



GCSE MARKING SCHEME

SUMMER 2017

**GCSE (NEW)
MATHEMATICS - COMPONENT 2 (HIGHER)
C300UB0-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2017 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 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
1. $(x =) 75 (^{\circ})$ $(y =) 73 (^{\circ})$	B1 B2 (3)	B1 for sight of $180 - 75 - 32$, or $180 - 107$, $180 - 75 - (180 - 100 - 48)$, or $180 - (360 - 100 - 48 - (180 - 75))$
2. 3400×1.026^{10} $= (\pounds) 4394.94$ $(\pounds) 605.06$	M1 A1 B1 (3)	Or equivalent full method Accept $(\pounds) 4394.93(569\dots)$ Must be to the nearest penny FT $(\pounds)5000 - 'their 4394.94'$ provided M1 awarded and $'their 4394.94' < 5000$
3. Sight of $x + 2x + 4x + 2x$ or $9x$ $9x = 180$ $x = 20$	B1 B1 (3)	Sight of $9x = 180$ implies previous B1 FT $'their x + 2x + 4x + 2x'$ provided it contains at least 3 of the appropriate terms, simplified and $'=$ $180'$ If previously B0 then allow this B1 for sight of $nx = 180$ where $7 \leq n \leq 11$ CAO. An answer $'x = 20'$ without previous equation is awarded the final B1 only If no marks, award SC2 for a calculation $(x =) 180 \div$ 9 giving an answer $x = 20$
4. $4/9$	B1 (1)	
5. $\pi \times r^2 = 24$ $r^2 = 24 \div \pi$ $r = 2.76(3\dots \text{cm})$	M1 A1 A1 (3)	This implies M1 Accept $r = 2.8(\text{cm})$ or from correct working $r = 3(\text{cm})$ If no marks, award SC1 for an answer of $2.77 (\text{cm})$
6.(a) 1.53×10^{15}	B1	
6.(b) 2×10^{19}	B1 (2)	
7.(a)(i) 062° (ii) 288°	B1 B1	Do not accept 62°
7.(b) $1 : 250\ 000$	B2 (4)	Allow $1 : 250\ 000 \text{ cm}$ B1 for 1 cm represents 2.5 km or 2500 m , OR 8cm represents $2\ 000\ 000\text{cm}$, or equivalent, correct units must be given, or $8 : 2\ 000\ 000$ or equivalent Allow B1 for an answer of $1 : 2.5 \text{ km}$ B0 for $1 : 2.5$

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
8.(a) 4 (days)	B2	B1 for either a partial method, e.g. 9 people take 2 days to mow the same length, or 1 person takes 36 days (to mow twice as long), or 3 people take 12 days (to mow twice as long), OR B1 for a full method, equivalent to $2 \times 3 \times 6 \div 9$, with an error in evaluation
8.(b) Assumption, e.g. 'all people work at the same rate', 'the grass verge that is twice as long is the same width as the other grass verge', 'same type of grass', 'weather is the same', 'same type of mower'	E1 (3)	The award of this mark depends on the award of B2 or B1 in (a) Allow as a misinterpretation, e.g. 'takes the same time cutting grass twice as long', 'the original 3 people will take 12 days to mow twice as long grass verge'
9.(a) $2x^2 - 7x - 15$	B2	B1 for $2x^2 - 10x + 3x - 15$ or B1 for FT correct collection of like terms provided at least 3 of the 4 terms are correct If no marks, award SC1 for answers of $2x^2 - 13x - 15$ or $2x^2 + 13x - 15$
9.(b) $(x + 2)(x + 3)$	B1 (3)	CAO
10.(a) 600 (people) and (£) 80	B1	
10.(b) Line of best fit	B1	Following trend with points above and below Do not allow a line through (0, 0)
10.(c)(i) Answer in the range (£)100 to (£)160	B1	FT 'their line of best fit'
10.(c)(ii) Reason, e.g. 'might be cold', 'depends on the weather', 'no data around 50 people to use', 'extending the line assumes the trend follows a straight line', 'no evidence to support less than 230 people', 'the line wouldn't pass through 0 people, £0'	E1	Allow, e.g. 'not as many people, so they may not stay long and not buy ice cream', 'if 50 people went, spend of approximately £100 (or more) would be unreasonable', 'not enough data'
10.(d) Answer in the range £0.65 to £1.20 or 65p to 120p with correct unit given	B1 (5)	Do not accept in correct units, e.g. 0.87p Allow, e.g. £0.87p

