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 = f + g- 15 3	 B1 B1 B1 (4)	FT until 2nd error occurs Mark final answer *Alternative method:* *w + 5 –f/3 = g/3* *B1* *w = g/3 + f/3 – 5* *B2* *Mark final answer, if further incorrect manipulation, award final B1 not final B2*
3*. 2.2 × 25 000 (cm) (= 55 000 cm) 0.55 (km)	M1 A1 (2)	Allow for sight of 55000, ignoring any units given CAO *Alternative:* *1 cm (= 250 m =) 0.25* ***km*** *or ¼* ***km*** *B1* *(¼ × 2.2 =) 0.55(km)* *B1*

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)	M1 A1	
4(a)(ii) (Area circle =) $\pi \times 14^2$ (Area square =) $1.25 \times \pi \times 14^2$	M1 M1	(= 615(.44...) 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
(Side of square) $\sqrt{(1.25 \times \pi \times 14^2)}$	m1	(= 27.7... cm)
(Perimeter) $4 \times \sqrt{(1.25 \times \pi \times 14^2)}$	m1	FT 'their area of a square' FT 4× 'their side length' provided at least M1 previously awarded
(Perimeter) Answer in the range 110.9 (cm) to 111 (cm)	A1	CAO
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'	E1	
4*(b) (72 ÷ 24 =) 3 (bags of spoons) AND (72 ÷ 18 =) 4 (boxes of forks)	B3	<u>Answers in the table take precedence over working</u> B2 for any of the following: • (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 B1 for any of the following: • $24 = 6 \times 4$ 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
(3×19.95 and 4×15.55 =) (£) 59.85 AND (£) 62.2(0)	M1	FT use of 'their 3 bags of spoons' and 'their 4 boxes of forks' provided at least B1 previously awarded
= (£) 122.05	A1	CAO
	(13)	

5*. Two unique possible reasons: • Didn't use raw data • Insufficient data	 E1 E1 (2)	E1 for any 1 possible reason Didn't use raw data includes, e.g. • 'median is (actually) 65(.15 cm)' • 'used rounded results' • 'depths were to the nearest 10 cm' Insufficient data includes, e.g. • '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' If the actual median is calculated it must be correct or approximately 65 (cm) *Depths recorded in order are 30, 50, 60, 80, 90, 100*
6. ½ × 8.2 × height = 41.82 height = $\frac{41.82}{½ \times 8.2}$ = 10.2 (cm) Area = ½ × 9.8 × 10.2 = 49.98 (cm^2)	M1 m1 A1 m1 A1 (5)	 May be embedded in further calculation Do not FT if clearly not perpendicular height used FT 'their 10.2' provided M1 previously awarded FT for accurate evaluation of 4.9 × 'their 10.2' Accept 50 (cm^2) from correct working *Alternative method:* $\frac{9.8}{8.2} \times 41.82$ *M4* *= 49.98 (cm^2) A1*
7(a) y = 4x + 7	B3	Must be given as an equation B2 for sight of y = 4x (+ ...) or m = 4, OR B1 for sight of y = (...x) + 7 or c = 7
7(b) y = 8x + 3 and y – 8x - 8 = 0, with no other equations indicated	B2 (5)	B1 for both correct answers with another equation also indicated, or B1 for one correct selection with at most one incorrect selection

8*. Method to compare, e.g. sight of • 1ml of each sight of 49 ÷ 87.5 and 72 ÷ 125 • Per 1p sight of 87.5 ÷ 49 and 125 ÷ 72 • Using 49p for 87.5ml sight of 49 × 125 ÷ 87.5 • Using 72p for 125ml sight of 72 × 87.5 ÷ 125	M1	
Accurate comparison calculated with a conclusion 87.5ml tube is better value Examples of evaluations: • 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	A1 (2)	If units are given they must be correct Allow reasonable rounding or truncation for comparison Allow 0.576(p) given as 0.57(p) or 0.58(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 Allow 50.4(p) given as 50(p)
9*(a) 3	B1	Accept (0, 3) Do not accept (3, 0)
9*(b) -12	B1	Accept (-3, -12) Do not accept (-12, -3)
9*(c) (1, 4)	B1	Do not accept '4' or (4, 1)
9*(d) (-1, 0) and (3, 0)	B2	With no extra coordinates B1 for sight of '-1' and '3'
9(e) Sight or indication of 'Yes' with appropriate working shown, e.g. 3 + 16.4 - 67.24 (= -47.84)	B1 (6)	
10. 3(7x+5)+2x-9+3(7x+5)+2x-9=232.8 21x+15+2x-9+21x+15+2x-9= 232.8 46x + 12 = 232.8 or 46x = 220.8 or x = 220.8 ÷ 46 x = 4.8 (cm) Length 115.8 (cm) AND Width 0.6 (cm)	B1 B1 B1 B1 B1 (5)	Or equivalent FT from '21x+15 + 2x – 9 = 232.8' (semi perimeter) FT from 1 error (or repeated error) in multiplying out brackets FT from 'their ax + b = 232.8' provided a≠0 and b≠0 (FT from semi perimeter is 9.86... cm) (FT from semi perimeter is 222.06 cm AND 10.72 cm) FT evaluations correct for 'their derived x'

