GCSE MARKING SCHEME

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/… or $\frac{4+5+2}{40+40+40}$
1*(c) $\frac{37}{120}$ (× 480) 148	M1 A1 (5)	Accept $\frac{\text{'their } 4+5+4+8+8+8\text{'}}{\text{'their } 40+40+40\text{'}}$ (× 480) CAO A final answer of 148/480 is M1, A0
2*(a) (a - 2)(a + 7)	B2	B1 for (a … 2)(a … 7)
2*(b) (b + 5)(b – 5)	B1	CAO
2*(c) d/5 = 12 – 2 or d/5 = 10 or d + 2 × 5 = 12 × 5 or d + 10 = 60 d = 50	M1 A1 (5)	CAO. Accept embedded answers Mark final answer *If no marks award SC1 for an answer of d = 70 from d/5 = 12 + 2*
3. 7.7×10^7 **AND** 2.2×10^8	B3 (3)	B2 for sight of either 7.7×10^7 OR 2.2×10^8, or for sight of 77 000 000 AND 220 000 000, or for sight of $7.704(4) \times 10^7$ AND $2.21(408) \times 10^8$ B1 for sight of $0.515 \times 1.496 \times 10^8$ $(= 7.7044 \times 10^7)$ OR $1.48 \times 1.496 \times 10^8$ $(= 2.21408 \times 10^8)$
4(a) Nickel (⅙ × 12 =) 2(%) Copper (100 – 12 - ⅙12 =) 86(%) 43 : 6 : 1	B1 B1 B2	Accept sight of 0.02 or 2/100 FT 'their ⅙12' 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 ⅙12' for B1 only unless equivalent stage(s) of simplification possible
4*(b)(65 + 14 + 9) × 27 ÷ 9 (=88 × 3) 264 (kg) Conclusion that it is not possible as 264 > 250, e.g. 'No as 264kg is greater than ¼ tonne'	M1 A1 E1 (7)	FT provided M1 awarded for an appropriate conclusion Do not accept ¼ tonne as any amount other than correctly giving 250 kg, however it is not essential to state this conversion

5*(a) Midpoints 10, 30, 50, 70, 90 1×10+8×30+9×50+7×70+6×90 ÷ 31 55.8(…cm)	B1 M1 m1 A1	 FT 'their midpoints' provided these are at the bounds or within the groups (10 + 240 + 450 + 490 + 540 = 1730) Accept 56(cm) from correct working
5*(b) Argument presented to include that (some) other groups could have snowfall towards the lower end of the group, e.g. 'group 20 to 40 (cm) may have actual snowfall between 21 and 23 cm'	E1 (5)	Accept 'the mean changes by about 2(.3 cm), so still about the same' Allow, e.g. 'Would not impact on the mean much' Do not allow an argument presented saying 'do not know the actual snowfall for the other groups' Do not accept an argument based on the reason for using midpoints without further clarification
6*(a) $x^2 = 96.05$ or $(x =) \sqrt{96.05}$ 9.8(cm)	M2 A1	M1 for $(x^2 =) 4.7^2 + 8.6^2$ FT from M1 for the correctly evaluated square root of 'their 96.05' provided 'their answer' > 8.6 (cm)
6*(b) $(y=) \sin^{-1}8.6/12.1$ or $\sin^{-1}0.7107..$ 45(.295…°) or 45.3(°)	M2 A1 (6)	M1 for $\sin y = 8.6/12.1$ ISW, i.e. do not accept 45.2(°) unless at least 45.29(5…°) seen previously Do not accept 45° without further explanation
7*. 6c + 3r = 24(.)60 **AND** 5c + 2r = 18(.)60 Method to solve simultaneous equations, allow an error but not in the equated variable with an attempt to subtract First variable correct Method to calculate second variable Second variable correct (40 – (7c+5r) = 40 – 34.40 =) (£)5.6(0) or 560(p)	B1 M1 A1 m1 A1 B1 (6)	Both equations given, c & r may be other letters, words are accepted FT provided at least one equation is correct and consistent place value, with equivalent level of difficulty Allow 1 error in one term, not one with equal coefficients Accept in £ or p **Curtain £2.20** **Rail £3.80** FT their first variable provided M1 previously awarded Accept in £ or p FT 'their c' and 'their r' provided M1 previously awarded If units are given they must be correct *Unsupported answers, no marks*

8(a) (Volume of the carton) $6\times6\times20$ $720\ (cm^3)$ (Volume in the bottle) $\pi\times3.5^2\times18.5$ 711.6 to $712.1(cm^3)$ Conclusion stating or implying 'No', with a reason, e.g. 'No as 720 >712' 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)'	M1 A1 M1 A1 E1	Allow if a drop extra is included, up to a maximum of $10cm^3$ FT for 'their volume of the carton' and 'their height in the milk bottle' provided at least M1, M1 previously awarded Accept reasoning based on uncertainty
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'	E1	Do not accept 'measurements given were not accurate' Accept 'measurements were internal measurements'
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'	E1 (7)	Allow 'milk may or may not fit' provided this could reasonably be an impact following 'their assumption'
9*. $12 \times 10.48 \div 19.32$ (=6.509… g) $12 - 6.5(\ldots.)$ 5.49(06….g) or 5.5 (g)	M2 M1 A1 (4)	M1 for $12 \div 19.32$ (= 0.6211…) Accept $6.5(\ldots) - 12$ FT 'their $12 \times 10.48 \div 19.32$' provided < 12 CAO, allowing also a negative difference

