for correct reflection in <math>y = 1</math> OR B1 for sight of line <math>x = 1</math> (must be unambiguous)</div>								
17.	<div>Use of 129.5 / time</div> <div>129.5 ÷ 3.5 or equivalent</div> <div>37 (miles per hour)</div>	<div>M1</div> <div>M1</div> <div>A1</div> <div>Allow M1 even for e.g. 129.5/3 hours 30 mins or 129.5/3.3(0) or 129.5/210</div> <div>Must be a complete and correct method e.g. 129.5/210 × 60</div> <div>CAO</div> <div>Award M1M0A0 for sight of unsupported 0.61(6666....) (use of 129.5/210) OR 39.24(2424....) (use of 129.5/3.3).</div>								



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# **GCSE MARKING SCHEME**

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**SUMMER 2022**

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

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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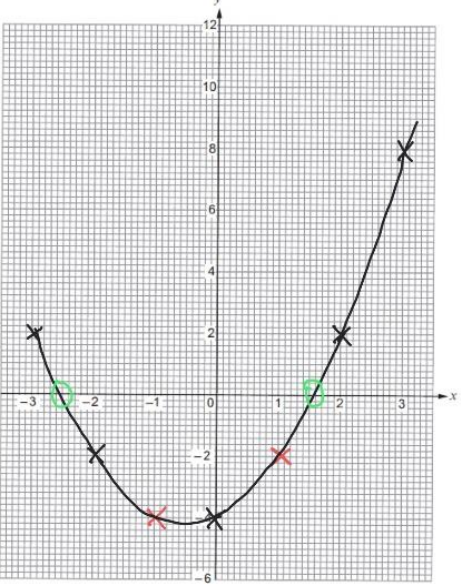
Unit 1: Intermediate Tier	Mark	Comments
1. (a) 72	B2	B1 for an appropriate sight of 9 or 8.
1. (b) -31	B1	
1. (c) 42 ISW	B1	Allow 42·0
2. Showing 30% (31%), and 32% OR 30/100, 31/100 and 32/100 OR (0·3), 0·31 and 0·32 OR three correct calculations for a common amount.  0·3 31%, 8/25 in order	B2          B1	B2 for all correct %, OR all correct fractions <u>with a common denominator</u> , OR all correct decimals, OR correct work using a common amount, OR a valid combination that allows full comparison.  B1 for one correct conversion or two correct calculations for a common amount.  Allow any unambiguous indication (e.g. 'converted' values.) <b>Strict FT</b> of 'their work' if at least B1 gained. Correct answer, with <u>no</u> other marks awarded, gains final B1 only.
3.  360 – 90 – 220 or equivalent   = 50(°)  (x = ) (180 - 50) ÷ 2 or equivalent  = 65(°)	M1    A1  M1  A1	<i>Answer line takes precedence.</i> Note: 360 – 310 or 270 – 220 or 140 – 90. Award M1 for complete method or intention of complete method provided not contradicted e.g. brackets missing 360 - 90 + 220.  May be seen in later working. May be seen in stages. FT (180 – 'their 50') ÷ 2
3. <u>Alternative method</u>  (Exterior angle = sum of the two opposite interior angles =) 220 – 90(=) 130(°)  (x = ) 130 ÷ 2 or equivalent = 65(°)	    B1  M2 A1	<i>Answer line takes precedence.</i>      FT (their '220 – 90') ÷ 2

<div>4.</div> <div><div>Imran = <b>25</b> (years old)</div><div>Glyn = <b>16</b> (years old)</div><div>Sheila = <b>8</b> (years old)</div></div>	<div><div>B3</div><div>Values in the answer space take precedence. If answer spaces are left blank allow unambiguous indication of their answers. Note: Check for the required conditions being met and not the individual numbers. <i>Required conditions (or equivalent) are:</i> <math>I + G + S = 49</math> <math>I = G + 9</math> <math>G = 2 \times S</math> A condition must be met using non-negative ages, otherwise B0. B3 all three conditions correct. B2 for two conditions correct. B1 for one condition correct.  If answer spaces are left blank, but 25,16 and 8 <b>clearly indicated</b>, but unlabelled and<ul style="list-style-type: none"><li>• in the correct order, award B3</li><li>• in any other order, award B2.</li></ul> Award B2 for 25, 16 and 8 in any order on the answer spaces.</div></div>																										
<div>5. (a) Any <math>n</math>, as a whole number, which results in <math>7n - 9</math> being a multiple of 4</div>	<div><div>B2</div><div>Answer space takes precedence and must not be from incorrect working. Do not ignore crossed-out work for this question. Award B1 for any one of:<ul style="list-style-type: none"><li>• any 2 correctly evaluated terms in the sequence <math>7n - 9</math> (i.e. not leading to, or not recognised as leading to, a multiple of 4 for their choice of <math>n</math>) or</li><li>• setting up an equation <math>7n - 9 = 4 \times k</math> (where <math>k \geq 1</math> and a whole number) and attempt to solve</li><li>• a correct value of <math>n</math> substituted in <math>7n - 9</math>, but contradiction or no answer given on answer line (e.g. <math>7 \times 3 - 9 = 12</math> and 12 written on answer line or answer line left blank).</li></ul><table><tr><td><math>n</math></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>.....</td></tr><tr><td><math>7n - 9</math></td><td>-2</td><td>5</td><td>12</td><td>19</td><td>26</td><td>33</td><td>40</td><td>47</td><td>54</td><td>61</td><td>68</td><td>.....</td></tr></table> Note: Award B0 for a correct value of <math>n</math> from incorrect working e.g. if <math>7 \times 4 - 9 = 19</math>, then <math>n = 19</math> on the answer line.</div></div>	$n$	1	2	3	4	5	6	7	8	9	10	11	.....	$7n - 9$	-2	5	12	19	26	33	40	47	54	61	68	.....
$n$	1	2	3	4	5	6	7	8	9	10	11	.....															
$7n - 9$	-2	5	12	19	26	33	40	47	54	61	68	.....															

5. (b) Any $n$ , as a whole number, which results in $3n - 5$ being a prime number	B2	<p>Answer space takes precedence and must not be from incorrect working. Do not ignore crossed-out work for this question. Award B1 for any one of:</p> <ul style="list-style-type: none"><li>any 2 correctly evaluated terms in the sequence <math>3n - 5</math> (i.e. not leading to, or not recognised as leading to, a prime number for their choice of <math>n</math>) or</li><li>setting up an equation <math>3n - 5 = \text{a prime number}</math> and attempt to solve</li><li>a correct value of <math>n</math> substituted in <math>3n - 5</math>, but contradiction or no answer given on answer line (e.g. <math>3 \times 4 - 5 = 7</math> and 7 written on answer line or answer line left blank)</li><li>a correct value of <math>n</math> substituted in <math>3n - 5</math>, but <math>n</math> contradicted for their workings given on answer line (but <math>n</math> still leads to a prime number) (e.g. <math>3 \times 4 - 5 = 7</math> and 12 written on answer line).</li></ul> <table><tr><td><math>n</math></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>.....</td></tr><tr><td><math>3n - 5</math></td><td>-2</td><td>1</td><td>4</td><td>7</td><td>10</td><td>13</td><td>16</td><td>19</td><td>22</td><td>25</td><td>28</td><td>.....</td></tr></table> <p>Note: Award B0 for a correct value of <math>n</math> from incorrect working e.g. if <math>3 \times 4 - 5 = 13</math>, then <math>n = 13</math> on the answer line.</p>	$n$	1	2	3	4	5	6	7	8	9	10	11	.....	$3n - 5$	-2	1	4	7	10	13	16	19	22	25	28	.....
$n$	1	2	3	4	5	6	7	8	9	10	11	.....																
$3n - 5$	-2	1	4	7	10	13	16	19	22	25	28	.....																
6. (a) (P(green or yellow) =) 0.7 or equivalent (P(yellow) = ) 0.35 or equivalent ISW	B1 B1	<p>FT 'their 0.7' <math>\div 2</math>, provided not 0.3 and less than 1.</p> <p>If no marks awarded, award SC1 for <math>P(\text{red}) + P(\text{green}) + P(\text{yellow}) = 1</math>.</p>																										
6. (b) Any valid explanation e.g. "as there are 10 balls, the only possible probabilities are 0.1, 0.2, 0.3 etc" "you can't have) 2.5 balls" "a quarter of 10 is not a whole number" "0.25 of 10 = 2.5, you can't have half a ball" "10 is not divisible by 4"	E1	<p>Accept "you can't have half a ball". Allow sight of 2.5 for E1.</p> <p>Do not accept incomplete explanations e.g. "we don't know how many blue (or white) balls there are".</p>																										

7. (a) $4y = 18$ $y = 4\frac{1}{2}$ or $18/4$ or $9/2$ or $4.5$	B1 B1	Mark final answer. FT from $4y = k$ . If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction. Award B1B1 for a final answer of $4r2$ only if a correct answer is seen. Award B1B0 for unsupported $4r2$ . Allow B1B1 for a correct embedded answer BUT only B1B0 if contradicted by $y \neq 4\frac{1}{2}$ .
7. (b) $8x + 3x = 17 + 38$ OR $-17 - 38 = -8x - 3x$ $11x = 55$ OR $-55 = -11x$ $x = 5$	B1 B1 B1	FT until 2 <sup>nd</sup> error.  Mark final answer. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise, accept a fraction. Allow B1B1B1 for a correct embedded answer BUT only B1B1B0 if contradicted by $x \neq 5$
8. (Area of rectangle) $48 = 8 \times x$ (width of rectangle, $x = 48/8 = 6$ (m))  (Area of trapezium $\Rightarrow$ ) $\frac{(5 + 9) \times (6 \times 2)}{2}$ or equivalent  $= 84 \text{ (m}^2\text{)}$	M1 A1  M1  A1	<i>Lengths may be shown on the diagrams.</i>  Allow an embedded 6 e.g. $8 \times 6 = 48$ for M1A1.  Sight of 12(m) implies the previous M1A1. FT 'their stated $x$ ' $\times 2$ . Allow M1 for correct intent <u>seen</u> . e.g. $5 + 9 \times 12 \div 2$
Organisation and Communication.          Accuracy of writing.	OC1          W1	For OC1, candidates will be expected to: <ul style="list-style-type: none"> <li>• present their response in a structured way</li> <li>• explain to the reader what they are doing at each step of their response</li> <li>• lay out their explanation and working in a way that is clear and logical</li> <li>• write a conclusion that draws together their results and explains what their answer means</li> </ul> For W1, candidates will be expected to: <ul style="list-style-type: none"> <li>• show all their working</li> <li>• make few, if any, errors in spelling, punctuation and grammar</li> <li>• use correct mathematical form in their working</li> <li>• use appropriate terminology, units, etc</li> </ul>

