Q	Marking instructions	AO	Marks	Typical solution
10(a)	Obtains a domain excluding negatives or excluding 3 Condone $x > 0$	1.1a	M1	$\{x: x \geq 0, x \neq 3\}$
	Deduces both $x \geq 0$ and $x \neq 3$ with no extras Condone $x > 0$	2.2a	A1	
	Obtains correct domain correctly stated in set notation	2.5	R1	
	Subtotal		**3**	

Q	Marking instructions	AO	Marks	Typical solution
10(b)	States that $h(x)$ has a discontinuity/asymptote at x = 3 or in the interval (1 , 4) OE	2.4	M1	$h(x)$ is not continuous at x = 3 This means that a change of sign between x = 1 and 4 does not imply a root
	Explains that the discontinuity is at x = 3 and this is in the interval $(1, 4)$	2.3	A1	
	Subtotal		**2**	

Q	Marking instructions	AO	Marks	Typical solution
10(c)	Selects an appropriate method to differentiate and reaches $h'(x)$ of the form $ax^{-\frac{1}{2}}(x-3)^{-1} + bx^{\frac{1}{2}}(x-3)^{-2}$ OE	3.1a	M1	$h(x) = \dfrac{\sqrt{x}}{x-3}$ $h'(x) = \dfrac{\frac{1}{2}x^{-\frac{1}{2}}(x-3) - x^{\frac{1}{2}}}{(x-3)^2}$ $h'(x) = 0 \Rightarrow \dfrac{\frac{1}{2}x^{-\frac{1}{2}}(x-3) - x^{\frac{1}{2}}}{(x-3)^2} = 0$ $\dfrac{1}{2}x^{-\frac{1}{2}}(x-3) - x^{\frac{1}{2}} = 0$ $\dfrac{(x-3)}{2\sqrt{x}} - \sqrt{x} = 0$ $x - 3 - 2x = 0$ $x = -3$ $x = -3$ is not in the domain of h hence the function has no turning points $h(x) > 0$ for $x > 3$ $h(x) < 0$ for $x < 3$ Hence function is one to one and has an inverse
	Obtains correct $h'(x)$ ACF	1.1b	A1	
	Equates their $h'(x)$ to 0	1.1a	M1	
	Obtains $x = -3$	1.1b	A1	
	Explains that a continuous function with no turning points is one to one and therefore the inverse exists. Condone omission of 'continuous'	2.4	E1	
	Completes a reasoned argument to correctly show that the function is one to one and deduces that $h(x)$ has an inverse Must explain that $x = -3$ is not in the domain and therefore there are no turning points and considers the sign of $h(x)$ either side of x = 3	2.1	R1	
	Subtotal		**6**	

	Question Total		**11**	