



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.

Autum 2017 Component 1: Higher Tier Mark Comment 1(a) 2 ³ × 3 ² × 5 B3 B2 for 2×2×2×3×3×5 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 FT the HCF of 3 ² × 5 × 7 and 'their 2 ³ × 3 ² × 5' B1 for 3 ³ × 5 or for any common factor of 315 and 360 which is greater than 1 1(c)(i) 0.00054 B1 1(c)(i) 0.00054 B1 1(c)(i) 0.00054 B1 1(c)(i) 0.00054 B1 1(c)(i) 0.00054 B1 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 els like go on the internet.' or You may not have done any of these things.' '2.(a)(ii) Valid comment. e.g. Wot reliable as only 5 students.' or 'Not reyr reliable, she needs to ask more people! E1 2(b)(i) Valid comment. e.g. 'Not reliable as only 5 students.' or 'Not reyr reliable, she needs to ask more people! E1 2(b)(i) Valid comment. e.g. 'the bills are less varied (as the range is 32 compared to £55 for Pay-as-you-go.)' or 'SM only bills are all about the same' or '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 'on Sterre spread out'. E1 Do not allow e.g. 'it has the cheaper highest bill.' Pay-as-you-go bills are more spread out.' Pay-as-you-go bills are more spread out.' Pay-as-you-go	EDUQAS GCSE (9-1) Mathematics		
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		(5)	

*3.(a)		
$ \begin{pmatrix} 9\\ 9.5 \end{pmatrix} $	B2	B1 for each element or
(9.5)		
		for $2\mathbf{p} = \begin{pmatrix} 10\\ 8 \end{pmatrix}$ or equivalent seen or
		for $\left(\frac{9}{9.5}\right)$ or for $\frac{9}{9.5}$ or for $\frac{9}{9.5}$
*3.(b)	PO	D1 for correct length but direction
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)	
$x^{2}-3x-10$	B2	B1 for $x^2 - 3x + \dots$ or for any three correct terms in $x^2 + 2x - 5x - 10$
*5.(b) 18 <i>a</i>	B2	Accept 18 a^1 for 2 marks.
	(4)	B1 for $k \times a^1$ or equivalent
*6.(a)(i)	(4)	
y is inversely proportional to x indicated	B1	
*6.(a)(ii) (<i>x</i> =) 0.25 or equivalent	B2	B1 for $100 = \frac{25}{x}$ seen
		Do not accept $y = 0.25$ or equivalent
$\frac{4}{0.8}$ or equivalent	M1	Allow e.g. '1 metre every 0.2 seconds.'
	۸ ۹	
5 (m/s)	A1	
*7(a)(i)	(5)	
*7(a)(i) 14π	B1	allow 43.96
*7(a)(ii) 4	B1	

*7(b) (diameter =) 6 (cm)	B1	May be on diagram
9π or $\pi \times 9$ or equivalent	B2	Mark final answer B1 for $\pi \times 3^2$ 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) (<i>a</i> =) 28 (<i>b</i> =) 35 (<i>c</i> =) 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) $205 \div 5 \times 8$ or equivalent	M1	Must be a complete method
328 (cm) or equivalent, CAO	A1	
	(8)	