9.  7, 7, 10, 12 (in any order)	B3	<p>Numbers shown <b><i>in</i></b> number boxes take precedence. The four conditions:</p> <ul style="list-style-type: none"> <li>• All numbers between 1 and 15 inclusive.</li> <li>• <b>Unique</b> mode = 7.</li> <li>• Median = 8.5.</li> <li>• Total = 36.</li> </ul> <p>B2 for three conditions met. B1 for two conditions met.</p> <p>FOUR numbers must be shown, otherwise B0. Award B1 only for 7, 7,10,10 OR 7, 7,11,11 (not a unique mode).</p>
10. (BC =) $56 \text{ (km)} \div (3 + 4) \times 4$ or equivalent  32 (km)  (BC =) $32 \text{ (km)} \div 8 \times 5$ or equivalent 20 (miles)	M1  A1  M1 A1	<p>M1 awarded for <b>complete</b> method.</p> <p>FT 'their derived 32' <math>\div 8 \times 5</math>.</p> <p>If a candidate works with AB instead of BC, then treat as a misread -1 (from A mark). <u>Example 1</u>  <math>56 \text{ (km)} \div (3 + 4) \times 3 = 24 \text{ (km)}</math> M1A1 (-1)  <math>24 \text{ (km)} \div 8 \times 5 = 15 \text{ (miles)}</math> M1 A1 (Total = 3 marks)</p> <p><u>Example 2</u>  e.g. <math>56 \text{ (km)} \div (3 + 4) \times 3 = 16 \text{ (km)}</math> M1A0  <math>16 \text{ (km)} \div 8 \times 5 = 10 \text{ (miles)}</math> M1 A1 (-1)  (Total = 2 marks)</p>
<u>10. Alternative Method</u> (AC =) $56 \text{ (km)} \div 8 \times 5$ or equivalent 35 (miles)  (BC =) $35 \text{ (miles)} \div (3 + 4) \times 4$ or equivalent 20 (miles)	M1 A1  M1 A1	<p>M1 awarded for <b>complete</b> method</p> <p>FT 'their derived 35' <math>\div (3 + 4) \times 4</math></p> <p>If a candidate works with AB instead of BC, then treat as a misread -1 (from second A mark).  <math>56 \text{ (km)} \div 8 \times 5 = 35 \text{ (miles)}</math> M1 A1  <math>35 \text{ (miles)} \div (3 + 4) \times 3 = 15 \text{ (miles)}</math> M1A1(-1)  (Total = 3 marks)</p>

11.(a)	-4	-2	B2	B1 for each
11. (b) At least 5 correct plots and no incorrect plot.  A smooth <u>curve</u> drawn through their plots.				P1 FT 'their $(-1, -4)$ ' and 'their $(1, -2)$ ' Allow $\pm \frac{1}{2}$ a small square'. C1 FT 'their 7 plots' OR a curve through the 5 given points <b>AND</b> $(-1, -4)$ and $(1, -2)$ . Allow the intention to pass through their plots (within 1 small square, either horizontally <u>or</u> vertically of the point).
11. (c)	-2.6	AND 1.6	B1	<u>Strict</u> FT 'their curve' only if exactly two points of intersection with the $x$ -axis. Answers must be written to one decimal place. Allow $\pm$ 'up to but not including 1 small square'.

<p>12.</p> <p>(0 pets angle =) <math>40(^{\circ}) \pm 2(^{\circ})</math></p> <p>(Year 5: 0 pets =) <math>\frac{40(^{\circ}) \pm 2(^{\circ})}{360} \times 36</math></p> <p>(Year 5: 0 pets =) 4</p> <p>(Year 5: 1 pet =) 9</p> <p>(Probability no more than 1 pet =) <math>\frac{27}{61}</math> or equivalent ISW</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B2</p>	<p>Answers may be seen on diagrams.</p> <p>Or equivalent. FT 'their 40'.</p> <p>Answer must be whole number and from correct working (e.g. not from <math>360 \div 90</math>). An answer of 4 (may be seen as <math>4/36</math>) implies B1M1A1, provided not from incorrect working. May be seen as <math>9/36</math>.</p> <p>FT <math>\frac{\text{'their derived 4' + 'their derived 9' + 6 + 8}}{61}</math> (no more than 1 pet)</p> <p>B1 for a numerator of 27 in a fraction <math>&lt; 1</math>. FT 'their derived 4' + 'their derived 9' + 6 + 8 accurately evaluated as a numerator in a fraction <math>&lt; 1</math>. B1 for a denominator of 61 in a fraction <math>&lt; 1</math>. Penalise incorrect notation –1. e.g. '27 in 61'.</p> <p>If no marks awarded, award SC1 for sight of a correct 61.</p> <p><u>Special cases:</u> <u>If only 1 pet considered from Year 5 AND Year 6, an answer of <math>\frac{17}{61}</math> would gain B0 or B1 M0A0B1B2</u> FT <math>\frac{\text{'their derived 9' + 8}}{61}</math> for B0 or B1 M0A0B0B2 Last B1 for a numerator of 17 in a fraction <math>&lt; 1</math>. FT 'their derived 9' + 8 accurately evaluated as a numerator in a fraction <math>&lt; 1</math>. Last B1 for a denominator of 61 in a fraction <math>&lt; 1</math>. Penalise incorrect notation –1. e.g. '17 in 61'.</p> <p><u>If only 0 pets considered from Year 5 AND Year 6, an answer of <math>\frac{10}{61}</math> would gain B1M1A1B0B2</u> FT <math>\frac{\text{'their derived 4' + 6}}{61}</math> for B1M1A0B0B2 Last B1 for a numerator of 10 in a fraction <math>&lt; 1</math>. FT 'their derived 4' + 6 accurately evaluated as a numerator in a fraction <math>&lt; 1</math>. Last B1 for a denominator of 61 in a fraction <math>&lt; 1</math>. Penalise incorrect notation –1. e.g. '10 in 61'.</p>
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<p>12. <u>Alternative method 1</u></p> <p><math>(0 + 1 \text{ pet angle} \Rightarrow) 130(^{\circ}) \pm 2(^{\circ})</math></p> <p>(Year 5: <math>0 + 1 \text{ pet} \Rightarrow) \frac{130(^{\circ}) \pm 2(^{\circ})}{360} \times 36</math></p> <p>(Year 5: <math>0 + 1 \text{ pet} \Rightarrow) 13</math></p> <p>(Probability no more than 1 pet <math>\Rightarrow</math>)  <math>\frac{27}{61}</math> or equivalent ISW</p>	<p>B1</p> <p>M1</p> <p>A2</p> <p>B2</p>	<p>Answers may be seen on diagrams</p> <p>Or equivalent FT 'their 130'</p> <p>May be seen as 13/36 Award A1 for an answer not rounded.</p> <p>FT (<u>'their derived 13' + 6 + 8</u>). 61</p> <p>B1 for a numerator of 27 in a fraction &lt; 1. FT 'their derived 13' + 6 + 8 accurately evaluated as a numerator in a fraction &lt; 1. B1 for a denominator of 61 in a fraction &lt; 1. Penalise incorrect notation –1. e.g. '27 in 61'.</p> <p>If no marks awarded for the whole question, award SC1 for sight of a correct 61.</p>
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13. $-6n + 21$ or equivalent	B2	B1 for sight of $-6n$ . If no marks, award SC1 for $6n + 21$ .
14. (a) 0.4 shown on 'A does not occur' branch Use of $0.6 \times \dots = 0.48$ $P(B \text{ occurs}) = 0.8$  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 'B occurs' branches.  FT 'their 0.8' only if M1 awarded. (0.48, 0.52, 0.48, 0.52 is M0A0A0)
14. (b) $0.4 \times 0.2$  $= 0.08$ ISW	M1 A1	FT 'their 0.4' $\times$ 'their 0.2' provided both between 0 and 1.
15. (a) $(CE = ) 8 \times \frac{15}{10}$ or $8 \div \frac{10}{15}$  $= 12$ (cm)	M1 A1	Or equivalent M1 for correct <u>use</u> of linear ratio.
15.(b) $(AB = ) 10.5 \times \frac{10}{15}$ or $10.5 \div \frac{15}{10}$ or equivalent  $= 7$ (cm)	M1 A1	Or equivalent M1 for correct <u>use</u> of linear ratio.  FT 'their scale factor' from (a) provided not 1.
16. Method to eliminate one variable e.g. 'equal coefficients AND <u>appropriate intention to add or subtract</u> ' or use a method of substitution First variable found $x = 4$ or $y = 7$ .  Substitute to find the 2 <sup>nd</sup> variable. Second variable found.	M1 A1  m1 A1	Allow one error in one term (not the term with equal coefficients).  CAO. Award A0 for an answer that leads to a whole number, but not expressed as a whole number (e.g. $y = 161/23$ or $x = 92/23$ )  FT substitution of their '1 <sup>st</sup> variable' if M1 gained. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction.  If no marks gained, allow SC1 for <u>both</u> answers of $x = 4$ AND $y = 7$ .
17. (a) $7.2 \times 10^6 \text{ cm}^3$	B1	
17. (b) 6	B1	
18. 0.2	B2	If B2 not awarded, award B1 for one of the following: <ul style="list-style-type: none"> <li>sight of 150 000 or</li> <li>sight of <math>3 \times 10^4</math> or</li> <li><math>2 \times 10^{-1}</math> or</li> <li><math>\frac{1}{5}</math> or <math>\frac{3}{15}</math> (or equivalent fraction)</li> </ul>



