Q	Marking instructions	AO	Marks	Typical solution
13(a)(i)	Rearranges to make x the subject by isolating x terms or Swaps x and y and isolates y terms	1.1a	M1	$y = \frac{2x+3}{x-2}$ $xy - 2y = 2x + 3$ $xy - 2x = 2y + 3$ $x(y-2) = 2y + 3$ $x = \frac{2y+3}{y-2}$ $f^{-1}(x) = \frac{2x+3}{x-2}$ $x \neq 2$
	Obtains correct rearrangement and factorises ACF PI by final correct answer	1.1b	A1	
	Obtains $f^{-1}(x)$ and states domain Must use fully correct notation	2.5	R1	
	Subtotal		**3**	
13(a)(ii)	Obtains any valid expression in x for $ff(x)$ Can be left unsimplified ISW	1.1b	B1	$ff(x) = x$
	Subtotal		**1**	
13(b)(i)	Deduces the greatest value of g by evaluating g (4)	2.2a	B1	$g(4) = 6$ Vertex at (1.25 , -1.5625) $\{y : -1.5625 \leq y \leq 6\}$
	Obtains the minimum value of g	3.1a	B1	
	States the range using their finite greatest value and finite minimum value using set notation or interval notation Accept $[-1.5625, 6]$ in interval notation For set notation - use of none curly brackets or commas scores R0	2.5	R1F	
	Subtotal		**3**	
13(b)(ii)	Demonstrates that g is a many to one function by using an appropriate method eg Sketches the function Or Evaluates $g(x)$ at two points that give the same answer.	2.4	E1	$g(0) = 0 = g(2.5)$ g is many to one so it does not have an inverse.
	Deduces that g is many to one and states that g has no inverse Or Explains that g is not one to one and states that g has no inverse	2.2a	E1	
	Subtotal		**2**	

13(c)	Substitutes $f(x)$ into $g(x)$ correctly	1.1a	M1	$gf(x) = \frac{2\left(\frac{2x+3}{x-2}\right)^2 - 5\left(\frac{2x+3}{x-2}\right)}{2}$
	Obtains common denominator of $2(x-2)^2$ or $(x-2)^2$ correctly The fraction(s) must have the fully correct structure	1.1b	A1	$= \frac{2(2x+3)^2 - 5(2x+3)(x-2)}{2(x-2)^2}$
	Expands at least two quadratics correctly	1.1a	M1	$= \frac{2(4x^2+12x+9) - 5(2x^2-x-6)}{2(x^2-4x+4)}$
	Completes rigorous argument to show the required result Must have expanded all three quadratics correctly Terms in the numerator and denominator can be in any order AG	2.1	R1	$= \frac{48 + 29x - 2x^2}{2x^2 - 8x + 8}$
	Subtotal		**4**	
13(d)	States $g(x) = 2$ or States $2x^2 - 5x - 4 = 0$ PI by solving correct quadratic PI by sight of $\frac{5+\sqrt{57}}{4}$ or $\frac{5-\sqrt{57}}{4}$	3.1a	M1	$2x^2 - 5x - 4 = 0$ $x = \frac{5 \pm \sqrt{57}}{4}$ $a > 0$ since $0 \leq x \leq 4$
	Determines the exact value of a giving a clear reason for the rejection of the negative root	2.4	R1	$a = \frac{5+\sqrt{57}}{4}$
	Subtotal		**2**	
	Question Total		**15**	