*9 (2)				
*9.(a) $3 \times \frac{4}{6} \times \frac{10}{5}$ or equivalent, seen or implied	M2	May be in st	eps or as sta	atements
		e.g.	T	LLs is
		Workers	Tonnes	Hours
		6	5	2
		6	10	4
		Or Workers	Tannaa	Houro
		Workers	Tonnes	Hours
		6 6	7.5 10	3 4
		0	10	4
		M1 for one o implied	correct step s	seen or
		e.g. $3 \times \frac{10}{5}$	or $3 \times \frac{4}{6}$	
		or one corre	ct statement	e.g.
		Workers	Tonnes	Hours
		1	1.25	3
		6	5	2
		6	7.5	3
		4	10	6
		8	10	3
		or equivalen	t	
		NB 4 worker	s 5 tonnes 3	hours is
		given and do	pes not score	e on its own
4 (hours)	A1			
*9.(b)				
Valid assumption.	E1	Allow 'The w		ot need to
e.g. 'The goods are all of the same type.' or		take any bre	aks.'	
'The vehicles used are the same.' or 'The		Do not allow		on all lift
goods can all be loaded into one vehicle.'		Do not allow the same we		
Valid impact.	E1	Allow 'The lo	ad time wou	ıld be
e.g. 'If the goods are heavier, they may		longer if the		
take longer to load.' or 'The load time		in ingen in ing	,	
would be longer if the vehicle could not				
take all 10 tonnes at once.'				
	(5)			
10.(a) No (stated or implied) AND either a correct	E2	E1 for No ar	nd a partially	correct
justification		justification.		
e.g. a comment such as 'He should have		e.g. Stating	that step 3 is	s incorrect.
reversed the inequality sign in step 3		or		
because he divided by $-2'$ or ' it should be		stating that e	•	not a
$x < \frac{-7}{-2}$ $x < 3.5'$		solution (no	subst seen)	
-2		or		-1 I
or		stating the a	nswer shoul	a be
showing by substitution an example of a		<i>x</i> < 3.5		
value of $x > 3.5$ is not a solution of the		or	<u>.</u>	
original inequality		stating that e		not a
or		solution (no	subst seen)	
showing by substitution an example of a				
value of of $x < 3.5$ is a solution of the				
original inequality		L		

10.(b)(i)	Γ	
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) $-2 < x < 2 \text{ or } x \in (-2, 2)$	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 $-2 < x \text{ or } x < 2$
		or for 'their $-2' < x <$ 'their 2', FT their intercepts from (b)(i)
		or for $-2 \le x \le 2$
		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)	D 0	
M LQ UQ IQR	B3	B1 for correct median
9.2 8.9 9.4 to 9.5 0.5 to 0.6		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	B2	FT their values from (a)(ii)
Box from 8.9 to (9.4 to 9.5)		B1 FT for 2 out of 3 correct from
Median at 9.2 11.(b)(ii)		whiskers, box, median
Litestar <i>A</i> and a correct reason. e.g. 'She should buy tablet <i>A</i> as the median	E1	FT their values from (a)(ii) or their box plot from (b)(i)
is greater (than tablet B).' or 'She should buy tablet A as the median is 0.3 hours		Allow 'Every statistic apart from the
more (than tablet <i>B</i>).' or 'She should buy		highest value is greater for Litestar
tablet A as the shortest battery life is $\frac{1}{2}$ hour greater.' or 'Tablet A as the Lower		A than for Litestar B.'
quartile is more than the lower quartile of		
tablet <i>B</i> .'	(7)	
<u> </u>	· · · /	