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# **GCSE MARKING SCHEME**

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**SUMMER 2022**

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

## **INTRODUCTION**

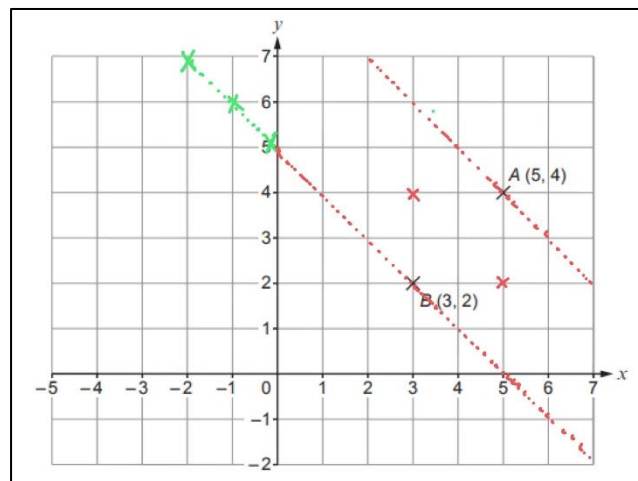
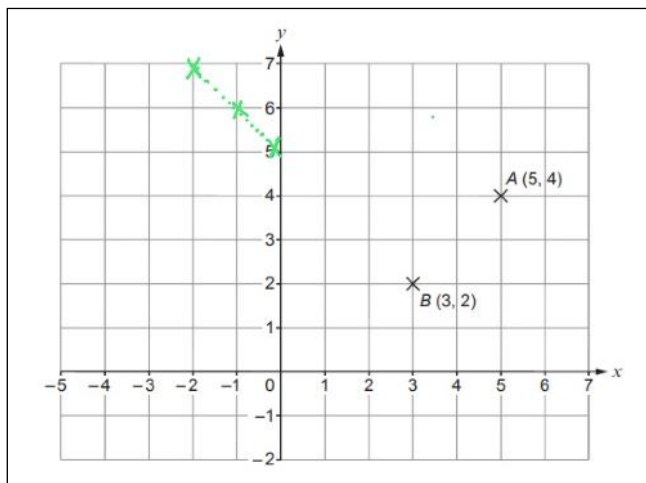
This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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

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

**WJEC GCSE MATHEMATICS**  
**SUMMER 2022 MARKING SCHEME**

Unit 2 Intermediate Tier	Mark	Comments
1. (a) $\frac{3.5}{100} \times 159.8$ or equivalent 5.593 or equivalent ISW	M1  A1	Award M1 for complete method.  Allow 5.6 OR 5.59. Award M1 A0 for unsupported final answer of 165.393 OR 154.207.
1. (b) 5.7 or equivalent	B2	B1 for sight of 16.2 or 10.5.
2. (a) (1, 0)	B2	Award B1 for one of the following: <ul style="list-style-type: none"> <li>if C clearly identified on grid at (1,0) but coordinates not given or are incorrect</li> <li>for an answer of (4, 3) (midpoint of AB)</li> <li>for an answer of (1x, 0y) and point not identified.</li> </ul>
2. (b) (-1, 6) OR (-2,7)	B2	<p>Award B2 for any point that satisfies the conditions e.g. (-1.5, 6.5)</p> <p>Award B1 for one of the following:</p> <ul style="list-style-type: none"> <li>if D identified on grid in a correct position but coordinates not given or are incorrect OR</li> <li>for the coordinates of any point that creates a right-angled triangle with AB as one side</li> </ul> <p>e.g.</p> <p>(0,5) (1,4) (2,3) (4,1) (5,0) (6,-1) (7,-2)</p> <p>(3,4) (5,2)</p> <p>(2,7) (3,6) (4,5) (6,3) (7,2)</p>



3.	$2.73 \text{ (pints)} \div 1.75 \text{ or } 2.73 \text{ (pints)} \times \frac{4}{7}$ $1.56 \text{ (litres)}$ $1.615(0) \text{ (litres)}$ $1.25 + 1.56 + 1.615$ $\div 3$ $1.475 \text{ (litres) or } 1.47 \text{ (litres) or } 1.48 \text{ (litres)}$	M1 A1  B1  M1  m1 A1	<b>Answer lines take precedence</b> Allow use of 568ml or 570ml $\approx$ 1 pint leading to an answer of 1.55 or 1.56.  (= 4.425) FT 1.25 + 'their 1.56' + 'their 1.615'. Award M1 for 1.25 + 2.73 + 1615.  Allow 1.5 (litres) from correct working.  Note: An answer of (1618.98/3 =) 539.66 or 540 or 539.6 or 539.7 implies M1m1A1.																										
4. (a)	<table border="1"><tr><td colspan="2" rowspan="2"></td><td colspan="4">Square spinner</td></tr><tr><td>2</td><td>4</td><td>6</td><td>8</td></tr><tr><td rowspan="3">Triangular Spinner</td><td>1</td><td>2</td><td>(4)</td><td>6</td><td>(8)</td></tr><tr><td>3</td><td>(6)</td><td>12</td><td>(18)</td><td>(24)</td></tr><tr><td>5</td><td>10</td><td>(20)</td><td>30</td><td>40</td></tr></table>			Square spinner				2	4	6	8	Triangular Spinner	1	2	(4)	6	(8)	3	(6)	12	(18)	(24)	5	10	(20)	30	40	B1	All six entries correct.
				Square spinner																									
		2	4	6	8																								
Triangular Spinner	1	2	(4)	6	(8)																								
	3	(6)	12	(18)	(24)																								
	5	10	(20)	30	40																								
4. (b) Valid explanation given e.g. "odd $\times$ even = even" "because it's odd times even" "even times any whole number is always even"		E1	Do not accept "because all the numbers on the square spinner are even".  Allow "as they are multiplied by even numbers which make even numbers" "because it's multiplied with an even number".																										
4. (c)	$\frac{7}{12}$ ISW	B2	FT 'their fully completed table'. Award B2 for unsupported 58.3(333...)%. Penalise -1 for <u>only</u> words (7 out of 12) or <u>only</u> ratio (7:12). B1 for $x/12$ if $x < 12$ . B1 for $7/y$ if $y > 7$ (FT 'their 7'). B1 for unsupported 58%.																										
4. (d) (Amount taken = $228 \times \text{£}2.50 =$ ) (£)570  (Expected number of winners = $\frac{7}{12} \times 228$ ) 133 (winners)  (Expected prize money = $133 \times \text{£}3.50 =$ ) (£)465.5(0)  (Expected profit = $228 \times \text{£}2.50 - 133 \times \text{£}3.50 =$ ) (£)104.5(0)		B1  B1  B1  B1	If 7/12 or correct % or decimal seen in part (c), it must be used for this B1. FT $228 \times$ 'their 7/12' provided less than 1. Allow 133/228 or '133 out of 228'. Must be whole number. Award B0 for $\frac{7}{12} \times 228 = 0.58(333...) \times 228 = 132$ winners. Award B0 for $\frac{7}{12} \times 228 = 0.6 \times 228 = 136$ or 137 winners.  FT $\text{£}3.50 \times$ 'their 133' (provided $< 228$ ).  (£)570 - (£)465.5(0) FT 'their (£)570' - 'their (£)465.5(0)'.  Award B1B1B1B0 for sight of $228 \times \text{£}2.50 - 133 \times \text{£}3.50$ with an incorrect final answer.  If the FT results in a loss, the 'Loss' must be stated, or the answer left as a negative.																										

<p>4. (d) <u>Alternative Method 1</u></p> <p>(Expected number of winners = <math>7/12 \times 228</math>) 133 (winners)</p> <p>(Expected number that don't win = <math>228 - 133</math>) 95 (non-winners)</p> <p>(Amount taken = <math>95 \times £2.50 =</math>) (£)237.5(0)</p> <p>(Expected profit = <math>95 \times £2.50 - 133 \times £1 =</math>) (£)104.5(0)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>If 7/12 or correct % or decimal seen in part (c), it must be used for this B1. FT 'their 7/12' if less than <math>1 \times 228</math>. Allow 133/228 or '133 out of 228'. Must be whole number. Award B0 for <math>7/12 \times 228 = 0.58(333...) \times 228 = 132</math> winners. Award B0 for <math>7/12 \times 228 = 0.6 \times 228 = 136</math> or 137 winners.</p> <p>FT 228 – 'their 133' (provided &lt; 228).</p> <p>FT £2.50 × 'their 95' provided &lt; 133.</p> <p>(£)237.5(0) – (£)133 FT 'their (£)237.5(0)' – 'their (£)133'.</p> <p>Award B1B1B1B0 for sight of <math>95 \times £2.50 - 133 \times £1</math> with an incorrect final answer.</p> <p>If the FT results in a loss, the 'Loss' must be stated, or the answer left as a negative.</p>
<p>4. (d) <u>Alternative Method 2</u> Working with 12 players</p> <p>(Amount taken = <math>12 \times £2.50 =</math>) (£)30(.00)</p> <p>(Expected prize money = <math>7 \times £3.50 =</math>) (£)24.5(0)</p> <p>(Expected profit for 12 players = (£)30(.00) - (£)24.5(0) =) (£)5.5(0)</p> <p>(Expected profit for 228 players <math>= \frac{228}{12} \times (£)5.5(0) =</math>) (£)104.5(0)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>FT 'their 7' (provided &lt; 12).</p> <p>FT 'their (£)30(.00)' – 'their (£)24.5(0)'.</p> <p>FT <math>19 \times</math> 'their (£)5.5(0)'.</p> <p>If the FT results in a loss, the 'Loss' must be stated, or the answer left as a negative.</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"> <li>• present their response in a structured way</li> <li>• explain to the reader what they are doing at each step of their response</li> <li>• lay out their explanation and working in a way that is clear and logical</li> <li>• write a conclusion that draws together their results and explains what their answer means</li> </ul> <p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• show all their working</li> <li>• make few, if any, errors in spelling, punctuation and grammar</li> <li>• use correct mathematical form in their working</li> <li>• use appropriate terminology, units, etc</li> </ul>

<div>5.</div> <div><div>length = 2 × width</div><div>Area = width × length</div><div>Area correctly evaluated AND &gt; 60 (cm<sup>2</sup>)</div><div>Perimeter = 2 × (width + length) or equivalent</div><div>Perimeter correctly evaluated AND &lt; 40 (cm)</div></div>	<div><div>B1</div><div>M1</div><div>A1</div><div>M1</div><div>A1</div></div> <div><div>Answer lines take precedence</div><div>Note: correct answer 5.47...(cm) ≤ width ≤ 6.66..(cm) Must be in the correct order for B1.</div><div>M1 for <b>using</b> the correct method (not for stating the formula). FT 'their width' × 'their length'.</div><div>M1 for <b>using</b> the correct method (not for stating the formula). FT 2 × ('their width' + 'their length').</div><div>If answer space is left blank:<ul style="list-style-type: none"><li>award full marks if correct length, width, area and perimeter clearly identified in working space or</li><li>penalise -1 if correct length, width, area and perimeter not clearly identified in working space.</li></ul></div><div>Penalise -1 if area and perimeter are reversed on the answer line but correct area and perimeter clearly identified in working space.</div><div>Note: (W and L need not be whole numbers)</div><table><tr><td>W</td><td>L</td><td>Area</td><td>Perimeter</td></tr><tr><td>6</td><td>12</td><td>72</td><td>36</td></tr></table></div>	W	L	Area	Perimeter	6	12	72	36
W	L	Area	Perimeter						
6	12	72	36						
<div>6. (a)</div> <div>Correct reflection in <math>x = 1</math>.</div> <div></div>	<div>B2</div> <div>B1 for correct reflection in <math>y = 1</math> OR B1 for sight of line <math>x = 1</math> (must be unambiguous).</div>								
<div>6. (b)</div> <div>Correct rotation.</div> <div></div>	<div>B2</div> <div>B1 for either a:<ul style="list-style-type: none"><li>90° anticlockwise rotation about (-1,1)</li><li>90° clockwise rotation about (1,-1).</li></ul></div>								