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
<p>11.(a) $27 \div 1\frac{2}{3}$ or equivalent full method</p> <p>16.2 (km per hour) AND states or implies target not achieved</p>	<p>B2</p> <p>B1</p>	<p>Allow $1\frac{2}{3} = 1.66$ or 1.67 for B2, but not $1\frac{2}{3} = 1.6$ Award B2 for sight of 4.5 m/s B1 for $27 \div 1$ hour 40 minutes or $27 \div 100$ Allow B1 for $27 \div 1.4(0)$ or $27 \div 1.6$</p> <p>CAO, must be exactly 16.2 (km per hour) from sight of $27 \div 1\frac{2}{3}$</p> <p>Unsupported 16.2 (km per hour) AND states or implies target not achieved is awarded B2 only (as answer may have been rounded to 16.2 km per hour from incorrect use of time)</p> <p>If no marks, allow SC1 for the appropriate interpretation of $27 \div$ 'their time given in hours' correctly evaluated, allowing $\frac{1}{3}$ hour written as 0.3</p> <p><i>Alternatives:</i></p> <p>(20 km/h means) 30 km in $1\frac{1}{2}$ hours M1 Attempts 14(:)20 + $1\frac{1}{2}$ m1 (Finish time would be) 15(:)50 AND (Didn't finish until 16:00 so) states or implies target not met A1</p> <p>OR</p> <p>(Time would be) $60 \times 27/20$ M1 81(minutes) or 1 hour 21 minutes A1 (Rosa would needed to have finished by 14:20 + 1 hr 21 minutes) 15(:)41 AND states or implies target not met (as she finished at 16:00) B1</p> <p>OR</p> <p>(Distance would be) $20 \times 1\frac{2}{3}$ M1 $33\frac{1}{3}$ (km) or 33.33(... km) A1 (A0 for 33.3(km)) (Rosa cycled) less than $33\frac{1}{3}$ (km) (or 33.33...km) AND states or implies target not met B1 (Use of $20 \times 1\frac{2}{3}$ as 20×1.6 is awarded M1 only)</p>

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
<p>13.(b) $4c + 5t = 4(.25)$ and $3c + 8t = 5(.61)$</p> <p>Method to eliminate variable, e.g. equal coefficients and shows intention to subtract</p> <p>First variable</p> <p>Second variable</p> <p>(£)6.05</p>	<p>B1</p> <p>M1</p> <p>A1</p> <p>A1</p> <p>B1</p> <p>(10)</p>	<p>Both equations given, c & t may be other letters, words are accepted</p> <p>FT provided at least one equation is correct and the other in an equivalent format, provided equivalent level of difficulty.</p> <p>Allow 1 error in one term, not one with equal coefficients c = (0.)35 or t = (0.)57</p> <p>FT their first variable provided M1 previously awarded</p> <p>If units are given they must be correct, allow £6.05p FT 'their (0.)35' + 10× 'their (0.)57' provided M1 awarded <i>Unsupported answers, no marks</i></p>
14.(a) 8 (cords)	B1	CAO
<p>14.(b) Interpretation and 'Yes', stated or implied, with a suitable correct calculation, e.g. 'yes' with</p> <ul style="list-style-type: none"> • 48 (hairdryers) have cords greater than 100cm, or • 12 (hairdryers) have cords less than (or equal to) 100cm, or • 15 hairdryers have cords less than 108cm • 80% (of hairdryers) had cords longer than 100cm <p>Assumption, e.g. 'assumed all the lengths were evenly distributed'</p>	<p>B2</p> <p>E1</p>	<p>B1 for 0.75×60, or 0.25×60, or $15/60$, or $45/60$, or $12/60$, or $48/60$, or sight of reading at LQ 108 (cm) (accept 106 cm to 110 cm)</p> <p>Depends on B1. Stated or implied Allow, e.g. 'the reading for the group(s) at upper bound'</p> <p>Accept, e.g. 'Target not met, as the relationship is probably not linear'</p> <p>Do not accept, e.g. 'my readings from the diagram were not accurate', 'measurements were inaccurate'</p>
<p>14.(c)(i) Answers in the range 132 to 136 (cm) inclusive</p> <p>(ii) No impact and gives a reason, e.g. states median is as (c)(i) and states, e.g. 'still less than 80 cm', or 'still below the median'</p>	<p>B1</p> <p>E1</p> <p>(6)</p>	