Sight of 8500 (grams) or 8.5 (kg) AND 10.5 (kg) or 10500 (grams)B2If units are given they must be correct. B1 for either $4 \times 10.5 + 20 \times 8.5$ or $\frac{215 - 4 \times 10.5}{20}$ or $\frac{215 - 20 \times 8.5}{4}$ M1FT their 8.5 and 10.5' providing all are in the same units, their 8.5' > 8.4 and their 10.5' > 10212 or 8.65 or 11.25A1CAO212 kg < 215kg or 8.65kg > 8.5kg or 11.25 kg > 10.5kg or equivalent AND Mahima is correct.E1Dependent on at least B1 M1 havin been previously awarded FT their 212' <215 Comparison with 215 must be seen or implied Allow 'Mahima is wrong' if their 212' > 21513. $y(w-2x) = 5 + x$ M1FT until second error. Correctly clears the fraction. $wy - 5 = x + 2xy$ or equivalent $wy - 5 = x(1 + 2y)$ M1Collects x terms to one side. Final answer; must be $x =$ not $-x =$ 14. $(\sqrt[3]{64} =) \frac{5}{2^3}$ or 2^2 $(4^6) =) \frac{[2^2]^9}{2^3}$ or 2^2 B114. $(\sqrt[3]{64} x 4^9 = 4^{10}$ seen or implied $(4^{10} =) \frac{[2^2]^9}{12^2 \frac{10}{10}}$ or $(2^4 =) 4^{22}$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{12^2 \frac{10}{10}}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{12^2 \frac{10}{10}}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{12^2 \frac{10}{10}}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{12^2 \frac{10}{10}}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{10}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{10}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{10}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{10}$ or $(2^4 - 1) 4^2$ seen or implied $(4^{10} - 2) \frac{[2^2]^9}{10}$ or $(2^4 - 1) 4^2$ seen or impl				
$\frac{215-4\times10.5}{20}$ or $\frac{215-20\times8.5}{4}$ are in the same units, 'their 8.5' > 8.4 and 'their 10.5' > 10 $212 \text{ or } 8.65 \text{ or } 11.25$ A1CAO $212 \text{ kg} < 215\text{ kg} \text{ or } 8.65\text{ kg} > 8.5\text{ kg or } 11.25 \text{ kg} > 10.5\text{ kg or equivalent}$ A1CAOAND Mahima is correct.E1Dependent on at least B1 M1 having been previously awarded MD FT 'their 212' <215		B2	correct.	
212 kg < 215kg or 8.65kg > 8.5kg or 11.25 kg > 10.5kg or equivalent AND Mahima is correct.E1Dependent on at least B1 M1 havin been previously awarded FT their 212' <215 Comparison with 215 must be seed or implied Allow 'Mahima is wrong' if their 212' > 21513. $y(w-2x)=5+x$ (5)13. $y(w-2x)=5+x$ M1wy $-5=x+2xy$ or equivalent $wy-5=x(1+2y)$ M1Multiplies out.Collects x terms to one side. Factorises $x=\frac{wy-5}{1+2y}$ A114. $(\sqrt[3]{64}=)(2^3)^{\circ}$ or 2^2 $(4^9=)(2^2)^{\circ}$ or 2^{16} 14. $(\sqrt[3]{64}x4^9=4^{10}$ seen or implied $A1$ 216A1A1Collect $x term thod required.Complete method required.CAO216A1A1A1\sqrt[3]{64}x4^9=4^{10} seen or implied2^{20-4} or 4^{10-2} or equivalent$	$\frac{215-4\times10.5}{215-20\times8.5}$ or $\frac{215-20\times8.5}{215-20\times8.5}$	M1	'their 8.5' > 8.4 and	
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$\begin{array}{c c} -x = \dots \\ \hline & & \\ \hline \hline & & \\ \hline \hline \hline \\ \hline \hline & & \\ \hline \hline \hline \\ \hline \hline \hline \hline$	· · · · ·	A1	Final answer; must be $x =$ not	
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$\begin{array}{c} (4^9 =) \left[2^2\right]^9 \text{ or } 2^{18} \\ 2^{2-4+18} \text{ or equivalent} \\ 2^{16} \end{array} \qquad \begin{array}{c} \text{B1} \\ \text{M1} \\ \text{Structure} \\ St$	14.	(3)		
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seen or implied B 2 ²⁰⁻⁴ or 4 ¹⁰⁻² or equivalent M			$\sqrt[3]{64} \times 4^9 = 4^{10}$ seen or implied B	1
2^{20-4} or 4^{10-2} or equivalent M			$(4^{10} =) [2^2]^{10}$ or $(2^{-4} =) 4^{-2}$	
2 ¹⁶ A			seen or implied $B^{2^{20}-4}$ or 4^{10-2} or equivalent $M^{2^{20}-4}$	1
				1
Alternative method 2:				
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		(4)	2^{16} A	

