



GCSE MARKING SCHEME

AUTUMN 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.

GCSE MATHEMATICS
COMPONENT 2 - HIGHER TIER
AUTUMN 2018 MARK SCHEME

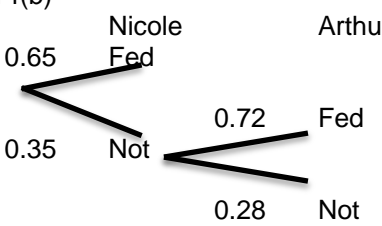
Eduqas Autumn 2018 Component 2 Higher Tier	Marks	Comments
1*(a) 1 : 1 : 3 in any order	B1	Allow multiples of this ratio
1*(b) 3/5 or equivalent	B1 (2)	FT 'their 3' 'their 1 + 1 + 3'
2*(a) $w = 7/e$	B1	CAO. Accept $7/e = w$
2*(b) $3w + 15 - f = g$ or $3w + 15 = f + g$ $3w = f + g - 15$ $w = \frac{f + g - 15}{3}$	B1 B1 B1 (4)	FT until 2 nd error occurs Mark final answer <i>Alternative method:</i> $w + 5 - f/3 = g/3$ B1 $w = g/3 + f/3 - 5$ B2 <i>Mark final answer, if further incorrect manipulation, award final B1 not final B2</i>
3*. $2.2 \times 25\,000$ (cm) (= 55 000 cm) 0.55 (km)	M1 A1 (2)	Allow for sight of 55000, ignoring any units given CAO <i>Alternative:</i> $1\text{ cm} (= 250\text{ m} =) 0.25\text{ km}$ or $\frac{1}{4}\text{ km}$ B1 $(\frac{1}{4} \times 2.2 =) 0.55(\text{ km})$ B1

<p>4*(a)(i) (C =) $2 \times \pi \times 14$ or $\pi \times 28$ Answer in the range 87.9 to 88 (cm) or 28π (cm)</p>	<p>M1 A1</p>	
<p>4(a)(ii) (Area circle =) $\pi \times 14^2$ (Area square =) $1.25 \times \pi \times 14^2$</p> <p>(Side of square) $\sqrt{(1.25 \times \pi \times 14^2)}$</p> <p>(Perimeter) $4 \times \sqrt{(1.25 \times \pi \times 14^2)}$</p> <p>(Perimeter) Answer in the range 110.9 (cm) to 111 (cm)</p> <p>Evaluation to suit the method used, e.g. 'rounding errors introduced by working out stage answers', 'it could have been worked out in one calculation without rounding errors', 'could be only suitable to give as a whole number', '(perhaps) radius given was only accurate to nearest cm, so answer cannot be accurate to 8 decimal places'</p>	<p>M1 M1</p> <p>m1</p> <p>m1</p> <p>A1</p> <p>E1</p>	<p>(= $615(.44\dots)$ to 616 cm^2 or 196π) (= 768.75 to 770 cm^2 or 245π) FT 'their $\pi \times 14^2$' provided it is dimensional correct, i.e. not for circumference</p> <p>(= $27.7\dots$ cm)</p> <p>FT 'their area of a square' FT $4 \times$ 'their side length' provided at least M1 previously awarded</p> <p>CAO</p>
<p>4*(b) $(72 \div 24 =) 3$ (bags of spoons) AND $(72 \div 18 =) 4$ (boxes of forks)</p> <p>$(3 \times 19.95$ and $4 \times 15.55 =)$ $(\pounds) 59.85$ AND $(\pounds) 62.2(0)$</p> <p style="text-align: right;">$= (\pounds) 122.05$</p>	<p>B3</p> <p>M1</p> <p>A1</p> <p>(13)</p>	<p><u>Answers in the table take precedence over working</u> B2 for any of the following:</p> <ul style="list-style-type: none"> • (least amount to buy) 72 • the correct number of bags and boxes for 'their number of common multiples' found from making only 1 error in listing <p>B1 for any of the following:</p> <ul style="list-style-type: none"> • $24 = 6 \times 4$ and $18 = 6 \times 3$, or similar provided the factors are broken down sufficiently to be able to find the LCM • the correct number of bags and boxes for 'their number of common multiples' found from making 2 errors in listing <p>FT use of 'their 3 bags of spoons' and 'their 4 boxes of forks' provided at least B1 previously awarded</p> <p>CAO</p>