7. (a)	$12p - 20$	B1	Must be an expression. Mark final answer.
7. (b)	$8m = w + 3$ or $w + 3 = 8m$ or $-8m = -w - 3$ $m = \frac{w+3}{8}$ or $\frac{w+3}{8} = m$ or $m = \frac{-w-3}{-8}$	B1 B1	Allow $-8m = -(w + 3)$ . FT only from $\pm 8m = \pm w \pm 3$ , stated or implied. (note: $8m = w + 3$ or $-8m = -w - 3$ will have already gained the previous B1). B1B0 for $-m = \frac{-3-w}{8}$ or equivalent. Mark final answer. <u>Note</u> Allow B1B0 for $m = (w + 3) \div 8$ with or without brackets. Allow B1B0 for $\frac{w+3}{8}$ ('m = ' missing).
7. (c)	$y^2 + y - 20$ ISW	B2	Allow $y^2 + 1y - 20$ . Award B1 for one of the following: <ul style="list-style-type: none"> <li><math>y^2 + 5y - 4y - 20</math></li> <li><math>y^2 + 5y - 4y + -20</math></li> <li><math>y^2 + 5y + -4y - 20</math></li> <li><math>y^2 + 5y + -4y + -20</math></li> <li><math>y^2 + ky - 20</math> (where <math>k \neq 0</math> or 1)</li> <li><math>y^2 + (1)y + t</math> (where <math>t \neq -20</math>)</li> <li>for sight of <math>y^2</math> AND <math>+5y</math> AND <math>-4y</math> AND <math>-20</math> but not in an expression.</li> </ul>
8.	corresponding angles	B1	
9.	Use of $129.5 / \text{time}$  $129.5 \div 3.5$ or equivalent  37 (miles per hour)	M1  M1  A1	Allow M1 even for e.g. $129.5/3$ hours 30 mins or $129.5/3 \cdot 3(0)$ or $129.5/210$ .  Must be a complete and correct method e.g. $129.5/210 \times 60$ .  CAO.  Award M1M0A0 for sight of unsupported $0.61(6666\dots)$ (use of $129.5/210$ ) OR $39.24(2424\dots)$ (use of $129.5/3 \cdot 3$ ).

<p>10. (Diameter =) <math>24.8 \div 2 \times 3</math> OR  (Radius =) <math>24.8 \div 2 \times 3 \div 2</math> or equivalent</p> <p>(Diameter =) 37.2 (cm) OR (Radius =) 18.6 (cm)</p> $\pi \times \left(\frac{37.2}{2}\right)^2 \times 24.8 \quad \text{or} \quad \pi \times 18.6^2 \times 24.8$ $= 27\,000 \text{ (cm}^3\text{)}$	<div>M1</div> <div>A1</div> <p>Sight of 1086 to 1087 (cm<sup>2</sup>) (base area calculated with radius 18.6 ) OR 4345 to 4348 (cm<sup>2</sup>) (base area calculated with diameter) implies first M1 A1.  If diameter AND radius given and radius ≠ 18.6 either:</p> <ul style="list-style-type: none"> <li>award M1A0 (for sight of diameter = 37.2) if their stated radius is then used to find the volume of the cylinder (2<sup>nd</sup> M mark is awarded) or</li> <li>award M1A1 (for sight of diameter = 37.2) if their incorrect radius is not used to find the volume of the cylinder (2<sup>nd</sup> M mark is not awarded).</li> </ul> <div>M1</div> <p>May be seen in parts.  Accept <math>3.14 \times 18.6^2 \times 24.8</math> or equivalent.  FT ‘their stated radius’ OR ‘their stated diameter’, provided it is halved at the appropriate stage.</p> <div>A2</div> <p>For A2, must be correct to 2sf.  A1 for an answer between 26 940 and 26 960 (cm<sup>3</sup>) inclusive.</p> <p><u>Note:</u></p> <p>(Diameter =) <math>24.8 \div 5 \times 3</math> OR  (Radius =) <math>24.8 \div 5 \times 3 \div 2</math> M0</p> <p>(Diameter =) 14.88 (cm) OR  (Radius =) 7.44 (cm) A0</p> $\pi \times 7.44^2 \times 24.8 \quad \text{M1}$ $4300 \text{ (cm}^3\text{)} \quad \text{A2}$ <p>A1 for answer between 4310 and 4314 (cm<sup>3</sup>) inclusive</p> <p>If M0 (2<sup>nd</sup> M mark) then award SC1 for an answer of either:</p> <ul style="list-style-type: none"> <li>110 000 (cm<sup>3</sup>) (from use of <math>\pi \times 37.2^2 \times 24.8</math> rounded correctly) OR</li> <li>17 000 (cm<sup>3</sup>) (from use of <math>\pi \times 14.88^2 \times 24.8</math> rounded correctly).</li> </ul> <p>FT ‘their stated diameter’ correctly rounding to 2sf for this SC1.</p>
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<p>11. <math>(BC^2 =) 9 \cdot 6^2 + 12 \cdot 8^2</math> or equivalent</p> <p><math>(BC^2 =) 256</math> or <math>(BC =) \sqrt{256}</math></p> <p><math>(BC =) 16</math> (cm)</p> <p><math>CD = 2 \times 60 \div 16</math> or equivalent</p> <p><math>(CD =) 7.5</math> (cm)</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M2</p> <p>A1</p>	<p>note: <math>(BC^2 =) 92 \cdot 16 + 163 \cdot 84</math> (ignore place values for M1)</p> <p>Award M1 for the correct values substituted into the Cosine rule.</p> <p>Allow <math>(BC =) \pm 16</math> (cm).</p> <p>FT from M1 for the correctly evaluated square root of 'their 256' provided their answer <math>&gt; 12 \cdot 8</math>.</p> <p>FT 'their derived BC' <b>OR</b> 'their stated 16' (not derived) provided <math>12 \cdot 8 &lt; \text{'their stated 16'} &lt; 22 \cdot 4</math>.</p> <p>Award M1 for <math>60 = \frac{1}{2} \times 16 \times CD</math> or equivalent.</p> <p>Allow M2A1 for a correct embedded answer BUT M2A0 if contradicted by <math>CD \neq 7.5</math> (cm).</p>
<p>11. <u>Alternative method:</u> <b>Correct</b> use of 'two-step' method</p> <p><math>(BC =) 16</math> (cm)</p> <p><math>CD = 2 \times 60 \div 16</math> or equivalent</p> <p><math>(CD =) 7.5</math> (cm)</p>	<p>M2</p> <p>A1</p> <p>M2</p> <p>A1</p>	<p>A partial trigonometric method is M0.</p> <p>FT 'their derived BC' <b>OR</b> 'their stated 16' (not derived) provided <math>12 \cdot 8 &lt; \text{'their stated 16'} &lt; 22 \cdot 4</math>.</p> <p>Award M1 for <math>60 = \frac{1}{2} \times 16 \times CD</math> or equivalent.</p> <p>Allow M2A1 for a correct embedded answer BUT M2A0 if contradicted by <math>CD \neq 7.5</math> (cm).</p>
<p>12. (a) <math>2x(4x + 3y)</math></p>	<p>B2</p>	<p>Award B1 for <math>2x(4x \pm \dots\dots\dots)</math> or <math>2x(\dots\dots\dots + 3y)</math></p> <p>Award B1 for a partial factorisation. i.e. <math>2(4x^2 + 3xy)</math> or <math>x(8x + 6y)</math>.</p> <p>Mark final answer.</p>
<p>12. (b)(i) <math>(x + 8)(x + 5)</math> ISW</p>	<p>B2</p>	<p>B1 for <math>(x \dots 8)(x \dots 5)</math>.</p>
<p>12. (b)(ii) Any valid explanation e.g. "you could expand the two brackets" "expanding is the opposite of factorising" "multiply the brackets together" "solve <math>(x + 8)(x + 5) = 0</math>, and then substitute the value(s) of <math>x</math> into <math>x^2 + 13x + 40</math>. It should give 0." "replace <math>x</math> in the brackets and expression with the same value. You should get the same answer."</p>	<p>E1</p>	<p>Allow "the two numbers need to add to 13, but multiply to make 40" "Use FOIL (CAMO) to check" or other names explaining the method.</p> <p>Allow method shown to expand brackets for example:</p> <div data-bbox="1145 1547 1490 1738" data-label="Diagram"> </div> <p>Do not accept "<math>(x + 8)(x + 5) = x^2 + 13x + 40</math>" without further working "taking out the brackets" "reverse the calculation"</p>