15. $\overline{\mathbb{C}}$ $\overline{\mathbb{W}}$ $\overline{\mathbb{J}}$ $\overline{\mathbb{P}}$ 12 0 $\overline{6}$ 18 $\overline{\mathbb{B}}$ 16 0 $\overline{\mathbb{B}}$ 24 $\overline{\mathbb{K}}$ 0 5 3 $\overline{\mathbb{B}}$ $\overline{\mathbb{B}}$ 28 5 17 50 $\overline{\mathbb{B}}$ 23 5 17 50 $\overline{\mathbb{B}}$ 16 16 ad 6 $\overline{\mathbb{B}}$ 23 5 17 50 $\overline{\mathbb{B}}$ 16 ad 6 $correctly placed\overline{\mathbb{B}}16ad6correctly placed\overline{\mathbb{B}}1616ad6correctly placed\overline{\mathbb{B}}161616161616\overline{50}7717ad1616\overline{50}777161616\overline{50}71616161616\overline{50}71616161616\overline{50}71616161616\overline{50}717161616\overline{16}\overline{17}\overline{16}$	15.							
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B160824K05382851750B1 for the 5's and remaining 0's correctly placed in the water columnB1 for the 16 and 2 correctly placed or for the 16 and 8 correctly placedB1 for the 16 and 8 correctly placedB1 for the 16 and 8 correctly placedB1 for the 17 and 6 correctly placedB1 for the 18 and 8 correctly placedB1 for the 18 and 18 - their 12' or their 16'sB1 for the 18 and 18 - C8 - their 16') or 17 and 17 - (8 - their 5') - their a' or 17 and 17 - (8 - their 5') - their a' or 17 and 17 - (8 - their 5') - their a' or 17 and 17 - (8 - their 16') or M216. B2 or equivalentA1CAO16. B2 = DF (pentagon regular, given)B1Angle AGB = angle EFD (exterior angles of regular pentagon)B1Angle AGB = angle EFD (exterior angles of regular pentagon)B1All necessary reasons givenE1Allow exterior angles of a regular pentagon to be stated once only.(Triangles are congruent) ASAB117.(a) (length =) $\frac{22}{1+2\sqrt{3}}$ M1 $\frac{22 - 44\sqrt{3}}{1-4(3)}$ M1	Р				18			(shaded) correctly placed
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$\frac{16+6}{50}$ 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)' CAO								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') –
$\overline{50}$ M2FT 'their 16' and 'their 6' for M1 or M2 $\overline{50}$ M1 for sight of either $\frac{16}{50}$ or $\frac{6}{50}$ or equivalent or sight of 'their (16 + 6)' $\frac{22}{50}$ or equivalentA1CAO $16.$ $BG = DF$ (pentagon regular, given)B1Angle AGB = angle EFD (exterior angles of regular pentagon)B1Angle ABG = angle EDF (exterior angles of regular pentagon)B1All necessary reasons givenE1Allow exterior angles of a regular pentagon to be stated once only.(Triangles are congruent) ASAB1 $17.(a)$ (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								May be probabilities or frequencies
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(Triangles are congruent) ASAB1Dependent on all previous marks having been awarded.17.(a) (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				EDF (e	xterior	angles of	B1	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	All nec	essary i	reason	is give	n		E1	
$(17.(a) = \frac{22}{1+2\sqrt{3}}$ $(1ength = \frac{22}{1+2\sqrt{3}} \times \frac{1-2\sqrt{3}}{1-2\sqrt{3}}$ $M1$ $\frac{22-44\sqrt{3}}{1-4(3)}$ $M1$	(Triang	gles are	congru	uent) A	SA		B1	
$(\text{length} =) \frac{22}{1 + 2\sqrt{3}} \qquad M1$ $\frac{22}{1 + 2\sqrt{3}} \times \frac{1 - 2\sqrt{3}}{1 - 2\sqrt{3}} \qquad M1$ $\frac{22 - 44\sqrt{3}}{1 - 4(3)} \qquad M1$							(5)	×
$\frac{22}{1+2\sqrt{3}} \times \frac{1-2\sqrt{3}}{1-2\sqrt{3}}$ M1 $\frac{22-44\sqrt{3}}{1-4(3)}$ M1	• • •	~) 2					
$\frac{22}{1+2\sqrt{3}} \times \frac{1-2\sqrt{3}}{1-2\sqrt{3}}$ M1 $\frac{22-44\sqrt{3}}{1-4(3)}$ M1	(lengt	$h = \frac{1}{1+1}$	$\frac{22}{2\sqrt{3}}$				M1	
							M1	
	$\frac{22-4}{1-4}$	$\frac{4\sqrt{3}}{(3)}$					M1	
							A1	