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
15. $175.5(0) \div 0.75$ (=£234) $\div 0.9(0)$ (£)260	M1 m1 A1 (3)	Or equivalent Or equivalent
16.(a) 28 (small grey tiles)	B1	
16.(b)(i) $n^2 + 3$ or equivalent	B2	B1 for $1n^2 (\pm a)$
16.(b)(ii) A suitable description, e.g. 'a square of n by n, with one tile at the right side and 2 tiles added on the bottom', 'square in the top left, then add 3'	E1 (4)	Allow 'a square with extra 3 tiles' FT from equivalent of $n^2 + 3$ only
17.(a) $952 \div 136$ (= 7) $\div 2.5$ 2.8 (m)	M1 m1 A1	OR $952 \div 2.5$ with $\div 136$
17.(b) $0.65 \times 1.5 \times 2 \times 120$ (234) $+$ (+) $0.35 \times 1.5 \times 2 \times 140$ (147) 381 (g) (< 400 g)	M3 A1 (7)	For a complete method including the intention to add M2 for sight of both products of the 4 numbers, or M2 for intention to add products of at least 3 correct numbers M1 for sight of one correct product of 4 numbers, or M1 for sight of both products of at least 3 correct numbers, or M1 for intention to add products of at least 2 correct numbers CAO

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
<p>18. $(AC^2 =) 2.6^2 + 13.4^2$ OR ($AC =$) $\sqrt{186.32}$ or $AC^2 = 186.32$</p> <p>$AC = 13.6499\dots$ (cm)</p> <p>$\tan A = 8.7/13.6499\dots$ ($=0.637\dots$) $A = 32.5^\circ$</p>	<p>M1</p> <p>A1</p> <p>M1 A2</p> <p>(5)</p>	<p>Accept rounded or truncated May be implied in further calculation</p> <p>FT 'their derived AC' provided M1 previously awarded CAO A1 for $\tan^{-1}0.637\dots$ or FT angle correct but not given to 3 sig. figs.</p> <p><i>Alternative:</i> $AB^2 = 2.6^2 + 13.4^2 + 8.7^2$ ($=262.01$) M1 $AB = 16.186\dots$ (cm) A1 $\sin A = 8.7/16.186\dots$ ($=0.537\dots$) M1 FT 'their derived AB' provided M1 previously awarded $A = 32.5^\circ$ A2 CAO with FT and A1 as above</p> <p><i>Alternative:</i> $AB^2 = 2.6^2 + 13.4^2 + 8.7^2$ ($=262.01$) M1 $AB = 16.186\dots$ (cm) A1 $\cos A = 13.6499\dots/16.186\dots$ ($=0.537\dots$) M1 FT 'their derived AB' provided M1 previously awarded and attempt $(AC^2 =) 2.6^2 + 13.4^2$ $A = 32.5^\circ$ A2 CAO with FT and A1 as above</p>
<p>19.(a) $25/50 \times 25/49$ ($= 625/2450 = 25/98$)</p> <p>$25/50 \times 25/49 + 25/50 \times 25/49$ $= 1250/2450$ ($= 25/49 = 0.51\dots$)</p>	<p>B1</p> <p>M1 A1</p>	<p>OR $2 \times 25/50 \times 25/49$ Ignore incorrect cancelling <i>Alternative</i> $1 \times 25/49$ M2 $25/49$ A1</p>
<p>19.(b) $1 - P(\text{odd, odd})$</p> <p>$= 1 - 25/50 \times 24/49$ ($= 1 - 24/98$)</p> <p>$= 74/98$ ($= 37/49 = 0.755\dots$)</p>	<p>S1</p> <p>M1</p> <p>A1</p> <p>(6)</p>	<p>FT from (a) $P(OE) \& P(EO) \& P(EE)$ used OR $P(OE) + P(EO) + P(EE)$ OR FT (a) + $P(EE)$</p> <p>$25/50 \times 25/49 + 25/50 \times 25/49 + 25/50 \times 24/49$ OR (a) + $25/50 \times 24/49$</p> <p>CAO. Ignore incorrect cancelling</p>

