GCSE MARKING SCHEME

AUTUMN 2017

GCSE
MATHEMATICS - COMPONENT 1 (HIGHER)
C300UA0-1

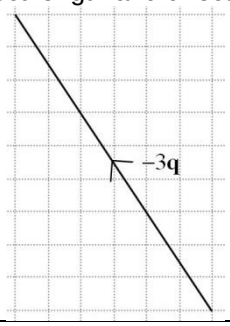
INTRODUCTION

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 GCSE (9-1) Mathematics Autumn 2017 Component 1: Higher Tier	Mark	Comment
1(a) $2^3 \times 3^2 \times 5$	B3	B2 for $2\times2\times2\times3\times3\times5$ or B1 for an attempt at the factors (list, repeated division or factor tree) with two correct factors seen before the first error
1(b) 45	B2	FT the HCF of $3^2 \times 5 \times 7$ and 'their $2^3 \times 3^2 \times 5$' B1 for $3^2\times5$ or for any common factor of 315 and 360 which is greater than 1
1(c)(i) 0.00054	B1	
1(c)(ii) 8×10^4	B2	B1 for 0.8×10^5 seen or for a final answer of 80 000
	(8)	
*2.(a)(i) Valid criticism about the instruction or response boxes. e.g. 'You may want to tick more than one box.' or 'You may have used it to do something else like go on the internet.' or 'You may not have done any of these things.'	E1	Do not allow e.g. 'They may not have a mobile phone.'
*2.(a)(ii) Valid criticism about the vagueness of the times used e.g. 'It does not say what *a lot* means.'	E1	
*2.(b)(i) Valid comment. e.g. 'Not reliable as only 5 students.' or 'Not very reliable, she needs to ask more people'	E1	
*2.(b)(ii) SIM only is better because e.g. 'the bills are less varied (as the range is £3 compared to £65 for Pay-as-you-go.)' or 'SIM only bills are all about the same' or 'Pay-as-you-go bills are more spread out'. Pay-as-you-go is better because e.g. 'the average monthly cost is less (as the mean is £12.75 compared to £16.25 for SIM only.' or 'Most Pay-as-you-go bills will be less than £12.75' or 'The mean Pay-as-you-go bill is lower than the lowest SIM only bill.'	E1 E1	Do not allow e.g. 'it has the cheaper highest bill.' Do not allow e.g. 'it has the cheaper lowest bill.'
	(5)	

*3.(a) $\begin{pmatrix} 9 \\ 9.5 \end{pmatrix}$	B2	B1 for each element or for $2\mathbf{p} = \begin{pmatrix} 10 \\ 8 \end{pmatrix}$ or equivalent seen or for $\begin{pmatrix} 9 \\ 9.5 \end{pmatrix}$ or for $\begin{matrix} 9 \\ 9.5 \end{matrix}$ or for $\frac{9}{9.5}$
*3.(b) Line of correct length and direction:  	B2	B1 for correct length but direction omitted or incorrect or for correct direction but incorrect length
	(4)	
*4. Correct construction with arcs	B2	B1 for correct arcs Tolerance ±2°
	(2)	
*5.(a) $x^2 - 3x - 10$	B2	B1 for $x^2 - 3x + ...$ or for any three correct terms in $x^2 + 2x - 5x - 10$
*5.(b) $18a$	B2	Accept 18 a^1 for 2 marks. B1 for $k \times a^1$ or equivalent
	(4)	
*6.(a)(i) y is inversely proportional to x indicated	B1	
*6.(a)(ii) (x =) 0.25 or equivalent	B2	B1 for $100 = \frac{25}{x}$ seen Do not accept y = 0.25 or equivalent
*6(b) $\frac{4}{0.8}$ or equivalent 5 (m/s)	M1 A1	Allow e.g. '1 metre every 0.2 seconds.'
	(5)	
*7(a)(i) 14π	B1	allow 43.96
*7(a)(ii) 4	B1	