13. (a)	$(x =) 14.5 \times \sin 42$  $= 9.7(02\dots)$	M2	Award M2 for $14.5 \times \cos 48$ or $\frac{14.5 \times \sin 42}{\sin 90}$ M1 for $\sin 42 = \frac{x}{14.5}$ or $\cos 48 = \frac{x}{14.5}$ or $\frac{x}{\sin 42} = \frac{14.5}{\sin 90}$																																																
		A1	Allow 10 from correct working. Award M2 A0 for an unsupported answer of $-13.2895\dots$ (radians) or $8.88715\dots$ (gradians).																																																
13. (a) <u>Alternative method:</u> <b>Correct</b> use of 'two-step' method.	$(x) = 9.7(02\dots)(\text{cm})$	M2	A partial trigonometric method is M0.																																																
		A1	Accept an answer that rounds to $9.7(\text{cm})$ Award M2 A0 for an answer of $-13.2895\dots$ (radians) or $8.88715\dots$ (gradians).																																																
13. (b)	$(y =) \cos^{-1} \frac{13.5}{15.8}$  Correct evaluation in the range $31.3$ to $31.4$	M2	M1 for $\cos y = \frac{13.5}{15.8} (= 0.854\dots)$																																																
		A1	Allow 31 from correct working. Allow correct angles given in radians ( $0.5463\dots$ ) or gradians ( $34.7812\dots$ ) Note: $\cos y = 0.85$ $y = 31.788\dots$ is awarded M2A0.																																																
13. (b) <u>Alternative method:</u> <b>Correct</b> use of 'two-step' method.	Correct evaluation in the range $31.3$ to $31.4$	M2	A partial trigonometric method is M0.																																																
		A1	Allow 31 from correct working. Allow correct angles given in radians ( $0.5463\dots$ ) or gradians ( $34.7812\dots$ )																																																
14. (a) Any intention of length $\times$ width $\times$ height = 132 e.g. $5x(x^2 + 3) = 132$ $5 \times x \times (x^2 + 3) = 132$ or $5x \times (x^2 + 3) = 132$ or equivalent		B1	Must be = 132. May be seen in parts. Do not allow missing brackets e.g. $5 \times x \times x^2 + 3 = 132$ .																																																
14. (b)(i) One correct evaluation $2 \leq x \leq 3$ 2 correct evaluations $2.55 \leq x \leq 2.75$ , (one value $< 132$ , one value $> 132$ )  2 correct evaluations $2.55 \leq x \leq 2.65$ , (one value $< 132$ , one value $> 132$ )  $x = 2.6$		B1 B1  M1  A1	Correct evaluation regarded as enough to identify if $< 132$ or $> 132$ . If evaluations not seen accept 'too high' or 'too low'. Look out for testing $5x^3 + 15x - 132 = 0$ or $x^3 + 3x = 26.4$ or equivalent  <table><tr><td><math>x</math></td><td><math>5x^3 + 15x</math></td><td></td><td></td></tr><tr><td>2</td><td>70</td><td></td><td></td></tr><tr><td>2.1</td><td>77.805</td><td></td><td></td></tr><tr><td>2.2</td><td>86.24</td><td></td><td></td></tr><tr><td>2.3</td><td>95.335</td><td></td><td></td></tr><tr><td>2.4</td><td>105.12</td><td></td><td></td></tr><tr><td>2.5</td><td>115.625</td><td>2.55</td><td>121.1568...</td></tr><tr><td>2.6</td><td>126.88</td><td>2.65</td><td>132.798.....</td></tr><tr><td>2.7</td><td>138.915</td><td>2.75</td><td>145.234.....</td></tr><tr><td>2.8</td><td>151.76</td><td></td><td></td></tr><tr><td>2.9</td><td>165.445</td><td></td><td></td></tr><tr><td>3</td><td>180</td><td></td><td></td></tr></table>	$x$	$5x^3 + 15x$			2	70			2.1	77.805			2.2	86.24			2.3	95.335			2.4	105.12			2.5	115.625	2.55	121.1568...	2.6	126.88	2.65	132.798.....	2.7	138.915	2.75	145.234.....	2.8	151.76			2.9	165.445			3	180		
$x$	$5x^3 + 15x$																																																		
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14. (b)(ii)  An answer in the range $9.76$ to $10.16$ (cm)		B1	Answer may be shown on the diagram.  FT 'their $2.6^2 + 3$ . FT $132 \div (5 \times \text{'their } x\text{'})$ .																																																



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# **GCSE MARKING SCHEME**

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**SUMMER 2022**

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

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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

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

**WJEC GCSE MATHEMATICS**  
**SUMMER 2022 MARKING SCHEME**

Unit 1: Higher Tier	Mark	Comments
<p>1. (BC =) <math>56 \text{ (km)} \div (3 + 4) \times 4</math> or equivalent</p> <p style="text-align: right;">32 (km)</p> <p>(BC =) <math>32 \text{ (km)} \div 8 \times 5</math> or equivalent</p> <p style="text-align: right;">20 (miles)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>M1 awarded for <b>complete</b> method.</p> <p>FT 'their derived 32' <math>\div 8 \times 5</math>.</p> <p>If a candidate works with AB instead of BC, then treat as a misread -1 (from A mark).</p> <p><u>Example 1</u>  <math>56 \text{ (km)} \div (3 + 4) \times 3 = 24 \text{ (km)}</math> M1A1 (-1)  <math>24 \text{ (km)} \div 8 \times 5 = 15 \text{ (miles)}</math> M1 A1 (Total = 3 marks)</p> <p><u>Example 2</u>  e.g. <math>56 \text{ (km)} \div (3 + 4) \times 3 = 16 \text{ (km)}</math> M1A0  <math>16 \text{ (km)} \div 8 \times 5 = 10 \text{ (miles)}</math> M1 A1 (-1)  (Total = 2 marks)</p>
<p><u>1. Alternative Method</u></p> <p>(AC =) <math>56 \text{ (km)} \div 8 \times 5</math> or equivalent</p> <p style="text-align: right;">35 (miles)</p> <p>(BC =) <math>35 \text{ (miles)} \div (3 + 4) \times 4</math> or equivalent</p> <p style="text-align: right;">20 (miles)</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>M1 awarded for <b>complete</b> method</p> <p>FT 'their derived 35' <math>\div (3 + 4) \times 4</math></p> <p>If a candidate works with AB instead of BC, then treat as a misread -1 (from second A mark).</p> <p><math>56 \text{ (km)} \div 8 \times 5 = 35 \text{ (miles)}</math> M1 A1  <math>35 \text{ (miles)} \div (3 + 4) \times 3 = 15 \text{ (miles)}</math> M1A1(-1)  (Total = 3 marks)</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"> <li>• present their response in a structured way</li> <li>• explain to the reader what they are doing at each step of their response</li> <li>• lay out their explanation and working in a way that is clear and logical</li> <li>• write a conclusion that draws together their results and explains what their answer means</li> </ul> <p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• show all their working</li> <li>• make few, if any, errors in spelling, punctuation and grammar</li> <li>• use correct mathematical form in their working</li> <li>• use appropriate terminology, units, etc</li> </ul>

2. (a)	-4                      -2	B2	B1 for each
2. (b) At least 5 correct plots and no incorrect plot.  A smooth <u>curve</u> drawn through their plots.		P1 C1	FT 'their $(-1, -4)$ ' and 'their $(1, -2)$ ' Allow $\pm \frac{1}{2}$ a small square'. FT 'their 7 plots' OR a curve through the 5 given points <b>AND</b> $(-1, -4)$ and $(1, -2)$ . Allow the intention to pass through their plots (within 1 small square, either horizontally <u>or</u> vertically of the point).
2.(c)	-2.6 AND 1.6	B1	Strict FT 'their curve' only if exactly two points of intersection with the $x$ -axis. Answers must be written to one decimal place. Allow $\pm$ 'up to but not including 1 small square'.



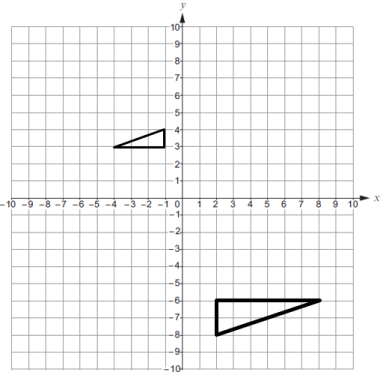
<p>3.</p> <p>(0 pets angle =) <math>40(^{\circ}) \pm 2(^{\circ})</math></p> <p>(Year 5: 0 pets =) <math>\frac{40(^{\circ}) \pm 2(^{\circ})}{360} \times 36</math></p> <p>(Year 5: 0 pets =) 4</p> <p>(Year 5: 1 pet =) 9</p> <p>(Probability no more than 1 pet =) <math>\frac{27}{61}</math> or equivalent ISW</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B2</p>	<p><i>Answers may be seen on diagrams</i></p> <p>Or equivalent FT 'their 40'</p> <p>Answer must be whole number and from correct working (e.g. not from <math>360 \div 90</math>) An answer of 4 (may be seen as <math>4/36</math>) implies B1M1A1, provided not from incorrect working. May be seen as <math>9/36</math></p> <p>FT <math>\frac{\text{'their derived 4' + 'their derived 9' + 6 + 8}}{61}</math> (no more than 1 pet)</p> <p>B1 for a numerator of 27 in a fraction <math>&lt; 1</math>. FT 'their derived 4' + 'their derived 9' + 6 + 8 accurately evaluated as a numerator in a fraction <math>&lt; 1</math>. B1 for a denominator of 61 in a fraction <math>&lt; 1</math>. Penalise incorrect notation –1. e.g. '27 in 61'.</p> <p>If no marks awarded, award SC1 for sight of a correct 61.</p> <p><u>Special cases:</u> <u>If only 1 pet considered from Year 5 AND Year 6, an answer of <math>\frac{17}{61}</math> would gain B0 or B1 M0A0B1B2</u> FT <math>\frac{\text{'their derived 9' + 8}}{61}</math> for B0 or B1 M0A0B0B2 Last B1 for a numerator of 17 in a fraction <math>&lt; 1</math>. FT 'their derived 9' + 8 accurately evaluated as a numerator in a fraction <math>&lt; 1</math>. Last B1 for a denominator of 61 in a fraction <math>&lt; 1</math>. Penalise incorrect notation –1. e.g. '17 in 61'.</p> <p><u>If only 0 pets considered from Year 5 AND Year 6, an answer of <math>\frac{10}{61}</math> would gain B1M1A1B0B2</u> FT <math>\frac{\text{'their derived 4' + 6}}{61}</math> for B1M1A0B0B2 Last B1 for a numerator of 10 in a fraction <math>&lt; 1</math>. FT 'their derived 4' + 6 accurately evaluated as a numerator in a fraction <math>&lt; 1</math>. Last B1 for a denominator of 61 in a fraction <math>&lt; 1</math>. Penalise incorrect notation –1. e.g. '10 in 61'.</p>
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<p>3. <u>Alternative method 1</u></p> <p><math>(0 + 1 \text{ pet angle} =) 130(^{\circ}) \pm 2(^{\circ})</math></p> <p>(Year 5: <math>0 + 1 \text{ pet} =) \frac{130(^{\circ}) \pm 2(^{\circ})}{360} \times 36</math></p> <p>(Year 5: <math>0 + 1 \text{ pet} =) 13</math></p> <p>(Probability no more than 1 pet =)</p> <p><math>\frac{27}{61}</math> or equivalent ISW</p>	<p>B1</p> <p>M1</p> <p>A2</p> <p>B2</p>	<p>Answers may be seen on diagrams</p> <p>Or equivalent FT 'their 130'</p> <p>May be seen as 13/36 Award A1 for an answer not rounded.</p> <p>FT ('their derived 13' + 6 + 8) 61</p> <p>B1 for a numerator of 27 in a fraction &lt; 1. FT 'their derived 13' + 6 + 8 accurately evaluated as a numerator in a fraction &lt; 1. B1 for a denominator of 61 in a fraction &lt; 1. Penalise incorrect notation –1. e.g. '27 in 61'.</p> <p>If no marks awarded for the whole question, award SC1 for sight of a correct 61.</p>
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4. (a) 0.4 shown on 'A does not occur' branch Use of $0.6 \times \dots = 0.48$ $P(B \text{ occurs}) = 0.8$  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 'B occurs' branches.  FT 'their 0.8' only if M1 awarded. (0.48, 0.52, 0.48, 0.52 is M0A0A0)
4. (b) $0.4 \times 0.2$  $= 0.08$ ISW	M1 A1	FT 'their 0.4' $\times$ 'their 0.2' provided both between 0 and 1.
5. (a) $(CE = ) 8 \times \frac{15}{10}$ or $8 \div \frac{10}{15}$  $= 12$ (cm)	M1 A1	Or equivalent M1 for correct <u>use</u> of linear ratio.
5.(b) $(AB = ) 10.5 \times \frac{10}{15}$ or $10.5 \div \frac{15}{10}$ or equivalent  $= 7$ (cm)	M1 A1	Or equivalent M1 for correct <u>use</u> of linear ratio.  FT 'their scale factor' from (a) provided not 1.
6. Method to eliminate one variable e.g. 'equal coefficients AND <u>appropriate intention</u> to add or subtract' or use a method of substitution First variable found $x = 4$ or $y = 7$ .  Substitute to find the 2 <sup>nd</sup> variable. Second variable found.	M1 A1  m1 A1	Allow one error in one term (not the term with equal coefficients).  CAO. Award A0 for an answer that leads to a whole number, but not expressed as a whole number (e.g. $y = 161/23$ or $x = 92/23$ )  FT substitution of their '1 <sup>st</sup> variable' if M1 gained. If FT leads to a whole number answer, it must be shown as a whole number. Otherwise accept a fraction.  If no marks gained, allow SC1 for <u>both</u> answers of $x = 4$ AND $y = 7$ .
7. (a) $7.2 \times 10^6 \text{ cm}^3$	B1	
7. (b) 6	B1	
8. 0.2	B2	If B2 not awarded, award B1 for one of the following: <ul style="list-style-type: none"> <li>sight of 150 000 or</li> <li>sight of <math>3 \times 10^4</math> or</li> <li><math>2 \times 10^{-1}</math> or</li> <li><math>\frac{1}{5}</math> or <math>\frac{3}{15}</math> (or equivalent fraction)</li> </ul>