17.(b)		· · · · · · · · · · · · · · · · · · ·
$x = (-2 + 4\sqrt{3})^2 + (1 + 2\sqrt{3})^2$	M1	FT 'their $-2+4\sqrt{3}$ ' for M1 only
$4 - 8\sqrt{3} - 8\sqrt{3} + 16(3) +$		
$1 + 2\sqrt{3} + 2\sqrt{3} + 4(3) = 65 - 12\sqrt{3}$	A1	NB Answer is given
18.(a)	(6)	
Correct explanation.	B2	Must use both the gradient and the length of <i>OA</i> .
e.g. $\frac{8}{6} = \frac{4}{3}$ and $6^2 + 8^2 = 10^2$ or equivalent or		B1 for a correct partial explanation
draws a 3,4,5 triangle and a 6,8,10 triangle		e.g. $\frac{8}{6} = \frac{4}{3}$ or $6^2 + 8^2 = 10^2$ or
and states they are similar		equivalent or draws a 3,4,5 triangle and a 6,8,10 triangle
18.(b)	N 4 4	
(Gradient of tangent =) $\frac{-1}{\frac{4}{3}}$	M1	
$8 = -\frac{3}{4} \times 6 + c$	m1	FT 'their – ¾'
$y = -\frac{3}{4}x + \frac{25}{2}$ or equivalent	A1	CAO
$0 = -\frac{3}{4}x + \frac{25}{2}$	M1	FT their equation of <i>AB</i> providing the gradient is negative.
$\left(\frac{50}{3},0\right)$ or equivalent	A1	Allow a final answer of $x = \frac{50}{3}$
A		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 andAXB, seen or impliedM1
		$\frac{BX}{8} = \frac{8}{6}$, seen or implied M1
		$OB = 8 \times \frac{8}{6} + 6 \qquad M1$
		$OB = \frac{100}{6}$ or equivalent CAO A1
		$B\left(\frac{50}{3},0\right)$ or equivalent A1

$$\frac{A}{10} + \frac{A}{10} + \frac{A}{10}$$

19.(a)		1
Translation through $\begin{pmatrix} 0\\k \end{pmatrix}$ where $k > 0$	54	
Translation through $\binom{k}{k}$ where $k > 0$	B1	(0,4)
Correct coordinates seen or scale marked	B1	× (-4,2)
		······································
 19.(b)		
Reflection in y-axis	B1	
Correct coordinates seen or scale marked	B1	(0,3)
		(4,1)
	(4)	
20.(a)(i)		
120	B2	B1 for $5 \times 4 \times 3 \times 2$ (×1) or 5! or equivalent
20.(a)(ii)		
$\frac{2}{5}$ or equivalent	B1	
5		
20.(b)	D 0	FT 40 (0) 1 4001
2160	B2	FT 18 × 'their 120'
		B1 for $6 \times 5 \times 4 \times 3 \times 2 \times 3$ or $\frac{3}{7} \times 7!$
		-
	(5)	or equivalent
21.(a)		
$f^{-1}(x) = \frac{x-2}{5}$ or equivalent	B2	v – 2
5		Award B1 for $x = \frac{y-2}{5}$ or equivalent
		unless x and y interchanged later
		or $r+2$
		SC1 for $y \text{ or } f^{-1}(x) = \frac{x+2}{5}$ or
		equivalent
r=2		
$\frac{x-2}{5} = 10$	M1	
x = 52	A1	
		Alternative method:
		$f^{-1}(x) = 10$ means $x = f(10)$ B2
		f(10) = 5(10) + 2 M1 x = 52 A1
l	L	$\lambda - J L$ AI