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

14(a) 4 × 95(p) + 5 × (£)1.04 + 7 × 75(p) × 28.8 ÷ (4+5+7) (£)25.65	M1 m1 A1	Irrespective of place value (= £3.80 + £5.20 + £5.25 = £14.25) If units are given they must be correct *Alternative:* *4 × 28.8 ÷ (4 + 5 + 7) or 5 × 28.8 ÷ (4 + 5 + 7) or 7 × 28.8 ÷ (4 + 5 + 7)* *M1* *95(p) × 7.2 + (£)1.04 ×9 + 75(p) × 12.6* *m1* *(FT from M1)* *(£)25.65* *A1*
(Profit =) ((£)29.99 – (£)25.65) × 12 (£)52.08	m1 A1	(=£4.34 × 12) FT use of 'their £25.65' provided at least M1 previously awarded CAO, accept (£)52 from correct working
14(b) Nicole Arthur 0.65 Fed 0.72 Fed 0.35 Not 0.28 Not 0.35 × 0.28 or (1 – 0.65)×(1 – 0.72) (=) 0.098 Statement or indication that either 0.098 < 0.1(0) or 9.8(%) < 10(%)	S1 M1 A1 E1 (9)	Ignore branches following Nicole feeding the birds OR 1 – (0.65 + 0.35 × 0.72) No FT from including additional product following Nicole feeding the birds Depends on M1 previously awarded

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

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) (Volume) $1/3 \times \pi \times 3.5^2 \times 14.58595...$ Answer in the range 187.(...cm^3) 2000 ÷ 187.(....) 10 (ice creams)	M1 A1 A1 m1 A1 M1 A1	Accept $15^2 = h^2 + 3.5^2$ 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) FT 'their 14.58595...' provided M1 previously awarded FT 'their 187.(...)' provided at least 3 marks previously awarded Must be a whole number
16(a)(ii) Evaluation of results, e.g. 'cone was full, if it wasn't Megan could have made more ice creams',	E1	Accept FT from reasoning behind rounding 'their number of ice creams' up or down 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'
16(b) $(6/4)^3 \times 40$ 135 (cm^3)	M1 A1 (10)	

17(a) $(2x+1)(3x-2)$ (=0) $x = -1/2$ with $x = 2/3$	B2 B1	If not B2, award B1 for $(2x \pm 1)(3x \pm 2)$ or $(2x \pm 2)(3x \pm 1)$ Do not accept 0.6 for 2/3, unless sight of 2/3 Allow 0.66(...) or 0.67 for 2/3 **Strict FT** from 'their pair of brackets' provided equivalent level of difficulty, with at least one answer a fraction
17(b) $n^2 + 3$	B2	B1 for $n^2 \pm a$, where $a \neq 0$
17(c) 32970	B1	CAO
17(d) $(x + 7)^2 \pm ....$ (Minimum value at x =) -7 (Minimum value is) -24	M1 A1 A1 (9)	
18. $3x + 2 = 4x^2 + 5x - 7$ $4x^2 + 2x - 9 = 0$ $x = \frac{-2 \pm\sqrt{(2^2 - 4\times4\times-9)}}{2\times4}$ $x = \frac{-2 \pm\sqrt{148}}{8}$ $x = 1.27069...$ or $x = 1.27$ **and** $x = -1.77069...$ or $x = -1.77$ $x = 1.27$ with $y = 5.81$ (or $y = 5.80$) **and** $x = -1.77$ with $y = -3.31$ (or $y=-3.32$)	M1 A1 m1 A1 A1 A1 (6)	Must be equated to zero. '=0' may be implied in further work to solve, if no further work and not '=0' then A0 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 m1for sight of $4(x + 1/4)^2 \pm \ldots$ 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 *Alternative using $x = (y - 2)/3$* M1 $y = 4\frac{(y- 2)^2}{3^2} + 5\frac{(y- 2)}{3} - 7$ or equivalent A1 $4y^2 - 10y - 77 = 0$ or equivalent, must equate to zero m1 $y = \{10\pm\sqrt{((-10)^2 - 4\times4\times-77)}\}/2\times4$ or equivalent, allow 1 slip in substitution A1 $y = (10\pm\sqrt{1332})/8$ or equivalent A1 $y = -3.312...$ or $y = -3.31$ **and** $y = 5.812...$ or $y = 5.81$ 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.

19(a) (30 ÷ 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 $\frac{\text{difference in y values}}{\text{difference in x values}}$ (÷ 60) ..... (km/min^2)	B1 M1 A1	Allow with ÷ 60 for change of units omitted for M1 only (Note: 0.01 to 0.03 km/min^2)
19(c) (33 – 44) ÷ 10 (× 60) -66 (km/h^2)	M1 A1 (6)	Allow (44 - 33) ÷ 10 (× 60) Allow with × 60 for change of units omitted for M1 only Must be negative
20. $EG^2 = 24.4^2 + 20.3^3$ - 2 × 24.4 × 20.3 × cos36° (= 206.0054....) EG = 14.35(2...cm) or 14.4 (cm) Area EFG = ½×24.4×20.3×sin36° Area EGH = ½×19.6×14.35×sin49° 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 × 0.325 × 0.215 × 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