<p>12. Correct enlargement</p> 	B2	<p>B1 for triangle enlarged with scale factor -2 (with correct orientation) in incorrect position (entirely within correct quadrant) OR consistent use of an incorrect <b>negative</b> scale factor (using correct centre) OR two (or three) correct vertices (not necessarily joined)</p>
<p>13.</p> $\frac{6x+5}{x} = 2x+3 \quad \text{or} \quad \frac{6x+5}{2x+3} = x \quad \text{or} \quad 6x+5 = x(2x+3)$ $6x+5 = 2x^2+3x$ $\text{or } 6x+5-2x^2-3x [=0]$ $\text{or } 2x^2+3x-6x-5 [=0] \text{ or equivalent}$ $2x^2-3x-5 (=0)$ $(x+1)(2x-5) (=0)$ <p>(Marian takes) 2.5 (hours) or equivalent</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>B2</p> <p>B1</p>	<p>Correct use of 'speed = distance / time', using three expressions. May be implied by further working.</p> <p>Expanding brackets FT 'their equation' if of equivalent difficulty</p> <p>Collecting like terms and re-arranging quadratic equation. Ignore presence of a denominator (provided correct).</p> <p>B1 for <math>(x \dots 1)(2x \dots 5)</math> FT their quadratic equation, provided of equivalent difficulty.</p> <p>Mark final answer. FT provided first B1 awarded and an algebraic method used to solve quadratic equation.</p> <p>Ignore negative solution <math>(x = -1)</math>.</p> <p>Strict FT 'their <u>derived</u> brackets'.</p> <p>No marks for a trial and improvement method.</p> <p>No marks for starting with <math>(2x+3)(6x+5) [=0]</math>.</p>
<p>13. <u>Alternative method to solve quadratic equation</u></p> $(x =) \frac{3 \pm \sqrt{(-3)^2 - 4(2)(-5)}}{2(2)}$ $x = \frac{3 \pm \sqrt{49}}{4}$ <p>(Marian takes) 2.5 (hours) or equivalent</p>	<p>M1</p> <p>A1</p> <p>A1</p>	<p>FT their quadratic equation, provided of equivalent difficulty.</p> <p>Allow one error, in sign or substitution, but not in formula</p> <p>Mark final answer. FT provided first B1 awarded. Ignore negative solution <math>(x = -1)</math>.</p>
<p>14. <math>\frac{1}{5}</math> or 0.2</p>	B2	<p>B1 for <math>5^{-1}</math> or <math>\frac{1}{125^{1/3}}</math> or <math>\frac{1}{\sqrt[3]{125}}</math> or <math>\left(\frac{1}{125}\right)^{\frac{1}{3}}</math> or <math>\sqrt[3]{\frac{1}{125}}</math>.</p> <p>Mark final answer</p>

15.	10	16 - 6√7	26 - 6√7 AND irrational indicated.	B2	B1 for <ul style="list-style-type: none"> <li>(numerator of) 20√2 or 10 × 2 × √2 or</li> <li>(denominator of) 2√2 or √8 or</li> <li>appropriate factorisation of both numerator and denominator</li> </ul> e.g. $\frac{\sqrt{2} \times \sqrt{2} \times \sqrt{2} \times \sqrt{100}}{\sqrt{2} \times \sqrt{2} \times \sqrt{2}}$ (or √100)
				B2	B1 for 3 or 4 correct terms within 9 - 3√7 - 3√7 + 7 (e.g. B0 for '2', from 2 sign errors) + √49 might be seen instead of +7. -6√7 is equivalent to 'two correct terms'.
				B1	Mark final answer. FT for equivalent difficulty (requiring collection of terms) provided either of B2s is awarded AND final answer is irrational AND requires no further simplification.
16. (a)		$y = -f(x)$		B1	Correct notation. Allow $y = -f x$
16. (b)		$y = f(x - 4)$		B1	Must be unambiguous e.g. not missing brackets.
17. (a)		$\frac{5}{10} \times \frac{4}{9} \times \frac{1}{8}$ or equivalent	$\frac{20}{720} (= \frac{1}{36})$ or equivalent	M1	Accept e.g. $\frac{5 \times 4 \times 1}{10 \times 9 \times 8}$
				A1	ISW
17.(b)		1 - P(no blue) $= 1 - \frac{5}{10} \times \frac{4}{9} \times \frac{3}{8}$	$= \frac{660}{720} (= \frac{11}{12})$ or equivalent	S1	May be implied by subsequent working.
				M1	<u>Complete</u> method.
				A1	ISW FT from part (a) consistent use of a wrongly calculated denominator.  If no other marks awarded, SC1 for sight of $\frac{875}{1000}$ or $\frac{940}{1000}$ or equivalent.
17.(b)		<u>Alternative method #1</u> 1 - P(three red) - P(two red, one green)		S1	May be implied by subsequent working.
		$= 1 - \frac{4}{10} \times \frac{3}{9} \times \frac{2}{8} - \frac{4}{10} \times \frac{3}{9} \times \frac{1}{8} \times 3$		M1	<u>Complete</u> method. (Missing x3 is S1 M0 A0.)
		$(= 1 - \frac{24}{720} - \frac{36}{720} \text{ or } 1 - \frac{1}{30} - \frac{1}{20})$		A1	ISW FT from part (a) consistent use of a wrongly calculated denominator.  If no other marks awarded, SC1 for sight of $\frac{888}{1000}$ or $\frac{940}{1000}$ or equivalent.
		$= \frac{660}{720} (= \frac{11}{12})$ or equivalent			

<p>17.(b) <u>Alternative method #2</u>  P(one blue, two not blue OR two blue, one not blue OR three blue)</p> $= \frac{5}{10} \times \frac{5}{9} \times \frac{4}{8} \times 3 + \frac{5}{10} \times \frac{4}{9} \times \frac{5}{8} \times 3 + \frac{5}{10} \times \frac{4}{9} \times \frac{3}{8}$ $= \frac{660}{720} \left( = \frac{11}{12} \right) \text{ or equivalent}$	<p>S1</p> <p>M1</p> <p>A1</p>	<p>May be implied by subsequent working.</p> <p><u>Complete</u> method. (Missing x3 is S1 M0 A0.)</p> <p>ISW  FT from part (a) consistent use of a wrongly calculated denominator.</p> <p>If no other marks awarded,  SC1 for sight of <math>\frac{875}{1000}</math> or <math>\frac{660}{1000}</math> or equivalent.</p>
<p>17. (b) <u>Alternative method #3</u>  P(two red, one blue OR one red, one green, one blue OR two blue, one red OR two blue, one green OR three blue)</p> $= \frac{4}{10} \times \frac{3}{9} \times \frac{5}{8} \times 3 + \frac{4}{10} \times \frac{1}{9} \times \frac{5}{8} \times 6$ $+ \frac{5}{10} \times \frac{4}{9} \times \frac{4}{8} \times 3 + \frac{5}{10} \times \frac{4}{9} \times \frac{1}{8} \times 3 + \frac{5}{10} \times \frac{4}{9} \times \frac{3}{8}$ $= \frac{660}{720} \left( = \frac{11}{12} \right) \text{ or equivalent}$	<p>S1</p> <p>M1</p> <p>A1</p>	<p>May be implied by subsequent working.</p> <p><u>Complete</u> method.  (Missing x3 and / or x6 is S1 M0 A0.)</p> <p>ISW  FT from part (a) consistent use of a wrongly calculated denominator.</p> <p>If no other marks awarded,  SC1 for sight of <math>\frac{860}{1000}</math> or <math>\frac{660}{1000}</math> or equivalent.</p>
<p>18. (Numerator)     3 (2x - 5)  (Denominator)    (2x + 5) (2x - 5)</p> $\frac{3}{2x + 5}$	<p>B1</p> <p>B2</p> <p>B1</p>	<p>B1 for (2x ..... 5) (2x ..... 5)</p> <p>FT from one error, provided equivalent difficulty.  Mark final answer.</p>





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# **GCSE MARKING SCHEME**

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**SUMMER 2022**

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

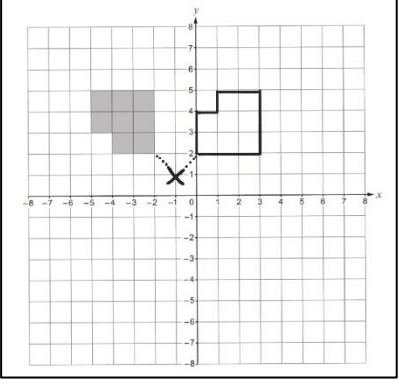
## **INTRODUCTION**

This marking scheme was used by WJEC for the 2022 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