<p>5*. Two unique possible reasons:</p> <ul style="list-style-type: none"> • Didn't use raw data • Insufficient data 	<p>E1</p> <p>E1</p> <p>(2)</p>	<p>E1 for any 1 possible reason</p> <p>Didn't use raw data includes, e.g.</p> <ul style="list-style-type: none"> • 'median is (actually) 65(.15 cm)' • 'used rounded results' • 'depths were to the nearest 10 cm' <p>Insufficient data includes, e.g.</p> <ul style="list-style-type: none"> • 'needs to take more readings of depth' • 'only recorded at one time of the day' • 'may only have taken readings near the banks of the river' <p>If the actual median is calculated it must be correct or approximately 65 (cm)</p> <p><i>Depths recorded in order are 30, 50, 60, 80, 90, 100</i></p>
<p>6. $\frac{1}{2} \times 8.2 \times \text{height} = 41.82$ $\text{height} = \frac{41.82}{\frac{1}{2} \times 8.2}$ $= 10.2 \text{ (cm)}$</p> <p>Area = $\frac{1}{2} \times 9.8 \times 10.2$ $= 49.98 \text{ (cm}^2\text{)}$</p>	<p>M1</p> <p>m1</p> <p>A1</p> <p>m1</p> <p>A1</p> <p>(5)</p>	<p>May be embedded in further calculation</p> <p>Do not FT if clearly not perpendicular height used FT 'their 10.2' provided M1 previously awarded</p> <p>FT for accurate evaluation of $4.9 \times$ 'their 10.2' Accept 50 (cm²) from correct working</p> <p><i>Alternative method:</i> $\frac{9.8 \times 41.82}{8.2} \quad M4$ $= 49.98 \text{ (cm}^2\text{)} \quad A1$</p>
<p>7(a) $y = 4x + 7$</p>	<p>B3</p>	<p>Must be given as an equation</p> <p>B2 for sight of $y = 4x (+ \dots)$ or $m = 4$, OR B1 for sight of $y = (\dots x) + 7$ or $c = 7$</p>
<p>7(b) $y = 8x + 3$ and $y - 8x - 8 = 0$, with no other equations indicated</p>	<p>B2</p> <p>(5)</p>	<p>B1 for both correct answers with another equation also indicated, or B1 for one correct selection with at most one incorrect selection</p>

<p>8*. Method to compare, e.g. sight of</p> <ul style="list-style-type: none"> • 1ml of each sight of $49 \div 87.5$ and $72 \div 125$ • Per 1p sight of $87.5 \div 49$ and $125 \div 72$ • Using 49p for 87.5ml sight of $49 \times 125 \div 87.5$ • Using 72p for 125ml sight of $72 \times 87.5 \div 125$ <p>Accurate comparison calculated with a conclusion 87.5ml tube is better value</p> <p>Examples of evaluations:</p> <ul style="list-style-type: none"> • 1ml is 0.56(p) and 0.576(p) • Per 1p is 1.78(5...ml) and 1.73(6..ml) • 49p for 87.5ml gives 70(p) for 125ml • 72p for 125ml gives 50.4(p) for 87.5p 	<p>M1</p> <p>A1</p> <p>(2)</p>	<p>If units are given they must be correct Allow reasonable rounding or truncation for comparison</p> <p>Allow 0.576(p) given as 0.57(p) or 0.58(p)</p> <p>Allow 1.78(5...ml) given as 1.78(ml) or 1.79(ml) and 1.73(6..) given as 1.73 or 1.74</p> <p>Allow 50.4(p) given as 50(p)</p>
<p>9*(a) 3</p>	<p>B1</p>	<p>Accept (0, 3) Do not accept (3, 0)</p>
<p>9*(b) -12</p>	<p>B1</p>	<p>Accept (-3, -12) Do not accept (-12, -3)</p>
<p>9*(c) (1, 4)</p>	<p>B1</p>	<p>Do not accept '4' or (4, 1)</p>
<p>9*(d) (-1, 0) and (3, 0)</p>	<p>B2</p>	<p>With no extra coordinates B1 for sight of '-1' and '3'</p>
<p>9(e) Sight or indication of 'Yes' with appropriate working shown, e.g. $3 + 16.4 - 67.24 (= -47.84)$</p>	<p>B1</p> <p>(6)</p>	
<p>10.</p> <p>$3(7x+5)+2x-9+3(7x+5)+2x-9=232.8$ $21x+15+2x-9+21x+15+2x-9= 232.8$</p> <p>$46x + 12 = 232.8$ or $46x = 220.8$ or $x = 220.8 \div 46$</p> <p style="text-align: center;">$x = 4.8$ (cm)</p> <p style="text-align: center;">Length 115.8 (cm) AND Width 0.6 (cm)</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>(5)</p>	<p>Or equivalent FT from '21x+15 + 2x – 9 = 232.8' (semi perimeter)</p> <p>FT from 1 error (or repeated error) in multiplying out brackets</p> <p>FT from 'their $ax + b = 232.8$' provided $a \neq 0$ and $b \neq 0$ (FT from semi perimeter is 9.86... cm)</p> <p>(FT from semi perimeter is 222.06 cm AND 10.72 cm) FT evaluations correct for 'their derived x'</p>

