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 (°) (y =) 73 (°)	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} = (£) 4394.94 (£) 605.06	M1 A1 B1 (3)	Or equivalent full method Accept (£) 4394.93(569…) Must be to the nearest penny FT (£)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 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 *n*x = 180 where 7 ≤ n ≤ 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 ÷ 9 giving an answer x = 20
4. 4/9	B1 (1)	
5. π × r^2 = 24 r^2 = 24 ÷ π r = 2.76(3… cm)	M1 A1 A1 (3)	 This implies M1 Accept r = 2.8(cm) or from correct working r = 3(cm) If no marks, award SC1 for an answer of 2.77 (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 cm B1 for 1 cm represents 2.5 km or 2500 m, OR 8cm represents 2 000 000cm, or equivalent, correct units **must** be given, or 8 : 2 000 000 or equivalent Allow B1 for an answer of 1 : 2.5 km B0 for 1 : 2.5

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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 × 3 × 6 ÷ 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

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11.(a) 27 ÷ 1⅔ or equivalent full method	B2	Allow 1⅔ =1.66 or 1.67 for B2, but not 1⅔ = 1.6 Award B2 for sight of 4.5 m/s B1 for 27 ÷ 1 hour 40 minutes or 27 ÷ 100 Allow B1 for 27 ÷ 1.4(0) or 27 ÷ 1.6
16.2 (km per hour) **AND** states or implies target not achieved	B1	CAO, must be exactly 16.2 (km per hour) from sight of 27 ÷ 1⅔ 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) If no marks, allow SC1 for the appropriate interpretation of 27 ÷ 'their time given in hours' correctly evaluated, allowing ⅓ hour written as 0.3 *Alternatives:* *(20 km/h means) 30 km in 1½ hours M1* *Attempts 14(:)20 + 1 ½ m1* *(Finish time would be) 15(:)50* ***AND*** *(Didn't finish until 16:00 so) states or implies target not met A1* *OR* *(Time would be) 60 × 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* *OR* *(Distance would be) 20 × 1⅓ M1* *33⅓ (km) or 33.33(... km) A1* *(A0 for 33.3(km))* *(Rosa cycled) less than 33⅓ (km) (or 33.33...km)* ***AND*** *states or implies target not met B1* *(Use of 20 × 1⅓ as 20 × 1.6 is awarded M1 only)*

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
11.(b) Impact statement, e.g. 'meets target', 'beats target' **AND** sight of (27 ÷ 1.25) 21.6 (km per hour)	E2 (5)	For E2 FT use of 'their time in hours' – 25 minutes used correctly **with** appropriate impact statement E1 for sight of 21.6 (km per hour) If no marks, SC1 for FT attempt 27 ÷ 'their time – 25 minutes written incorrectly' **with** appropriate impact statement, e.g. time used in (a) is 1.4, uses 1.4 – 25 minutes in calculating average speed '27 ÷ 1.15 = 23.47... so meets target'
12. Mid-points 2, 6, 10, 14, 18 2×2+6×7+10×10+14×8+18×3 (=312) ÷ 30 10.4(mm)	B1 M1 m1 A1 (4)	 FT 'their midpoints' provided these are at the bounds or within the groups (4 + 42 + 100 + 112 + 54 = 312)
13.(a) (Turnips used) 3 × 3 ÷ 5 or 6 × 3 ÷ 10 or (Turnips left over) 8 - 3 × 3 ÷ 5 or 8 - 6 × 3 ÷ 10 1.8 (kg) turnips needed 6.2 (kg) turnips left over (Onions needed) 3 × 2 ÷ 5 or 6 × 2 ÷ 10 or 1.8 × 2 ÷ 3 1.2 (kg)	M1 A1 A1 M1 A1	Allow equivalent in g for possible M1, A1, A0 only CAO CAO FT 'their 1.8' Allow equivalent in g for possible M1, A0 only