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

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

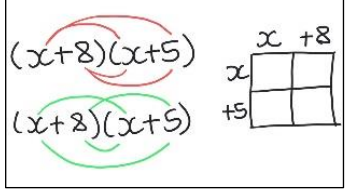
**WJEC GCSE MATHEMATICS**  
**SUMMER 2022 MARKING SCHEME**

Unit 2 Higher Tier	Mark	Comments
<p>1. Correct rotation.</p> 	<p>B2</p>	<p>B1 for either a:</p> <ul style="list-style-type: none"> <li>90° anticlockwise rotation about <math>(-1,1)</math></li> <li>90° clockwise rotation about <math>(1,-1)</math>.</li> </ul>
<p>2. (a)</p> $8m = w + 3 \text{ or } w + 3 = 8m \text{ or } -8m = -w - 3$ $m = \frac{w + 3}{8} \text{ or } \frac{w + 3}{8} = m \text{ or } m = \frac{-w - 3}{-8}$	<p>B1 B1</p>	<p>Allow <math>-8m = -(w + 3)</math>.  FT only from <math>\pm 8m = \pm w \pm 3</math>, stated or implied.  (note: <math>8m = w + 3</math> or <math>-8m = -w - 3</math> will have already gained the previous B1).  B1B0 for <math>-m = \frac{-3 - w}{8}</math> or equivalent.  Mark final answer.</p> <p><u>Note</u>  Allow B1B0 for <math>m = (w + 3) \div 8</math> with or without brackets.  Allow B1B0 for <math>\frac{w + 3}{8}</math> ('m = ' missing).</p>

2. (b)	$y^2 + y - 20$ ISW	B2	<p>Allow <math>y^2 + 1y - 20</math>.  Award B1 for one of the following:</p> <ul style="list-style-type: none"> <li>• <math>y^2 + 5y - 4y - 20</math></li> <li>• <math>y^2 + 5y - 4y + - 20</math></li> <li>• <math>y^2 + 5y + - 4y - 20</math></li> <li>• <math>y^2 + 5y + - 4y + - 20</math></li> <li>• <math>y^2 + ky - 20</math> (where <math>k \neq 0</math> or <math>1</math>)</li> <li>• <math>y^2 + (1)y + t</math> (where <math>t \neq -20</math>)</li> <li>• for sight of <math>y^2</math> AND <math>+5y</math> AND <math>-4y</math> AND <math>-20</math> but not in an expression.</li> </ul>
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<p>4. <math>(BC^2 =) 9 \cdot 6^2 + 12 \cdot 8^2</math> or equivalent</p> <p><math>(BC^2 =) 256</math> or <math>(BC =) \sqrt{256}</math></p> <p><math>(BC =) 16</math> (cm)</p> <p><math>CD = 2 \times 60 \div 16</math> or equivalent</p> <p><math>(CD =) 7.5</math> (cm)</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>M2</p> <p>A1</p>	<p>note: <math>(BC^2 =) 92 \cdot 16 + 163 \cdot 84</math> (ignore place values for M1) Award M1 for the correct values substituted into the Cosine rule.</p> <p>Allow <math>(BC =) \pm 16</math> (cm). FT from M1 for the correctly evaluated square root of 'their 256' provided their answer <math>&gt; 12 \cdot 8</math>.</p> <p>FT 'their derived BC' <b>OR</b> 'their stated 16' (not derived) provided <math>12 \cdot 8 &lt; \text{'their stated 16'} &lt; 22 \cdot 4</math>. Award M1 for <math>60 = \frac{1}{2} \times 16 \times CD</math> or equivalent.</p> <p>Allow M2A1 for a correct embedded answer BUT M2A0 if contradicted by <math>CD \neq 7.5</math> (cm).</p>
<p>4. <u>Alternative method:</u> <b>Correct</b> use of 'two-step' method</p> <p><math>(BC =) 16</math> (cm)</p> <p><math>CD = 2 \times 60 \div 16</math> or equivalent</p> <p><math>(CD =) 7.5</math> (cm)</p>	<p>M2</p> <p>A1</p> <p>M2</p> <p>A1</p>	<p>A partial trigonometric method is M0.</p> <p>FT 'their derived BC' <b>OR</b> 'their stated 16' (not derived) provided <math>12 \cdot 8 &lt; \text{'their stated 16'} &lt; 22 \cdot 4</math>. Award M1 for <math>60 = \frac{1}{2} \times 16 \times CD</math> or equivalent.</p> <p>Allow M2A1 for a correct embedded answer BUT M2A0 if contradicted by <math>CD \neq 7.5</math> (cm).</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"> <li>• present their response in a structured way</li> <li>• explain to the reader what they are doing at each step of their response</li> <li>• lay out their explanation and working in a way that is clear and logical</li> <li>• write a conclusion that draws together their results and explains what their answer means</li> </ul> <p>For W1, candidates will be expected to:</p> <ul style="list-style-type: none"> <li>• show all their working</li> <li>• make few, if any, errors in spelling, punctuation and grammar</li> <li>• use correct mathematical form in their working</li> <li>• use appropriate terminology, units, etc</li> </ul>

5. (a) $2x(4x + 3y)$	B2	Award B1 for $2x(4x \pm \dots\dots\dots)$ or $2x(\dots\dots\dots + 3y)$ Award B1 for a partial factorisation. i.e. $2(4x^2 + 3xy)$ or $x(8x + 6y)$ . Mark final answer.
5. (b)(i) $(x + 8)(x + 5)$ ISW	B2	B1 for $(x \dots 8)(x \dots 5)$ .
5. (b)(ii) Any valid explanation e.g. "you could expand the two brackets" "expanding is the opposite of factorising" "multiply the brackets together" "solve $(x + 8)(x + 5) = 0$ , and then substitute the value(s) of $x$ into $x^2 + 13x + 40$ . It should give 0." "replace $x$ in the brackets and expression with the same value. You should get the same answer."	E1	Allow "the two numbers need to add to 13, but multiply to make 40" "Use FOIL (CAMO) to check" or other names explaining the method.  Allow method shown to expand brackets for example:   Do not accept " $(x + 8)(x + 5) = x^2 + 13x + 40$ " without further working "taking out the brackets" "reverse the calculation"
6. $3 \cdot 648 \times 10^4$	B1	
7. (a) $(x = ) 14 \cdot 5 \times \sin 42$          $= 9 \cdot 7(02 \dots\dots)$	M2          A1	Award M2 for $14 \cdot 5 \times \cos 48$ or $\frac{14 \cdot 5 \times \sin 42}{\sin 90}$ M1 for $\sin 42 = \frac{x}{14 \cdot 5}$ or $\cos 48 = \frac{x}{14 \cdot 5}$ or $\frac{x}{\sin 42} = \frac{14 \cdot 5}{\sin 90}$  Allow 10 from correct working. Award M2 A0 for an unsupported answer of $-13 \cdot 2895 \dots$ (radians) or $8 \cdot 88715 \dots$ (gradians).
7. (a) <u>Alternative method:</u> <b>Correct</b> use of 'two-step' method.  $(x) = 9 \cdot 7(02 \dots\dots)(\text{cm})$	M2  A1	A partial trigonometric method is M0.  Accept an answer that rounds to $9 \cdot 7(\text{cm})$ Award M2 A0 for an answer of $-13 \cdot 2895 \dots$ (radians) or $8 \cdot 88715 \dots$ (gradians).
7. (b) $(y =) \cos^{-1} \frac{13 \cdot 5}{15 \cdot 8}$   Correct evaluation in the range $31 \cdot 3$ to $31 \cdot 4$	M2  A1	M1 for $\cos y = \frac{13 \cdot 5}{15 \cdot 8} (= 0 \cdot 854 \dots)$  Allow 31 from correct working. Allow correct angles given in radians ( $0 \cdot 5463 \dots$ ) or radians ( $34 \cdot 7812 \dots$ ) Note: $\cos y = 0 \cdot 85$ $y = 31 \cdot 788 \dots$ is awarded M2A0.
7. (b) <u>Alternative method:</u> <b>Correct</b> use of 'two-step' method.  Correct evaluation in the range $31 \cdot 3$ to $31 \cdot 4$	M2  A1	A partial trigonometric method is M0.  Allow 31 from correct working. Allow correct angles given in radians ( $0 \cdot 5463 \dots$ ) or radians ( $34 \cdot 7812 \dots$ )

8. (a) Any intention of length $\times$ width $\times$ height = 132 e.g. $5x(x^2 + 3) = 132$ $5 \times x \times (x^2 + 3) = 132$ or $5x \times (x^2 + 3) = 132$ or equivalent	B1	Must be = 132. May be seen in parts. Do not allow missing brackets e.g. $5 \times x \times x^2 + 3 = 132$ .																																																
8. (b)(i) One correct evaluation $2 \leq x \leq 3$ 2 correct evaluations $2.55 \leq x \leq 2.75$ , (one value $< 132$ , one value $> 132$ )  2 correct evaluations $2.55 \leq x \leq 2.65$ , (one value $< 132$ , one value $> 132$ )  $x = 2.6$	B1 B1  M1  A1	<i>Correct evaluation regarded as enough to identify if <math>&lt;132</math> or <math>&gt;132</math>. If evaluations not seen accept 'too high' or 'too low'.</i> <i>Look out for testing <math>5x^3 + 15x - 132 = 0</math> or <math>x^3 + 3x = 26.4</math> or equivalent</i>  <table><tr><th><math>x</math></th><th><math>5x^3 + 15x</math></th><th></th><th></th></tr><tr><td>2</td><td>70</td><td></td><td></td></tr><tr><td>2.1</td><td>77.805</td><td></td><td></td></tr><tr><td>2.2</td><td>86.24</td><td></td><td></td></tr><tr><td>2.3</td><td>95.335</td><td></td><td></td></tr><tr><td>2.4</td><td>105.12</td><td></td><td></td></tr><tr><td>2.5</td><td>115.625</td><td>2.55</td><td>121.1568...</td></tr><tr><td><b>2.6</b></td><td><b>126.88</b></td><td><b>2.65</b></td><td><b>132.798.....</b></td></tr><tr><td><b>2.7</b></td><td><b>138.915</b></td><td>2.75</td><td>145.234.....</td></tr><tr><td>2.8</td><td>151.76</td><td></td><td></td></tr><tr><td>2.9</td><td>165.445</td><td></td><td></td></tr><tr><td>3</td><td>180</td><td></td><td></td></tr></table>	$x$	$5x^3 + 15x$			2	70			2.1	77.805			2.2	86.24			2.3	95.335			2.4	105.12			2.5	115.625	2.55	121.1568...	<b>2.6</b>	<b>126.88</b>	<b>2.65</b>	<b>132.798.....</b>	<b>2.7</b>	<b>138.915</b>	2.75	145.234.....	2.8	151.76			2.9	165.445			3	180		
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8. (b)(ii)  An answer in the range 9.76 to 10.16 (cm)	B1	Answer may be shown on the diagram.  FT 'their $2.6^2 + 3$ . FT $132 \div (5 \times \text{'their } x\text{'})$ .																																																
9. (Area of circular face=) $\pi \times 34^2 (= 1156\pi)$  (Curved surface area of hemisphere=) $2 \times \pi \times 34^2$ o.e.  (Total surface area=) $3468 \pi$ (cm <sup>2</sup> ) or answers in the range: 10 889.4 (cm <sup>2</sup> ) to 10 896.6 (cm <sup>2</sup> )	M1  M2   A1	Accept values between 3629.8 and 3632.2 if $\pi \times 34^2$ or $1156\pi$ not seen.  $2312\pi$ or values between 7259.6 and 7264.4 M1 for sight of $4 \times \pi \times 34^2$ or $4624\pi$ or values between 14519 and 14529.  Sight of $3 \times \pi \times 34^2$ implies M1 M2.  CAO. Mark final answer. Allow an answer of 10 900 from correct working.  If no marks awarded, award SC2 for an unsupported $5 \times \pi \times 34^2$ ( $5780\pi$ or values between 18 149 and 18 160.8).																																																