*7(b) (diameter =) 6 (cm) 9π or $\pi\times9$ or equivalent	B1 B2	May be on diagram Mark final answer B1 for $\pi\times3^2$ or equivalent If no marks award SC1 for an answer of 36π or 144π
	(5)	
8. (a) $\left(\frac{16}{5}-\frac{9}{7}=\right)\frac{112}{35}-\frac{45}{35}$ or $2-\frac{3}{35}$ $\frac{67}{35}$ or $1\frac{32}{35}$	M2 A1	M1 for $\frac{112}{35}$ or $\frac{45}{35}$ or $2+\frac{7}{35}-\frac{10}{35}$
*8.(b) (a =) 28 (b =) 35 (c =) 55	B3	B1 for each correct value or B2 for 35 and attempting 4×7 and 11×5 or for a set of values in the correct ratio that are not 2-digit e.g. 56, 70, 110 or B1 for a common multiple of 5 and 7 or for two pairs of two-digit numbers in the ratio 4 : 5 AND 7 : 11
*8.(c) $205\div5\times8$ or equivalent 328 (cm) or equivalent, CAO	M1 A1	Must be a complete method
	(8)	

*9.(a) $3\times\frac{4}{6}\times\frac{10}{5}$ or equivalent, seen or implied	M2	May be in steps or as statements e.g. Workers / Tonnes / Hours 6 / 5 / 2 6 / 10 / 4 or Workers / Tonnes / Hours 6 / 7.5 / 3 6 / 10 / 4 M1 for one correct step seen or implied e.g. $3\times\frac{10}{5}$ or $3\times\frac{4}{6}$ or one correct statement e.g. Workers / Tonnes / Hours 1 / 1.25 / 3 6 / 5 / 2 6 / 7.5 / 3 4 / 10 / 6 8 / 10 / 3 or equivalent NB 4 workers 5 tonnes 3 hours is given and does not score on its own
4 (hours)	A1	
*9.(b) Valid assumption. e.g. 'The goods are all of the same type.' or 'The vehicles used are the same.' or 'The goods can all be loaded into one vehicle.'	E1	Allow 'The workers did not need to take any breaks.' Do not allow e.g. 'They can all lift the same weight.'
Valid impact. e.g. 'If the goods are heavier, they may take longer to load.' or 'The load time would be longer if the vehicle could not take all 10 tonnes at once.'	E1	Allow 'The load time would be longer if they had to take breaks.'
	(5)	
10.(a) No (stated or implied) AND either a correct justification e.g. a comment such as 'He should have reversed the inequality sign in step 3 because he divided by -2' or ' it should be $x<\frac{-7}{-2}\quad x<3.5$' or showing by substitution an example of a value of $x > 3.5$ is not a solution of the original inequality or showing by substitution an example of a value of of $x < 3.5$ is a solution of the original inequality	E2	E1 for No and a partially correct justification. e.g. Stating that step 3 is incorrect. or stating that e.g. $x = 4$ is not a solution (no subst seen) or stating the answer should be $x < 3.5$ or stating that e.g. $x = 2$ is not a solution (no subst seen)

10.(b)(i) Correct parabola through (–2, 0) and (2, 0).	B2	B1 for correct shape with intercepts relatively correct but roots not marked or for correct roots seen but shape of curve incorrect. Be generous with symmetry; ignore coordinates of vertex
10.(b)(ii) $-2 < x < 2$ or $x \in (-2, 2)$	B2	Accept $-2 < x$ and $x < 2$ or $-2 < x$, $x < 2$ or the interval $(-2, 2)$ for 2 marks. B1 for each correct end or for $-2 < x$ <u>or</u> $x < 2$ or for 'their –2' < x < 'their 2', FT their intercepts from (b)(i) or for $-2 \leq x \leq 2$ or for the correct region on the graph in (b)(i) identified as the solution set (including open circles at each x-intercept)
	(6)	
11.(a)(i) 22	B1	
11.(a)(ii) <table><tr><th>M</th><th>LQ</th><th>UQ</th><th>IQR</th></tr><tr><td>9.2</td><td>8.9</td><td>9.4 to 9.5</td><td>0.5 to 0.6</td></tr></table>	B3	B1 for correct median B1 for correct LQ and UQ B1 FT for correct IQR; FT 'their UQ' – 'their LQ' provided one is correct
11.(b)(i) Correct box plot: Whiskers from 8 to 10.4 Box from 8.9 to (9.4 to 9.5) Median at 9.2	B2	FT their values from (a)(ii) B1 FT for 2 out of 3 correct from whiskers, box, median
11.(b)(ii) Litestar *A* and a correct reason. e.g. 'She should buy tablet *A* as the median is greater (than tablet *B*).' or 'She should buy tablet *A* as the median is 0.3 hours more (than tablet *B*).' or 'She should buy tablet *A* as the shortest battery life is ½ hour greater.' or 'Tablet *A* as the Lower quartile is more than the lower quartile of tablet *B*.'	E1	FT their values from (a)(ii) or their box plot from (b)(i) Allow 'Every statistic apart from the highest value is greater for Litestar *A* than for Litestar *B*.'
	(7)	