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
13.(b) 4c+ 5t = 4(.)25 **and** 3c + 8t = 5(.)61	B1	Both equations given, c & t may be other letters, words are accepted FT provided at least one equation is correct and the other in an equivalent format, provided equivalent level of difficulty.
Method to eliminate variable, e.g. equal coefficients and shows intention to subtract	M1	Allow 1 error in one term, not one with equal coefficients **c = (0.)35** or **t = (0.)57**
First variable	A1	
Second variable	A1	FT their first variable provided M1 previously awarded
(£)6.05	B1	If units are given they must be correct, allow £6.05p FT 'their (0.)35' + 10× 'their (0.)57' provided M1 awarded
	(10)	*Unsupported answers, no marks*
14.(a) 8 (cords)	B1	CAO
14.(b) Interpretation and 'Yes', stated or implied, with a suitable correct calculation, e.g. 'yes' with • 48 (hairdryers) have cords greater than100cm, 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	B2	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)
Assumption, e.g. 'assumed all the lengths were evenly distributed'	E1	Depends on B1. Stated or implied Allow, e.g.'the reading for the group(s) at upper bound' Accept, e.g. 'Target not met, as the relationship is probably not linear' Do not accept, e.g. 'my readings from the diagram were not accurate', 'measurements were inaccurate'
14.(c)(i) Answers in the range 132 to 136 (cm) inclusive	B1	
(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'	E1	
	(6)	

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
15. 175.5(0) ÷ 0.75 (=£234) ÷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 $1n^2$ (± 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 ÷ 136 (= 7) ÷ 2.5 2.8 (m)	M1 m1 A1	OR 952 ÷ 2.5 with ÷ 136
17.(b) 0.65 × 1.5 × 2 × 120 (234) + (+) 0.35 × 1.5 × 2 × 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
18. $(AC^2 =)\ 2.6^2 + 13.4^2$ OR $(AC =) \sqrt{186.32}$ or $AC^2 = 186.32$	M1	
AC = 13.6499… (cm)	A1	Accept rounded or truncated May be implied in further calculation
tanA = 8.7/13.6499… (=0.637…) A = 32.5(°)	M1 A2	FT 'their derived AC' provided M1 previously awarded CAO A1 for $\tan^{-1}0.637…$ or FT angle correct but not given to 3 sig. figs. *Alternative:* *$AB^2 = 2.6^2 + 13.4^2 + 8.7^2$ (=262.01) M1* *AB = 16.186… (cm) A1* *sinA = 8.7/16.186… (=0.537…) M1* *FT 'their derived AB' provided M1 previously awarded* *A = 32.5(°) A2* *CAO* *with FT and A1 as above* *Alternative:* *$AB^2 = 2.6^2 + 13.4^2 + 8.7^2$ (=262.01) M1* *AB = 16.186… (cm) A1* *cosA = 13.6499.../16.186… (=0.537…) M1* *FT 'their derived AB' provided M1 previously awarded* *and attempt $(AC^2 =)\ 2.6^2 + 13.4^2$* *A = 32.5(°) A2 CAO* *with FT and A1 as above*
	(5)	
19.(a) 25/50 × 25/49 (= 625/2450 = 25/98)	B1	
25/50 × 25/49 + 25/50 × 25/49 = 1250/2450 (= 25/49 = 0.51….)	M1 A1	OR 2 × 25/50 × 25/49 Ignore incorrect cancelling *Alternative* *1 × 25/49 M2* *25/49 A1*
19.(b) 1 – P(odd, odd)	S1	*FT from (a) P(OE) & P(EO) & P(EE)used* OR P(OE) + P(EO) + P(EE) OR FT (a) + P(EE)
= 1 – 25/50 × 24/49 (= 1 – 24/98)	M1	25/50×25/49+25/50×25/49+25/50×24/49 OR (a) + 25/50×24/49
= 74/98 (= 37/49 = 0.755…)	A1	CAO. Ignore incorrect cancelling
	(6)	

