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# **GCSE MARKING SCHEME**

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**SUMMER 2018**

**GCSE  
MATHEMATICS – COMPONENT 2 (HIGHER TIER)  
C300UB0-1**

## **INTRODUCTION**

This marking scheme was used by WJEC for the 2018 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.

Eduqas Summer 2018 C2 Higher Tier Update 130618	Mark	Comment
1*(a) Indicates or implies 'No' or 'Don't know' with a reason, e.g. 'No, not all scores are equally likely', 'Don't know, as not enough throws to tell', 'No as it shows fewer 2s and 5s', 'No, high numbers of 1 and 6', 'No, appears to be biased towards 1 and 6'	E1	Accept, e.g. 'No, should have equal amounts for each number',  Allow, e.g. 'Don't know, dice are random so there could be variety in results', 'No, if fair all would be 1/6'
1*(b) $\frac{11}{120}$	B2	B1 for $11/\dots$ or $\frac{4+5+2}{40+40+40}$
1*(c) $\frac{37}{120} (\times 480)$  148	M1 A1 (5)	Accept ' <u>their 4+5+4+8+8+8</u> ' ( $\times 480$ ) 'their $40 + 40 + 40$ ' CAO A final answer of 148/480 is M1, A0
2*(a) $(a - 2)(a + 7)$	B2	B1 for $(a \dots 2)(a \dots 7)$
2*(b) $(b + 5)(b - 5)$	B1	CAO
2*(c) $d/5 = 12 - 2$ or $d/5 = 10$ or $d + 2 \times 5 = 12 \times 5$ or $d + 10 = 60$ $d = 50$	M1 A1 (5)	CAO. Accept embedded answers Mark final answer <i>If no marks award SC1 for an answer of <math>d = 70</math> from <math>d/5 = 12 + 2</math></i>
3. $7.7 \times 10^7$ <b>AND</b> $2.2 \times 10^8$	B3 (3)	B2 for sight of either $7.7 \times 10^7$ <u>OR</u> $2.2 \times 10^8$ , or for sight of 77 000 000 <u>AND</u> 220 000 000, or for sight of $7.704(4) \times 10^7$ <u>AND</u> $2.21(408) \times 10^8$  B1 for sight of $0.515 \times 1.496 \times 10^8 (= 7.7044 \times 10^7)$ <u>OR</u> $1.48 \times 1.496 \times 10^8 (= 2.21408 \times 10^8)$
4(a) Nickel ( $\frac{1}{6} \times 12 =$ ) 2(%) Copper ( $100 - 12 - \frac{1}{6}12 =$ ) 86(%)  43 : 6 : 1	B1 B1  B2	Accept sight of 0.02 or 2/100 FT 'their $\frac{1}{6}12$ ' Accept sight of 0.86 or 86/100 or equivalent  B1 for 86 : 12 : 2 or equivalent, or B1 for 1 : 6 : 43 or in other incorrect order FT 'their $\frac{1}{6}12$ ' for B1 only unless equivalent stage(s) of simplification possible
4*(b) $(65 + 14 + 9) \times 27 \div 9 (=88 \times 3)$ 264 (kg) Conclusion that it is not possible as $264 > 250$ , e.g. 'No as 264kg is greater than $\frac{1}{4}$ tonne'	M1 A1 E1  (7)	FT provided M1 awarded for an appropriate conclusion Do not accept $\frac{1}{4}$ tonne as any amount other than correctly giving 250 kg, however it is not essential to state this conversion