$ (5x+2)(5x+2)^2 = (5x+2)(25x^2+20x+4) $ M1 Seen or implied. Allow $(5x+2)^2 = 25x^2+20x+4$ if Convincing correct completion to given answer $125x^3+150x^2+60x+8$ A1 NB Answer is given $ \begin{array}{c} 21.(b)(ii) \\ -27 \\ \hline \\ 22.(a) \\ (x-3)^2+10 \text{ or } a = -3, b = 10 \\ \hline \\ 22.(a) \\ (x-3)^2+10 \text{ or } a = -3, b = 10 \\ \hline \\ 22.(b) \\ (3, 21) \\ \hline \\ 22.(b) \\ (3, 21) \\ \hline \\ 22.(b) \\ (3, 21) \\ \hline \\ \\ 22.(b) \\ (3, 21) \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	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.
Convincing correct completion to given answer $125x^3 + 150x^2 + 60x + 8$ A1NB Answer is given21.(b)(ii) -27B122.(a) $(x-3)^2 + 10$ or $a = -3, b = 10$ B3B2 for sight of $\left(x - \frac{6}{2}\right)^2 - 3^2$ or B1 for sight of $\left(x - \frac{6}{2}\right)^2 \pm \dots$ Ignore '= 0' if seen.22.(b) $(3, 21)$ B2FT -'their a' and 11 + 'their b' B1 for each coordinate.	$(5x+2)(5x+2)^2 = (5x+2)(25x^2+20x+4)$	M1	Allow $(5x+2)^2 = 25x^2 + 20x + 4$ if
-27 B1 (8) (8) $(x-3)^2 + 10$ or $a = -3, b = 10$ B3B2 for sight of $\left(x - \frac{6}{2}\right)^2 - 3^2$ or B1 for sight of $\left(x - \frac{6}{2}\right)^2 \pm \dots$ Ignore '= 0' if seen. $(3, 21)$ B2B2FT -'their a' and 11 + 'their b'B1 for each coordinate.	o 1 o	A1	
22.(a) $(x-3)^2 + 10$ or $a = -3, b = 10$ B3B2 for sight of $\left(x - \frac{6}{2}\right)^2 - 3^2$ or B1 for sight of $\left(x - \frac{6}{2}\right)^2 \pm \dots$ Ignore '= 0' if seen.22.(b) $(3, 21)$ B2FT -'their a' and 11 + 'their b' B1 for each coordinate.			
$(x-3)^2 + 10$ or $a = -3, b = 10$ B3B2 for sight of $\left(x - \frac{6}{2}\right)^2 - 3^2$ or B1 for sight of $\left(x - \frac{6}{2}\right)^2 \pm \dots$ Ignore '= 0' if seen.22.(b) (3, 21)B2FT - 'their a' and 11 + 'their b' B1 for each coordinate.		(8)	
22.(b) Ignore '= 0' if seen. (3, 21) B2 FT –'their a' and 11 + 'their b' B1 for each coordinate.		B3	B2 for sight of $\left(x - \frac{6}{2}\right)^2 - 3^2$
22.(b) B2 FT –'their a' and 11 + 'their b' B1 for each coordinate.			or B1 for sight of $\left(x-\frac{6}{2}\right)^2 \pm \dots$
(3, 21) B2 FT –'their a' and 11 + 'their b' B1 for each coordinate.			Ignore '= 0' if seen.
		B2	
(5)		(5)	B1 for each coordinate.