Eduqas Summer 2017 GCSE (9-1) Mathematics Component 2: Higher Tier	Mark	Comments
20.(a)(i) **LM** = -**OL** + **OM** or **LM** = -(4**a**+3**b**) +(18**a** - 3**b**) = 14**a** - 6**b**	M1 A1	Accept intention of brackets CAO. ISW. Must be simplified form
20.(a)(ii) **KL** = -**OK** + **OL** or **KL** = -(-3**a**+6**b**) + (4**a** + 3**b**) = 7**a** - 3**b**	M1 A1	Accept intention of brackets CAO. Must be simplified form *In (a) if both A0 as not in simplest form, also award SC1 for correct unsimplified vectors* *(ii) 3**a** – 6**b** + 4**a** + 3**b** and (i) -4**a** – 3**b** + 18**a** – 3**b***
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× KL Accept, e.g. 'all points on the same straight line' Allow, e.g. 'parts of a straight line'
20.(b) Sight of - ½(4**a**+ 3**b**) or ½(4**a** + 3**b**) **MQ** = -**OM** + ½**OL** or **MQ** = -(18**a**- 3**b**) +½(4**a** + 3**b**) = -16**a** + 4.5**b**	B1 M1 A1 (9)	May be simplified at a later stage Intention of brackets (= -18**a** + 3**b** + 2**a** + 1.5**b**) CAO.
21.(a) ½ ×(x+1)×(4x-5 + 3x+2) or ½ ×(x+1)×(7x-3) $45.2 = 1/2\ (7x^2 + 7x – 3x – 3)$ 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' (9)	B2 E1	FT use of 'their positive value' for B1 only provided previous M1 in (b) awarded B1 for sight of 4×3.38 -5 **and** 3×3.38 + 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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22. $DB^2 = 4.2^2+2.6^2-$ $2\times4.2\times2.6\times\cos55.5(°)$	M1	
$DB^2 = 12.02968…$	m1	Accept rounded or truncated
DB = 3.468… (cm), or DB = √12.02968…	A1	Accept answers in the inclusive range 3.468 to 3.5 (cm) for DB
$\sin ADB = \frac{2.6 \times \sin 55.5}{3.468(…)}$	M2	FT 'their DB' provided not a value given in the question M1 for $\frac{\sin ADB}{2.6} = \frac{\sin A}{DB}$ or equivalent
Angle ADB 38(.15…°)	A1	Accept answers in the range 37.7(°) to 38.2(°) inclusive (from max DB = 3.5 cm to min DB 3.468…cm)
Angle BDC (= 82°–ADB =) 43.8(…°)	A1	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
Area BDC = ½ × 6.4 × 3.468… × sin43.8(°)	M1	FT 'their DB' and 'their angle BDC' provided at least 2 method marks (M2 or M1, M1 or M1 and m1) previously awarded
Answer in the inclusive range 7.68 to 7.82(…) (cm^2)	A1 (9)	CAO
23.(a) Correct plots for values of t from 0 to 6 and joined with a curve	B2	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 t: 0 1 2 3 4 5 6 v: 0 5 8 9 8 5 0
23.(b)(i) ½×1×[0+0+2(5+8+9+8+5)]	M2	Or equivalent full method 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
35 (metres)	A1	CAO
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'	E1 (6)	
24.(a) (DE =) =¼πx	B2	B1 for π × 2 × x × 45/360 or equivalent unsimplified expression

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24.(b) (Cone radius =) x/8 or equivalent	B2	FT 'their derived DE' B1 for ¼πx = 2 × π × cone radius, or ¼πx = π × diameter
perpendicular height^2 = $x^2 - (x/8)^2$	M1	FT 'their derived cone radius' provided it is in terms of x and equivalent level of difficulty and at least B1 previously awarded
= $(64x^2 - x^2)/64$ or $63x^2/64$	A1	FT correct stage towards simplifying as a single term
Perpendicular height = $\frac{3\sqrt{7}x}{8}$ cm	A1	CAO. Must be convincing from correct working, e.g. with sight of $63 = 3^2 \times 7$ or 9×7 or $63x^2/64$
	(7)	