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
20.(a)(i) $LM = -OL + OM$ or $LM = -(4a+3b) + (18a - 3b)$ $= 14a - 6b$	M1 A1	Accept <u>intention</u> of brackets CAO. ISW. Must be simplified form
20.(a)(ii) $KL = -OK + OL$ or $KL = -(-3a+6b) + (4a + 3b)$ $= 7a - 3b$	M1 A1	Accept <u>intention</u> of brackets CAO. Must be simplified form <i>In (a) if both A0 as not in simplest form, also award SC1 for correct unsimplified vectors (ii) $3a - 6b + 4a + 3b$ and (i) $-4a - 3b + 18a - 3b$</i>
20.(a)(iii) Reasonable statement, e.g. LM is twice the length of KL' States or implies collinear, or exact description of collinear	B1 B1	Allow for sight of $LM = 2 \times KL$ Accept, e.g. 'all points on the same straight line' Allow, e.g. 'parts of a straight line'
20.(b) Sight of $-\frac{1}{2}(4a+3b)$ or $\frac{1}{2}(4a+3b)$ $MQ = -OM + \frac{1}{2}OL$ or $MQ = -(18a-3b) + \frac{1}{2}(4a+3b)$ $= -16a + 4.5b$	B1 M1 A1 (9)	May be simplified at a later stage <u>Intention</u> of brackets ($= -18a + 3b + 2a + 1.5b$) CAO.
21.(a) $\frac{1}{2}x(x+1)x(4x-5+3x+2)$ or $\frac{1}{2}x(x+1)x(7x-3)$ $45.2 = \frac{1}{2}(7x^2 + 7x - 3x - 3)$ or equivalent $90.4 = 7x^2 + 4x - 3$ with $7x^2 + 4x = 93.4$ or $7x^2 + 4x - 93.4 = 0$	M1 m1 A1	Mark intention, i.e. brackets may be missing
21.(b) $(x =) \frac{-4 \pm \sqrt{4^2 - 4 \times 7 \times -93.4}}{2 \times 7}$ $= \frac{-4 \pm \sqrt{2631.2}}{14}$ 3.38 with -3.95	M1 A1 A1	Allow if seen in (a), provided not contradicted in (b) Allow 1 slip in substitution, but must be correct formula OR for sight of 3.38 or -3.95 CAO. Both solutions to 2dp
21.(c) 8.5(129...cm) or 8.52 (cm) and 12.1(346... cm) or 12.14 (cm) Decision and justification, e.g. 'that the negative solution in (b) was not valid, 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 $4 \times 3.38 - 5$ and $3 \times 3.38 + 2$, or for sight of either correct length Do not accept a decision alone, e.g. 'did not use the negative answer'