<p>11*(a) 15000×1.034^{22} (= £) 31299(.91...)</p>	<p>M2 A1</p>	<p>M1 for indication of 15000×1.034 (= 15510) or equivalent Accept (£)31300</p>
<p>11(b) 15000×1.034^{10} (= £ 20955.433...)</p> <p>$15000 \times 1.034^{10} - 10000$ (= £ 10955.43...)</p> <p>$10955(.43...) \times 1.034^{12}$ (= £16363.49...)</p> <p>Total pay back $10000 + 16363$ (=) (£) 26363</p>	<p>M1 m1 M1 A1 (7)</p>	<p>FT 'their derived £10955.43...' FT from '£10955' gives (£)16362.846...</p> <p>CAO, accept an answer that rounds to (£) 26363</p>
<p>12. Probability of black is 0.1 Profit $300 - 300 \times 0.1 \times 2.50 - 300 \times 0.2 \times 1.50$ (= $300 - 75 - 90$) or</p> <p>$300 (0.7 \times 1 - 0.1 \times 1.5 - 0.2 \times 0.5)$ (= $300 (0.7 - 0.15 - 0.1)$)</p> <p>(£)135</p>	<p>B1 M2 A1 (4)</p>	<p>May be seen in stages, must show full calculation method eventually FT 'their 0.1' provided it is clearly the probability of selecting a black ball M1 for sight of $300 \times 0.1 \times 2.50$ or $300 \times 0.2 \times 1.50$ (=165), or if one incorrect product within $300 (0.7 \times 1 - 0.1 \times 1.5 - 0.2 \times 0.5)$</p> <p>Only continue with FT 'their 0.1' provided 'their 135' > 125</p>
<p>13(a)(i) $\tan \text{rise} = 24/26.4$ or angle of rise = $\tan^{-1} 24/26.4$</p> <p>42(.27...°)</p>	<p>M1 A1</p>	<p><u>Trigonometry must be used in (a)</u></p>
<p>13(a)(ii) $\tan 42(.27...^\circ) = 2^{\text{nd}} \text{rise}/39.5$ or $2^{\text{nd}} \text{rise} = 39.5 \times \tan 42(.27...^\circ)$</p> <p>($2^{\text{nd}} \text{rise} =$) 36 (cm)</p>	<p>M1 A1</p>	<p>FT 'their angle of rise' provided M1 previously awarded</p> <p>Must be 2 sig. figs. Do not accept an unsupported answer of 36 (cm), trigonometry must be seen</p>
<p>13(b) $2^{\text{nd}} \text{rise}/39.5 = 24/26.4$ or $2^{\text{nd}} \text{rise} = 39.5 \times 24/26.4$ or $2^{\text{nd}} \text{rise} = 39.5 \times 0.9(090...)$ or $2^{\text{nd}} \text{rise} = 39.5 \div 1.1$ or equivalent</p> <p>35.9(... cm) or 36 (cm) AND an evaluation, e.g. 'similar triangles as fewer stages', 'non trigonometry method as few stages, so less chance of making a mistake'</p>	<p>M1 A2 (7)</p>	<p>Must show ratio or similar triangle working, not the use of 'tan' Accept use of scale factor method</p> <p>MUST FT from working A1 for 36 (cm) or 35.9(...cm) OR for an evaluation</p>