<p>8(a) (Volume of the carton) <math>6 \times 6 \times 20</math> <math>720 \text{ (cm}^3\text{)}</math></p> <p>(Volume in the bottle) <math>\pi \times 3.5^2 \times 18.5</math> <math>711.6 \text{ to } 712.1 \text{ (cm}^3\text{)}</math></p> <p>Conclusion stating or implying 'No', with a reason, e.g. 'No as <math>720 &gt; 712</math>' OR 'Yes', with a reason, e.g. 'Yes, as the milk will fill up past the height of 18.5cm (beyond the cylindrical part of the bottle)'</p>	<p>M1 A1</p> <p>M1 A1</p> <p>E1</p>	<p>Allow if a drop extra is included, up to a maximum of <math>10 \text{ cm}^3</math></p> <p>FT for 'their volume of the carton' and 'their height in the milk bottle' provided at least M1, M1 previously awarded</p> <p>Accept reasoning based on uncertainty</p>
<p>8(b)(i) Assumption stated, e.g. 'the bottle is in the shape of a cylinder (with height 18.5cm)', 'the measurements given are the internal measurements', 'no milk in the top of the carton', 'no milk in the neck of the bottle', 'assumed filled to the top'</p>	<p>E1</p>	<p>Do not accept 'measurements given were not accurate' Accept 'measurements were internal measurements'</p>
<p>8(b)(ii) Impact, e.g. 'all the milk may not fit into the bottle', 'the milk might overflow in the bottle', 'the milk might fill the neck of the bottle'</p>	<p>E1</p> <p>(7)</p>	<p>Allow 'milk may or may not fit' provided this could reasonably be an impact following 'their assumption'</p>
<p>9*. <math>12 \times 10.48 \div 19.32 \text{ (=6.509... g)}</math></p> <p><math>12 - 6.5(\dots)</math></p> <p><math>5.49(06\dots\text{g}) \text{ or } 5.5 \text{ (g)}</math></p>	<p>M2</p> <p>M1</p> <p>A1</p> <p>(4)</p>	<p>M1 for <math>12 \div 19.32 \text{ (= 0.6211...)}</math></p> <p>Accept <math>6.5(\dots) - 12</math> FT 'their <math>12 \times 10.48 \div 19.32</math>' provided <math>&lt; 12</math> CAO, allowing also a negative difference</p>

<p>10.</p> $x \times \frac{1}{4} + (x + 2) \times \frac{1}{2} + (x - 4) \times \frac{1}{4} \text{ or}$ $x \times 0.25 + (x + 2) \times 0.5 + (x - 4) \times 0.25$ <p>(=) <math>x/4 + x/2 + 1 + x/4 - 1</math> or equivalent using decimals</p> <p>(=) <math>x</math> (km)</p>	<p>M2</p> <p>m1</p> <p>A1</p> <p>(4)</p>	<p>M1 for any 2 terms correct (sum need not be shown), or for <math>x \times 15 + (x + 2) \times 30 + (x - 4) \times 15</math> or for intention of the correct sum but missing brackets</p> <p>FT from M1 previously awarded for 'their correct expansion'</p> <p>From convincing working</p>
<p>11(a) Explanation, e.g. '1m<sup>2</sup> = 10 000cm<sup>2</sup>', 'as this is area not length', '1m<sup>2</sup> is 100cm by 100cm'</p>	<p>E1</p>	<p>Accept a diagram showing 1m by 1m is 100cm by 100cm</p>
<p>11(b)(i) 6.5 × 'a value between 1.2m and 1.4m inclusive'</p> <p>65000 × 120 or 6.5 × 1.2 to 65000 × 140 or 6.5 × 1.4</p> <p>Answer in the range 7 800 000cm<sup>3</sup> to 9 100 000cm<sup>3</sup>, or 7.8m<sup>3</sup> to 9.1m<sup>3</sup>, or 7800 litres to 9100 litres</p> <p>(7800 litres to 9100 litres) ÷ 1800 × 0.5, or (7800 litres to 9100 litres) ÷ 3600, or equivalent</p> <p>Answer in the range 2.16 (litres) to 2.53 (litres)</p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>m1</p> <p>A1</p>	<p>Place value may not be correct</p> <p>Place value must be consistent, although may include conversion to litres, ÷ 1000 or × 1000 respectively (65000 × 130 = 8 450 000 or 6.5 × 1.3 = 8.45) FT 'their (120+120+130+140+140) ÷ 5'</p> <p>Accept embedded within further calculation Any units given must be correct FT correct evaluation using 'their (120+120+130+140+140) ÷ 5'</p> <p>Place value may not be correct FT 'their volume' provided at least M1 previously awarded Accept rounded or truncated from correct working</p> <p>CAO</p>
<p>11(b)(ii) Explanation of decision, e.g. 'I <b>only</b> used one of the depths', 'I used an average depth but this may not be accurate', 'I used an average depth but there were only 5 readings', 'I used the median depth of just a few readings'</p> <p><b>AND</b></p> <p>Improvement of method, e.g. 'take more depth readings', 'I could have used the average depth', 'I could have looked at the shallowest and deepest readings', 'get more information', 'consider the shape of the pond'</p>	<p>E2</p> <p>(8)</p>	<p>This explanation <b>must</b> follow from the method they used.</p> <p>E1 for either the decision or the improvement of the method</p> <p>Allow 'I used one of the depths', 'I used the median', 'I used an average depth', 'I used the mean depth'</p>