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<p>22. $DB^2 = 4.2^2 + 2.6^2 - 2 \times 4.2 \times 2.6 \times \cos 55.5^\circ$</p> <p>$DB^2 = 12.02968\dots$</p> <p>$DB = 3.468\dots$ (cm), or $DB = \sqrt{12.02968\dots}$</p> <p>$\sin ADB = \frac{2.6 \times \sin 55.5}{3.468\dots}$</p> <p>Angle ADB $38.15\dots^\circ$</p> <p>Angle BDC (= $82^\circ - ADB =$) $43.8\dots^\circ$</p> <p>Area BDC = $\frac{1}{2} \times 6.4 \times 3.468\dots \times \sin 43.8^\circ$</p> <p>Answer in the inclusive range 7.68 to 7.82(\dots) (cm^2)</p>	<p>M1</p> <p>m1</p> <p>A1</p> <p>M2</p> <p>A1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>(9)</p>	<p>Accept rounded or truncated</p> <p>Accept answers in the inclusive range 3.468 to 3.5 (cm) for DB</p> <p>FT 'their DB' provided not a value given in the question</p> <p>M1 for $\frac{\sin ADB}{2.6} = \frac{\sin A}{DB}$ or equivalent</p> <p>Accept answers in the range 37.7° to 38.2° inclusive (from max DB = 3.5 cm to min DB 3.468...cm)</p> <p>Accept answers in the range 43.8° to 44.3° inclusive (from DB = 3.468...cm to 3.5 cm) FT 82 – 'their ADB' provided previous M1 or M2 awarded</p> <p>FT 'their DB' and 'their angle BDC' provided at least 2 method marks (M2 or M1, M1 or M1 and m1) previously awarded</p> <p>CAO</p>																
<p>23.(a) Correct plots for values of t from 0 to 6 and joined with a curve</p>	<p>B2</p>	<p>B1 for at least 5 correct plots joined with a 'curve', or all 7 points plotted accurately but not joined, or not joined with a curve</p> <table border="1" data-bbox="754 1357 1225 1424"> <tr> <td>t</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>v</td> <td>0</td> <td>5</td> <td>8</td> <td>9</td> <td>8</td> <td>5</td> <td>0</td> </tr> </table>	t	0	1	2	3	4	5	6	v	0	5	8	9	8	5	0
t	0	1	2	3	4	5	6											
v	0	5	8	9	8	5	0											
<p>23.(b)(i) $\frac{1}{2} \times 1 \times [0 + 0 + 2(5 + 8 + 9 + 8 + 5)]$</p> <p>35 (metres)</p>	<p>M2</p> <p>A1</p>	<p>Or equivalent full method</p> <p>M1 for at least 4 individual areas correct ($2.5 + 6.5 + 8.5 + 8.5 + 6.5 + 2.5$) or if 1 slip in the trapezium rule</p> <p>CAO</p>																
<p>23.(b)(ii) States or implies Sharmin is correct with a suitable reason, e.g. 'Correct as all 6 areas are less than the actual areas', 'Correct as there are gaps left above the triangles and trapezia'</p>	<p>E1</p> <p>(6)</p>																	
<p>24.(a) $(DE =) = \frac{1}{4}\pi x$</p>	<p>B2</p>	<p>B1 for $\pi \times 2 \times x \times 45/360$ or equivalent unsimplified expression</p>																

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
24.(b) (Cone radius =) $x/8$ or equivalent perpendicular height ² = $x^2 - (x/8)^2$ = $(64x^2 - x^2)/64$ or $63x^2/64$ Perpendicular height = $\frac{3\sqrt{7}x}{8}$ cm	B2 M1 A1 A1 (7)	FT 'their derived DE' B1 for $\frac{1}{4}\pi x = 2 \times \pi \times$ cone radius, or $\frac{1}{4}\pi x = \pi \times$ diameter FT 'their derived cone radius' provided it is in terms of x and equivalent level of difficulty and at least B1 previously awarded FT correct stage towards simplifying as a single term CAO. Must be convincing from correct working, e.g. with sight of $63 = 3^2 \times 7$ or 9×7 or $63x^2/64$