<p>14(a)</p> $4 \times 95(p) + 5 \times (\pounds)1.04 + 7 \times 75(p)$ $\times 28.8 \div (4+5+7)$ <p style="text-align: right;">(\pounds)25.65</p> <p>(Profit =) ((\pounds)29.99 – (\pounds)25.65) \times 12</p> <p style="text-align: right;">(\pounds)52.08</p>	<p>M1</p> <p>m1</p> <p>A1</p> <p>m1</p> <p>A1</p>	<p>Irrespective of place value (= \pounds3.80 + \pounds5.20 + \pounds5.25 = \pounds14.25)</p> <p>If units are given they must be correct</p> <p><i>Alternative:</i> $4 \times 28.8 \div (4 + 5 + 7)$ or $5 \times 28.8 \div (4 + 5 + 7)$ or $7 \times 28.8 \div (4 + 5 + 7)$ M1 $95(p) \times 7.2 + (\pounds)1.04 \times 9 + 75(p) \times 12.6$ m1 <i>(FT from M1)</i> A1 (\pounds)25.65</p> <p>(=\pounds4.34 \times 12) FT use of 'their \pounds25.65' provided at least M1 previously awarded CAO, accept (\pounds)52 from correct working</p>
<p>14(b)</p>  <p>0.65 Nicole Fed 0.35 Not</p> <p>0.72 Fed 0.28 Not</p> 0.35×0.28 <p>or $(1 - 0.65) \times (1 - 0.72)$</p> <p style="text-align: center;">(=) 0.098</p> <p>Statement or indication that either $0.098 < 0.1(0)$ or $9.8(\%) < 10(\%)$</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>E1</p> <p>(9)</p>	<p>Ignore branches following Nicole feeding the birds</p> <p>OR $1 - (0.65 + 0.35 \times 0.72)$</p> <p>No FT from including additional product following Nicole feeding the birds Depends on M1 previously awarded</p>

15(a) 135 (matches)	B1	
<p>15(b)(i)Midpoints 10, 30, 50, 70, 90</p> <p>Sum of the products of interval points and frequencies, e.g. for midpoints use: $10 \times 40 + 30 \times 30 + 50 \times 35 + 70 \times 20 + 90 \times 10$ $\div 135$</p> <p>(Use of midpoints gives) 39.6(29...minutes)</p>	<p>B1</p> <p>M1</p> <p>m1</p> <p>A1</p>	<p>FT 'their interval points'</p> <p>(=5350)</p> <p>FT 'their 135' from (a)</p> <p>Allow 40 (minutes) from correct working Accept an answer for correct working between 29.6 and 49.63 (minutes) inclusive (Use of upper bounds gives $6700 \div 135 = 49.6(29\dots)$) (Use of lower bounds gives $4000 \div 135 = 29.6(29\dots)$)</p>
<p>15(b)(ii) Statement relevant to their assumption, e.g. if upper bounds used 'the actual mean could be less',</p> <p>if lower bounds used 'the actual mean could be greater',</p> <p>if midpoints used 'the mean could be lower' or 'the mean could be higher' or 'the mean could be higher or lower'</p>	<p>E1</p> <p>(6)</p>	<p>Accept 'matches with no goals were not included so the actual mean time is greater'</p>

<p>16(a)(i) $h^2 = 15^2 - 3.5^2$ $h^2 = 212.75$ or $h = \sqrt{212.75}$ 14.58595...(cm) or 14.6 (cm)</p> <p>(Volume) $\frac{1}{3} \times \pi \times 3.5^2 \times 14.58595\dots$</p> <p>Answer in the range 187.(...cm³)</p> <p>$2000 \div 187.(....)$</p> <p>10 (ice creams)</p>	M1 A1 A1 m1 A1 M1 A1	<p>Accept $15^2 = h^2 + 3.5^2$</p> <p>Accept rounded answers, but NOT truncated answers FT from M1 for the correctly evaluated square root of 'their 212.75' provided 'their answer' < 15 (cm)</p> <p>FT 'their 14.58595...' provided M1 previously awarded</p> <p>FT 'their 187.(...)' provided at least 3 marks previously awarded Must be a whole number</p>
<p>16(a)(ii) Evaluation of results, e.g. 'cone was full, if it wasn't Megan could have made more ice creams',</p>	E1	<p>Accept FT from reasoning behind rounding 'their number of ice creams' up or down</p> <p>Allow, e.g. 'inside measurements could be less, so could be 11 rather than 10 ice creams', 'could have extra ice cream on the top, so makes fewer', 'not practical, as impossible to fill to the bottom of the cone'</p>
<p>16(b) $(\frac{6}{4})^3 \times 40$ 135 (cm³)</p>	M1 A1 (10)	