<p>12. For sight of 0.85 and 0.78 or 85% and 78% or equivalent</p> <p><math>(42.50 \div 0.85) \div 0.78</math> or equivalent</p> <p>(£) 64.10</p>	<p>B1</p> <p>M2</p> <p>A1</p> <p>(4)</p>	<p>May be embedded</p> <p>M1 for sight of <math>42.50 \div 0.85</math> or 'an amount <math>&gt; 42.50</math>' <math>\div 0.78</math> or equivalent, or for <math>(42.50 \div 85) \div 78</math> or other consistent place value error, or for sight of (pre final reduction price of) (£)50</p> <p>CAO. Must be to the nearest penny</p>
<p>13. Sight of 715 (g) and 305 (g) <math>715 + 4 \times 305</math></p> <p>1935 (g)</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>(3)</p>	<p>FT 'their 715' and 'their 305' in working provided <math>&lt; 720</math> and <math>&lt; 310</math> respectively</p> <p>CAO, not FT</p>
<p>14(a) 2 £(s)/person</p>	<p>B1</p> <p>U1</p>	<p>Accept answers in the range 1.9 to 2.1</p> <p>Allow £(s) per person or pounds per person</p> <p>Do not accept £/people (singular is needed for people), or charge per person</p>
<p>14(b)(i) Correct graph with points connected, for 0 people £60 to 200 people £660</p>	<p>B2</p>	<p>B1 for 0 people costing £60 shown OR</p> <p>B1 for a straight line with a gradient of 3</p>
<p>14(b)(ii) <math>t = 3(x)p + 60</math></p>	<p>B1</p>	<p>CAO, not FT</p>
<p>14(c) 20 (people)</p> <p>(£) 120</p>	<p>B1</p> <p>B1</p> <p>(7)</p>	<p>Allow tolerance of <math>\frac{1}{2}</math> small square</p> <p>FT from 'their line'</p> <p>FT from 'their line'</p>
<p>15(a) <math>500 \times 1.021^{18}</math> (= £)726.83</p>	<p>M2</p> <p>A1</p>	<p>M1 for sight of <math>500 \times 1.021</math> or equivalent</p> <p>CAO</p>
<p>15(b) (£) <math>x \times (1 + y/100)^6</math> or equivalent</p>	<p>B2</p> <p>(5)</p>	<p>ISW</p> <p>B1 for sight of <math>x \times (1 + \dots)^6</math> or <math>(1 + y/100)^6</math> or <math>x(y/100)^6</math></p> <p>B0 for <math>x \times 1.y^6</math></p>
<p>16. 14625</p>	<p>B2</p> <p>(2)</p>	<p>B1 for sight of</p> <p><math>C = \frac{2340}{(52/A)^2}</math> or <math>C = \frac{2340}{(52/130)^2}</math> or <math>C = \frac{2340}{0.4^2}</math> or <math>B = 0.16</math></p>

17. $n^2 + n + 1$	B2 (2)	CAO B1 for sight of $n^2 \pm \dots$ , not for $n^2$ alone OR B1 for $an^2 \pm \dots$ where $a \neq 1$
18(a) Either starting $x = 13 - 9/x$ or starting with $x^2 - 13x + 9 = 0$ , showing the 2 stages of rearrangement	B1	2 stages required either multiplication by $x$ and '= 0', or division by $x$ and isolating the original ' $x^2$ ' term
18(b) Sight of $x_2 = 12.25$  Sight of $x_4 = 12.26(62229\dots)$ <b>and</b> $x_5 = 12.26(62778\dots)$  Solution to 2 d.p. is 12.27 from sight of $x_4 = 12.26(62229\dots)$ <b>and</b> $x_5 = 12.26(62778\dots)$	M1  m1  A1  (4)	Allow for sight of $x_3 = 12.26(5\dots)$ <b>and</b> $x_4 = 12.26(6\dots)$  Ignore any further calculations
19. $(1 \div 0.8)^3 \times 66$ or equivalent  128.9(0625 litres) or 129 (litres)	M1  A1  (2)	
20(a) $2x(3x - 4) + 5x (=47)$ or $2x(3x + 1) - 5x (=47)$ or equivalent $6x^2 - 8x + 5x = 47$ or $6x^2 + 2x - 5x = 47$  $6x^2 - 3x - 47 = 0$	M1  A1  A1	Allow intention  Must be from convincing working shown  Must be from convincing working shown
20(b) $(x =) \frac{3 \pm \sqrt{(-3)^2 - 4 \times 6 \times -47}}{2 \times 6}$ $= \frac{3 \pm \sqrt{1137}}{12}$  3.06 and -2.56	M1  A1  A1	Allow 1 slip in substitution, but must be correct formula  Both solutions given to 2dp
20(c) 32.6 (cm)  Decision, e.g. 'that the negative solution in (b) was not valid', 'only used the position solution' <b>AND</b> Reason, e.g. 'as lengths can only be positive'	B2  E1  (9)	FT use of 'their positive value' for B1 only provided previous M1 in (b) awarded B1 for sight of $10x + 2$ or equivalent, OR $10 \times 3.06 + 2$  Accept if the decision and/or reason is written in (b)