12. Sight of 8500 (grams) or 8.5 (kg) AND 10.5 (kg) or 10500 (grams) $4 \times 10.5 + 20 \times 8.5$ or $\frac{215-4\times10.5}{20}$ or $\frac{215-20\times8.5}{4}$ 212 or 8.65 or 11.25 212 kg < 215kg or 8.65kg > 8.5kg or 11.25 kg > 10.5kg or equivalent AND Mahima is correct.	B2 M1 A1 E1	If units are given they must be correct. B1 for either FT 'their 8.5 and 10.5' providing all are in the same units, 'their 8.5' > 8.4 and 'their 10.5' > 10 CAO Dependent on at least B1 M1 having been previously awarded FT 'their 212' <215 Comparison with 215 must be seen or implied Allow 'Mahima is wrong' if 'their 212' > 215
	(5)	
13. $y(w-2x)=5+x$ $wy-2xy=5+x$ $wy-5=x+2xy$ or equivalent $wy-5=x(1+2y)$ $x=\frac{wy-5}{1+2y}$	 M1 M1 M1 M1 A1	FT until second error. Correctly clears the fraction. Multiplies out. Collects x terms to one side. Factorises Divides Final answer; must be x =… not $-x$ = ...
	(5)	
14. $(\sqrt[3]{64} =) 2^{\frac{6}{3}}$ or 2^2 $(4^9 =) \ [2^2]^9$ or 2^{18} 2^{2-4+18} or equivalent 2^{16}	 B1 B1 M1 A1	 FT 'their 18' and 'their 2' providing both are positive Complete method required. CAO
		Alternative method 1: $\sqrt[3]{64} \times 4^9 = 4^{10}$ *seen or implied* **B1** $(4^{10} =) \ [2^2]^{10}$ or $(2^{-4} =) 4^{-2}$ *seen or implied* **B1** 2^{20-4} or 4^{10-2} or equivalent **M1** 2^{16} **A1**
		Alternative method 2: $(2^{-4} =) \frac{1}{16}$ *seen or implied* **B1** $\sqrt[3]{64} \times \frac{1}{16} = \frac{1}{4}$ *seen or implied* **B1** 4^{9-1} or equivalent **M1** 2^{16} **A1**
	(4)	