<p>17(a) $(2x + 1)(3x - 2) (=0)$</p> <p>$x = -1/2$ with $x = 2/3$</p>	<p>B2</p> <p>B1</p>	<p>If not B2, award B1 for $(2x \pm 1)(3x \pm 2)$ or $(2x \pm 2)(3x \pm 1)$</p> <p>Do not accept 0.6 for 2/3, unless sight of 2/3 Allow 0.66(...) or 0.67 for 2/3</p> <p>Strict FT from 'their pair of brackets' provided equivalent level of difficulty, with at least one answer a fraction</p>
<p>17(b) $n^2 + 3$</p>	<p>B2</p>	<p>B1 for $n^2 \pm a$, where $a \neq 0$</p>
<p>17(c) 32970</p>	<p>B1</p>	<p>CAO</p>
<p>17(d) $(x + 7)^2 \pm \dots$</p> <p>(Minimum value at $x =$) -7</p> <p>(Minimum value is) -24</p>	<p>M1</p> <p>A1</p> <p>A1</p> <p>(9)</p>	
<p>18. $3x + 2 = 4x^2 + 5x - 7$ $4x^2 + 2x - 9 = 0$</p> <p>$x = \frac{-2 \pm \sqrt{(2^2 - 4 \times 4 \times -9)}}{2 \times 4}$</p> <p>$x = \frac{-2 \pm \sqrt{148}}{8}$</p> <p>$x = 1.27069\dots$ or $x = 1.27$ and $x = -1.77069\dots$ or $x = -1.77$</p> <p>$x = 1.27$ with $y = 5.81$ (or $y = 5.80$) and $x = -1.77$ with $y = -3.31$ (or $y = -3.32$)</p>	<p>M1</p> <p>A1</p> <p>m1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>A1</p> <p>(6)</p>	<p>Must be equated to zero. '=0' may be implied in further work to solve, if no further work and not '=0' then A0</p> <p>FT provided their quadratic does not factorise and equivalent level of difficulty Use of correct quadratic formula, allow 1 slip in substitution (not a slip with the formula) If completing the square used award m1 for sight of $4(x + 1/4)^2 \pm \dots$</p> <p>FT provided M1, m1 previously awarded using their values of x in $3x + 2$ or equivalent to find y-values to 2 d.p. Accept answers given as coordinates</p> <p><i>Alternative using $x = (y - 2)/3$</i></p> <p>M1 $y = 4\left(\frac{y-2}{3}\right)^2 + 5\left(\frac{y-2}{3}\right) - 7$ or equivalent</p> <p>A1 $4y^2 - 10y - 77 = 0$ or equivalent, must equate to zero</p> <p>m1 $y = \{10 \pm \sqrt{(-10)^2 - 4 \times 4 \times -77}\} / 2 \times 4$ or equivalent, allow 1 slip in substitution</p> <p>A1 $y = (10 \pm \sqrt{1332}) / 8$ or equivalent</p> <p>A1 $y = -3.312\dots$ or $y = -3.31$ and $y = 5.812\dots$ or $y = 5.81$</p> <p>A1 $x = 1.27, y = 5.81$ with $x = -1.77, y = -3.31$ FT to final A1, provided M1, m1 previously awarded using their values of y in $(y - 2)/3$ or equivalent to find x-values to 2 d.p.</p>

19(a) $(30 \div 60 =) 0.5$ (km/min)	B1	Accept an answer in the range 0.46(km/min) to 0.52(km/min)
19(b) Tangent drawn at $t = 17$ <u>difference in y values</u> $(\div 60)$ <u>difference in x values</u> (km/min ²)	B1 M1 A1	Allow with $\div 60$ for change of units omitted for M1 only (Note: 0.01 to 0.03 km/min ²)
19(c) $(33 - 44) \div 10$ ($\times 60$) -66 (km/h ²)	M1 A1 (6)	Allow $(44 - 33) \div 10$ ($\times 60$) Allow with $\times 60$ for change of units omitted for M1 only Must be negative
20. $EG^2 = 24.4^2 + 20.3^3$ $- 2 \times 24.4 \times 20.3 \times \cos 36^\circ$ (= 206.0054....) EG = 14.35(2...cm) or 14.4 (cm) Area EFG = $\frac{1}{2} \times 24.4 \times 20.3 \times \sin 36^\circ$ Area EGH = $\frac{1}{2} \times 19.6 \times 14.35 \times \sin 49^\circ$ Area EFG = 145.5 (cm ²) to 145.6 (cm ²) AND Area EGH = 106.1 (cm ²) to 106.6 (cm ²) Following correct working, answer in the range 251.6 (cm ²) to 252.2 (cm ²)	M1 A1 M1 M1 A1 A1 (6)	FT 'their 14.35...' provided M1 awarded for the cosine rule Use of 14.4 gives 106.5(046...cm ²) Depends on the award of all previous M1 marks
21. Sight of least density 7747.5 (kg/m ³) Sight of all least dimensions 0.325(m), 0.215(m) and 0.105(m) Mass 7747.5 \times 0.325 \times 0.215 \times 0.105 56.8(kg)	B1 B1 M1 A1 (4)	Accept equivalents in cm FT provided 'their density' < 7748, and at least 1 of the least dimensions is correct Must be in the correct units, if cm used throughout need sight of appropriate conversion of each to m, or volume to m ³ CAO, from correct working and not from premature approximation