<p>21. <math>(x+6)^2 \pm \dots</math>  <math>\dots\dots\dots + 21</math></p> <p>Stationary point (-6, 21)</p>	<p>B1 B1  B2  (4)</p>	<p>Sight of <math>(x+6)^2</math> or <math>(x + 12/2)^2</math> Ignore sight of '=0'  Accept 57 - 36 if not evaluated, otherwise mark final value. Do not accept '= -21' or '=21'  <math>(x + 6)^2 + 21</math>, B1, B1 ISW.</p> <p>Must follow completing the square  FT from 'their <math>(x + 6)^2</math>' for the x coordinate  FT their value but not 57 or - 36 for the y coordinate  B1 for ( .... , 21) or (-6, ....)</p>
<p>22(a) <math>20 \times 4 + \frac{1}{2} \times 10 \times 10</math>  130 (girls)</p>	<p>M1 A1</p>	<p>CAO</p>
<p>22(b)  Total boys:  <math>20 \times 2 + 10 \times 15 + 10 \times 19 + 10 \times 10 + 30 \times 1</math></p> <p>Boys 510</p> <p>&gt;1hour: Girls 225 <b>and</b> Boys 130</p> <p>%: Girls (100×) 225/580, OR  Boys (100×) 130/510</p> <p>In order: 38.79....(%)  <b>and</b> 25.49....(%)</p>	<p>M1 A1  B2  M1  A1  (8)</p>	<p>Allow for sight of any three correct products in a sum of 5 products</p> <p>CAO  B1 for one correct total</p> <p>FT provided M1 previously awarded</p> <p>FT provided M1 and at least B1 previously awarded  Mark final answer, in answer space if completed.  Accept 38.8(%) or 39(%) <b>and</b> 25.5(%) or 25(%)  Do not accept as final answers 38(%) or 38.7(%)  <b>and</b> 25.4(%) or 26(%), i.e. any rounding must be correct</p>

23. $BD^2 = 4.2^2 + 3.9^2 - 2 \times 4.2 \times 3.9 \times \cos 86^\circ$ $BD^2 = 30.564 \dots$ or $BD = 5.528 \dots$ (cm)	M1 A1	Accept rounded or truncated, or implied in the next stage of working
$\cos C = \frac{6.4^2 + 5.8^2 - BD^2}{2 \times 6.4 \times 5.8}$ (=0.59...)	M2	With either the value for BD used or the values substituted into the cosine rule from the left hand side triangle M1 for $BD^2 = 6.4^2 + 5.8^2 - 2 \times 6.4 \times 5.8 \times \cos C$
An answer in the range $53^\circ$ to $54^\circ$	A1	Must be from correct working shown
Area ABD = $\frac{1}{2} \times 4.2 \times 3.9 \times \sin 86^\circ$ Area BCD = $\frac{1}{2} \times 6.4 \times 5.8 \times \sin C$	M1 M1	A value for C must be shown, FT 'their derived $\hat{B}\hat{C}\hat{D}$ '
Area ABD = $8.17$ (cm <sup>2</sup> ) or $8.2$ (cm <sup>2</sup> ) OR Area BCD = $14.8$ to $15.02$ (cm <sup>2</sup> )	A1	Only accept $8$ (cm <sup>2</sup> ) from sight of correct working FT 'their derived $\hat{B}\hat{C}\hat{D}$ '
( <u>Total area</u> $\times 3.59 =$ ) $\frac{60}{22.97} \times 3.59$ to $\frac{23.2(0\dots)}{60} \times 3.59$	M1	FT 'their total area' provided at least 2 marks previously awarded in working to find the area
Answer in the range $(\pounds)1.37$ to $(\pounds)1.39$	A1	CAO. Must follow correct working shown
		Maximum of SC7 for incorrectly considering AC as bisecting $\hat{B}\hat{A}\hat{C}$ : Correctly finding BCA (sine rule) B1 Finding CBA (angle sum triangle) B1 FT Correctly finding AC (cosine rule) B1 FT Correctly finding CDA (cosine rule) B1 FT Correctly finding the area of each of the triangles B1 B1 FT
	(10)	Correctly costs AND finds the change B1