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

12. For sight of 0.85 and 0.78 or 85% and 78% or equivalent (42.50 ÷ 0.85) ÷ 0.78 or equivalent (£) 64.10	B1 M2 A1 (4)	May be embedded M1 for sight of 42.50 ÷ 0.85 or 'an amount > 42.50' ÷ 0.78 or equivalent, or for (42.50 ÷ 85) ÷ 78 or other consistent place value error, or for sight of (pre final reduction price of) (£)50 CAO. Must be to the nearest penny
13. Sight of 715 (g) and 305 (g) 715 + 4 × 305 1935 (g)	B1 M1 A1 (3)	 FT 'their 715' and 'their 305' in working provided <720 and <310 respectively CAO, not FT
14(a) 2 £(s)/person	B1 U1	Accept answers in the range 1.9 to 2.1 Allow £(s) per person or pounds per person Do not accept £/people (singular is needed for people), or charge per person
14(b)(i) Correct graph with points connected, for 0 people £60 to 200 people £660	B2	B1 for 0 people costing £60 shown OR B1 for a straight line with a gradient of 3
14(b)(ii) t = 3(×)p + 60	B1	CAO, not FT
14(c) 20 (people) (£) 120	 B1 B1 (7)	Allow tolerance of ½ small square FT from 'their line' FT from 'their line'
15(a) 500 × 1.021^{18} (= £)726.83	M2 A1	M1 for sight of 500 × 1.021 or equivalent CAO
15(b) (£) $x \times (1 + y/100)^6$ or equivalent	B2 (5)	ISW B1 for sight of $x \times (1 + \ldots)^6$ or $(1 + y/100)^6$ or $x(y/100)^6$ B0 for $x \times 1.y^6$
16. 14625	B2 (2)	B1 for sight of $C = \frac{2340}{(52/A)^2}$ or $C = \frac{2340}{(52/130)^2}$ or $C = \frac{2340}{0.4^2}$ or B = 0.16

17. $n^2 + n + 1$	B2 (2)	CAO B1 for sight of $n^2 \pm$ …., not for n^2 alone OR B1 for $an^2 \pm$ … 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 $x_4 = 12.26(62229…)$ **and** $x_5 = 12.26(62778…)$ Solution to 2 d.p. is 12.27 from sight of $x_4 = 12.26(62229…)$ **and** $x_5 = 12.26(62778…)$	M1 m1 A1 (4)	 Allow for sight of $x_3 = 12.26(5…)$ **and** $x_4 = 12.26(6…)$ 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' **AND** 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)

21. $(x+6)^2 \pm \ldots$ …….. + 21 Stationary point (-6, 21)	B1 B1 B2 (4)	Sight of $(x+6)^2$ or $(x + {}^{12}/_{2})^2$ Ignore sight of '=0' Accept 57 - 36 if not evaluated, otherwise mark final value. Do not accept '= -21' or '=21' *$(x + 6)^2 + 21$, B1, B1 ISW.* Must follow completing the square FT from 'their $(x + 6)^2$' for the x coordinate FT their value but not 57 or - 36 for the y coordinate B1 for (…. , 21) or (-6, ….)
22(a) 20×4 + ½×10×10 130 (girls)	M1 A1	 CAO
22(b) Total boys: 20×2+10×15+10×19+10×10+30×1 Boys 510 >1hour: Girls 225 **and** Boys 130 %: Girls (100×) 225/580, OR Boys (100×) 130/510 In order: 38.79….(%) **and** 25.49…(%)	 M1 A1 B2 M1 A1 (8)	 Allow for sight of any three correct products in a sum of 5 products CAO B1 for one correct total FT provided M1 previously awarded FT provided M1 and at least B1 previously awarded Mark final answer, in answer space if completed. Accept 38.8(%) or 39(%) **and** 25.5(%) or 25(%) Do not accept as final answers 38(%) or 38.7(%) **and** 25.4(%) or 26(%), i.e. any rounding must be correct

23. $BD^2=4.2^2+3.9^2-2\times4.2\times3.9\times\cos86°$ $BD^2=30.564\ldots$ or $BD=5.528\ldots$(cm)	M1 A1	 Accept rounded or truncated, or implied in the next stage of working
$\cos C = \frac{6.4^2+5.8^2-BD^2}{2\times6.4\times5.8}$ (=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 $BD^2 = 6.4^2+5.8^2 - 2\times6.4\times5.8\times\cos C$
An answer in the range 53(°) to 54(°)	A1	Must be from correct working shown
Area ABD = ½×4.2×3.9×sin86° Area BCD = ½×6.4×5.8×sinC	M1 M1	 A value for C must be shown, FT 'their derived BĈD'
Area ABD = 8.17(cm^2) or 8.2(cm^2) OR Area BCD = 14.8 to 15.02 (cm^2)	A1	Only accept 8(cm^2) from sight of correct working FT 'their derived BĈD'
$\left(\frac{\text{Total area}}{60}\times 3.59 =\right)$ $\frac{22.97}{60}\times3.59$ to $\frac{23.2(0\ldots)}{60}\times3.59$	M1	FT 'their total area' provided at least 2 marks previously awarded in working to find the area
Answer in the range (£)1.37 to (£)1.39	A1	CAO. Must follow correct working shown
	(10)	Maximum of SC7 for incorrectly considering AC as bisecting BÂC: 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 Correctly costs AND finds the change B1