15. 		C	W	J	
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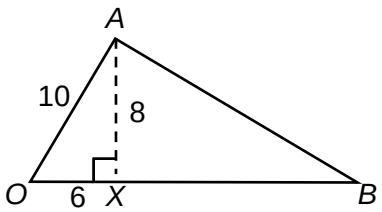
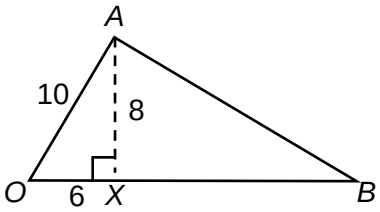
P	12	0	6	18
B	16	0	8	24
K	0	5	3	8
	28	5	17	50		B4	B1 for the given 24, 28, 8, 0 (shaded) correctly placed B1 for the 5's and remaining 0's correctly placed in the water column B1 for 16 and 12 correctly placed or for the 16 and 8 correctly placed B1 for the 18 and 6 correctly placed or for the 17 and 6 correctly placed FT 'their 16' & 'their 12' or 'their 16' & 'their 8', i.e.18 and 18 – 'their 12' or 18 and 18 – (28 – 'their 16') or 17 and 17 – (8 – 'their 5') – 'their 8' or 17 and 17 – (8 – 'their 5') – (24 – 'their 16') May be probabilities or frequencies
$\frac{16+6}{50}$	M2	FT 'their 16' and 'their 6' for M1 or M2 M1 for sight of either $\frac{16}{50}$ or $\frac{6}{50}$ or equivalent or sight of 'their (16 + 6)'
$\frac{22}{50}$ or equivalent	A1	CAO
	(7)	
16. *BG* = *DF* (pentagon regular, given)	B1	
Angle *AGB* = angle *EFD* (exterior angles of regular pentagon)	B1	
Angle *ABG* = angle *EDF* (exterior angles of regular pentagon)	B1	
All necessary reasons given	E1	Allow exterior angles of a regular pentagon to be stated once only.
(Triangles are congruent) ASA	B1	Dependent on all previous marks having been awarded.
	(5)	
17.(a) $(\text{length} =) \frac{22}{1+2\sqrt{3}}$	M1	
$\frac{22}{1+2\sqrt{3}} \times \frac{1-2\sqrt{3}}{1-2\sqrt{3}}$	M1	
$\frac{22-44\sqrt{3}}{1-4(3)}$	M1	
$-2+4\sqrt{3}$	A1	

17.(b) $x=\left(-2+4\sqrt{3}\right)^2+\left(1+2\sqrt{3}\right)^2$ $4-8\sqrt{3}-8\sqrt{3}+16(3)+$ $1+2\sqrt{3}+2\sqrt{3}+4(3)=65-12\sqrt{3}$	M1 A1	FT 'their $-2+4\sqrt{3}$' for M1 only NB Answer is given
	(6)	
18.(a) Correct explanation. e.g. $\frac{8}{6}=\frac{4}{3}$ **and** $6^2 + 8^2 = 10^2$ or equivalent or draws a 3,4,5 triangle **and** a 6,8,10 triangle **and** states they are similar	B2	Must use both the gradient and the length of *OA*. B1 for a correct partial explanation e.g. $\frac{8}{6}=\frac{4}{3}$ or $6^2 + 8^2 = 10^2$ or equivalent or draws a 3,4,5 triangle and a 6,8,10 triangle
18.(b) (Gradient of tangent =) $\frac{-1}{4/3}$ $8=-\frac{3}{4}\times 6+c$ $y=-\frac{3}{4}x+\frac{25}{2}$ or equivalent $0=-\frac{3}{4}x+\frac{25}{2}$ $\left(\frac{50}{3},0\right)$ or equivalent	M1 m1 A1 M1 A1	 FT 'their – ¾' CAO FT their equation of *AB* providing the gradient is negative. Allow a final answer of $x=\frac{50}{3}$
		***Alternative method 1:*** Identifies similar triangles *OAX* and *OBA,* seen or implied ***M1*** $\frac{10}{6}=\frac{OB}{10}$, seen or implied ***M1*** $OB=10\times\frac{10}{6}$ ***M1*** $OB=\frac{100}{6}$ or equivalent CAO ***A1*** $B\left(\frac{50}{3},0\right)$ or equivalent ***A1*** ***Alternative method 2:*** Identifies similar triangles *OXA* and *AXB,* seen or implied ***M1*** $\frac{BX}{8}=\frac{8}{6}$, seen or implied ***M1*** $OB=8\times\frac{8}{6}+6$ ***M1*** $OB=\frac{100}{6}$ or equivalent CAO ***A1*** $B\left(\frac{50}{3},0\right)$ or equivalent ***A1***



Alternative method 3:

$\tan AOB = \frac{4}{3}$ ***M1***

$\cos AOB = \frac{3}{5}$ ***M1***

$\left(\cos AOB = \frac{OA}{OB} =\right) \quad \frac{10}{OB} = \frac{3}{5}$ ***M1***

$OB = \frac{50}{3}$ or equivalent CAO ***A1***

$B\left(\frac{50}{3}, 0\right)$ or equivalent ***A1***

Alternative method 4:

Identifies similar triangles *OAX* and *OBA*, seen or implied ***M1***

$AB = 10 \times \frac{8}{6}$, seen or implied ***M1***

$OB = \sqrt{10^2 + \left(\frac{40}{3}\right)^2}$ ***M1***

$OB = \frac{50}{3}$ or equivalent CAO ***A1***

$B\left(\frac{50}{3}, 0\right)$ or equivalent ***A1***

Alternative method 5:

(Gradient *AB* =) $\frac{-1}{4/3}$, seen or implied ***M1***

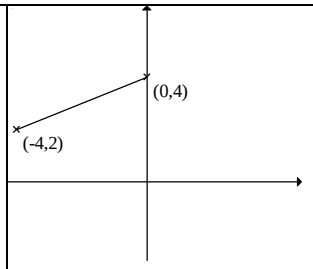
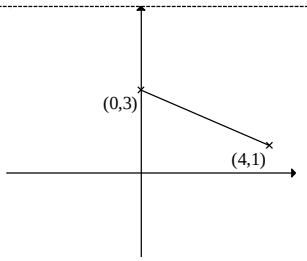
$-\frac{3}{4} = -\frac{8}{BX}$, seen or implied ***M1***

$OB = 8 \times \frac{4}{3} + 6$ ***M1***

$OB = \frac{100}{6}$ or equivalent CAO ***A1***

$B\left(\frac{50}{3}, 0\right)$ or equivalent ***A1***

(7)

19.(a) Translation through $\begin{pmatrix}0\\k\end{pmatrix}$ where $k > 0$ Correct coordinates seen or scale marked	 B1 B1	
19.(b) Reflection in y-axis Correct coordinates seen or scale marked	 B1 B1	
	(4)	
20.(a)(i) 120	B2	B1 for $5 \times 4 \times 3 \times 2$ ($\times 1$) or 5! or equivalent
20.(a)(ii) $\frac{2}{5}$ or equivalent	B1	
20.(b) 2160	B2	FT $18 \times$ 'their 120' B1 for $6 \times 5 \times 4 \times 3 \times 2 \times 3$ or $\frac{3}{7} \times 7!$ or equivalent
	(5)	
21.(a) $f^{-1}(x) = \frac{x-2}{5}$ or equivalent	B2	Award B1 for $x = \frac{y-2}{5}$ or equivalent unless x and y interchanged later or SC1 for y or $f^{-1}(x) = \frac{x+2}{5}$ or equivalent
$\frac{x-2}{5} = 10$ $x = 52$	M1 A1	
		Alternative method: $f^{-1}(x) = 10$ means $x = f(10)$ ***B2*** $f(10) = 5(10) + 2$ ***M1*** $x = 52$ ***A1***

21.(b)(i) $gf(x) = g(5x+2)$ or $gf(x) = (5x+2)^3$ or $gf(x) = (f(x))^3$	B1	Correct order of composition seen or implied.
$(5x+2)(5x+2)^2 = (5x+2)(25x^2+20x+4)$	M1	Seen or implied. Allow $(5x+2)^2 = 25x^2+20x+4$ if $(5x+2)^3$ attempted
Convincing correct completion to given answer $125x^3+150x^2+60x+8$	A1	NB Answer is given
21.(b)(ii) -27	B1	
	(8)	
22.(a) $(x-3)^2+10$ or $a=-3, b=10$	B3	B2 for sight of $\left(x-\frac{6}{2}\right)^2-3^2$ or B1 for sight of $\left(x-\frac{6}{2}\right)^2 \pm \ldots$ Ignore '= 0' if seen.
22.(b) (3, 21)	B2	FT $-$'their a' and 11 + 'their b' B1 for each coordinate.
	(5)	