<p>10.</p> $\frac{97.5}{0.55}$          $= 177.3$	<p>M2</p>          <p>A1</p>	<p>If many attempts are offered without a method/answer being identified, then mark the final attempt. If M2 not gained, award M1 A0 for correct use of values <math>97.5 \leq t &lt; 98</math> and <math>0.5 &lt; w \leq 0.55</math>.</p> <p>CAO. Must be to 1 decimal place. Mark final answer. An unsupported answer of 177.3 gains full marks. SC2 for an unsupported answer of 177.27(2727...), fractional equivalent = 1950/11 SC1 for an unsupported answer of 177 or 177.2 or for sight of 97.5 and 0.55 used within the same calculation.</p>
<p>11. <math>\sin \text{BAD} = \frac{2 \times 112}{10 \times 27}</math> or equivalent</p> <p>(BAD=) <math>56(.06\dots^\circ)</math></p> <p>(Area of shaded region=) <math>112 - \frac{56(.06\dots) \times \pi \times 10^2}{360}</math></p> <p>(Area of shaded region =) <math>63(.077\dots \text{cm}^2)</math> or answers in the range: 63 to <math>63.2 \text{ (cm}^2\text{)}</math></p>	<p>M2</p>          <p>A1</p>          <p>M2</p>          <p>A1</p>	<p>M1 for the <u>correct use</u> of the formula when <math>\sin \text{BAD}</math> is <u>not</u> the subject e.g. <math>112 = \frac{1}{2} \times 10 \times 27 \times \sin \text{BAD}</math>.</p> <p>Accept <math>56.1^\circ</math>. Allow correct angles given in radians (0.9784..) or gradians (62.2896....)</p> <p>F.T. their derived or stated value of angle BAD. M1 for <math>\frac{56(.06\dots) \times \pi \times 10^2}{360}</math> (=48.92 cm<sup>2</sup>)</p>
<p><u>Alternative method for the first 3 marks</u></p> <p><i>Correct use of a two-step method.</i></p> <p>(BAD=) <math>56(.06\dots^\circ)</math></p>	<p>M2</p>          <p>A1</p>	<p><u>Example</u> (Perpendicular height of triangle=) <math>112 \times 2 \div 27 = 8.2(96\dots)</math> or 8.3 (BAD=) <math>\sin^{-1}[8.2(96\dots) \div 10]</math></p> <p>Allow correct angles given in radians (0.9784...) or gradians (62.2896...)</p>
<p>12. <math>4(2x + 9) + 5(3x - 7)</math> [= <math>8x + 36 + 15x - 35</math>] as a <u>numerator</u> within a single fraction</p> <p><math>(3x - 7)(2x + 9)</math> as a <u>denominator</u></p> $= \frac{23x+1}{(3x-7)(2x+9)} \quad \text{or} \quad \frac{23x+1}{6x^2+13x-63}$	<p>M1</p>          <p>M1</p>          <p>A1</p>	<p>Accept intention of brackets. e.g. <math>4 \times 2x + 9 + 5 \times 3x - 7</math></p> <p>CAO. Mark final answer. (If expanded, the denominator must be correct.) If no marks awarded, then SC1 for sight of <math>23x + 1</math>.</p>
<p>13. <math>\frac{2}{5} \times \frac{2}{5} \times \frac{2}{5}</math></p> $= \frac{8}{125} (=0.064) \text{ ISW}$	<p>M1</p>          <p>A1</p>	<p>Or equivalent, e.g. <math>0.4 \times 0.4 \times 0.4</math></p> <p>SC1 for <math>27/125 (=0.216)</math> for a correct evaluation of three odd numbers chosen.</p>



<p>16. (Sight of <math>2x(5x + 1) = 10x^2 + 2x</math> OR (Sight of <math>(7 - 2x)^2 = 49 - 14x - 14x + 4x^2</math> OR <math>2x(5x + 1) = (7 - 2x)^2</math></p> $10x^2 + 2x = 49 - 14x - 14x + 4x^2$ $6x^2 + 30x - 49 = 0$ $x = \frac{-30 \pm \sqrt{30^2 - 4 \times 6 \times -49}}{2 \times 6} \quad \text{or} \quad x = \frac{-30 \pm \sqrt{30^2 - 4 \times 6 \times -49}}{2 \times 6}$ $x = \frac{-30 \pm \sqrt{2076}}{12} \quad \text{or} \quad x = \frac{-30 \pm \sqrt{2076}}{12}$ $\text{or } x = \frac{-15 \pm \sqrt{519}}{6} \quad \text{or} \quad x = \frac{-15 \pm \sqrt{519}}{6}$ $x = 1.3 \text{ (answer to 1 d.p.)}$	<p>B1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p>	<p>Or equivalent. Or equivalent. <math>2x(5x + 1) = (7 - 2x)^2</math> may be implied in later working.</p> <p>F.T. expansions of equivalent level of difficulty provided B1 previously awarded. '= 0' required, but may be implied by an attempt to use the quadratic formula.</p> <p>Substitution into the formula must be seen for M1. F.T. 'their derived quadratic equation' equated to zero of equivalent difficulty (<math>a</math>, <math>b</math> and <math>c</math> must be non-zero). Allow one slip in substitution <b>for M1 only</b>, but must be correct formula.</p> <p>Can be implied from at least one of their two values of <math>x</math> correctly evaluated (<math>x=1.29...</math> or <math>x=-6.29...</math>)</p> <p>FT for A1 for their quadratic equation provided:</p> <ul style="list-style-type: none"> <li>• rounding required to 1 d.p. AND</li> <li>• one positive and one negative root.</li> </ul> <p>Do not allow 1.30. Do not penalise if negative solution also shown (<math>x = -6.3</math> or <math>-6.29(...)</math>)</p> <p>Note: sight of a correct answer does not imply full marks without working.</p>
<p><u>Using trial and improvement for the final 3 marks</u> Two correct evaluations <math>1.25 \leq x \leq 1.35</math>, (one value <math>&lt; 0</math>, one value <math>&gt; 0</math>)</p> $x = 1.3 \text{ (answer to 1 d.p.)}$	<p>M2</p> <p>A1</p>	<p>Two correct evaluations must be seen, otherwise M0. F.T. 'their derived quadratic equation' (<math>=0</math> or <math>=</math>'their constant') of equivalent difficulty (<math>a</math>, <math>b</math> and <math>c</math> must be non-zero) and their <math>x</math> involves rounding to 1 d.p.</p> <p>FT for A1 for their quadratic equation.</p>

<p>17. <u>Method using the linear scale factor</u></p> <p>(Linear scale factor=) <math>\sqrt[3]{\frac{4913}{8000}}</math> OR <math>\frac{\sqrt[3]{4913}}{\sqrt[3]{8000}}</math> (= 0.85 or <math>\frac{17}{20}</math>)</p> <p>(Height of Solid B=) <math>\sqrt[3]{\frac{4913}{8000}} \times 30</math> = 25.5 (cm)</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Or equivalent.</p> <p>F.T. their derived linear scale factor (from <math>\sqrt[3]{}</math>)</p> <p>CAO.</p>
<p>17. <u>Alternative method using the linear scale factor</u></p> <p>(Linear scale factor=) <math>\sqrt[3]{\frac{8000}{4913}}</math> OR <math>\frac{\sqrt[3]{8000}}{\sqrt[3]{4913}}</math> (=1.17647... or <math>\frac{20}{17}</math>)</p> <p>(Height of Solid B=) <math>30 \div \sqrt[3]{\frac{8000}{4913}}</math> = 25.5(cm)</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Or equivalent.</p> <p>F.T. their derived linear scale factor (from <math>\sqrt[3]{}</math>)</p> <p>CAO</p>
<p>17. <u>Method using the volume scale factor</u></p> <p><math>\frac{h^3}{30^3} = \frac{4913}{8000}</math> (=0.614...)</p> <p>(Height of solid B=) <math>\sqrt[3]{30^3 \times \frac{4913}{8000}}</math> OR <math>\sqrt[3]{30^3 \div \frac{8000}{4913}}</math> = 25.5 (cm)</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Must include <math>\frac{h^3}{30^3}</math> or equivalent, e.g. <math>\left(\frac{h}{30}\right)^3 = \frac{4913}{8000}</math></p> <p>CAO</p>
<p>17. <u>Alternative method using the volume scale factor</u></p> <p><math>\frac{30^3}{h^3} = \frac{8000}{4913}</math> (=1.628...)</p> <p>(Height of solid B=) <math>\sqrt[3]{30^3 \div \frac{8000}{4913}}</math> OR <math>\sqrt[3]{30^3 \times \frac{4913}{8000}}</math> = 25.5 (cm)</p>	<p>B1</p> <p>M1</p> <p>A1</p>	<p>Must include <math>\frac{30^3}{h^3}</math> or equivalent, e.g. <math>\left(\frac{30}{h}\right)^3 = \frac{8000}{4913}</math></p> <p>CAO</p>