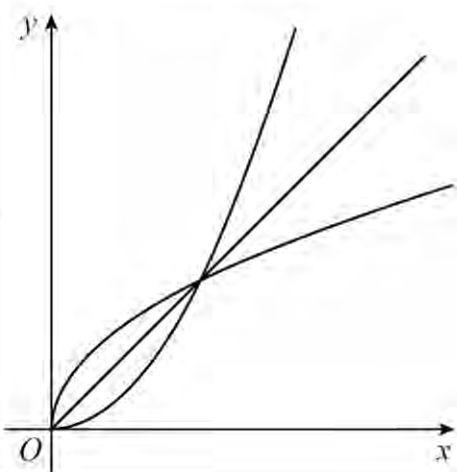


Q	Marking instructions	AO	Marks	Typical solution
12(a)	Deduces ≥ 5 or >5	2.2a	M1	Range $\{y : y \geq 5\}$
	Writes the correct range using correct set notation Acceptable examples include: $\{x : x \geq 5\}$ $\{f(x) : f(x) \geq 5\}$ $[5, \infty)$ Ignore anything before $[5, \infty)$	2.5	A1	
	Subtotal		2	

Q	Marking instructions	AO	Marks	Typical solution
12(b)	Demonstrates that f is many to one. This could be evidenced by a sketch of the graph of $y=f(x)$ demonstrating the horizontal line test, or by giving two x -values which result in the same value of $f(x)$, or states $f(-x) = f(x)$	2.4	E1	$f(-1) = 6 = f(1)$ $\therefore f$ is many to one, so it does not have an inverse
	Explains that f is many to one or that f is not one to one and deduces that f does not have an inverse	2.2a	E1	
	Subtotal		2	

Q	Marking instructions	AO	Marks	Typical solution
12(c)	Draws a convex curve between the origin and (1,1) There should be no doubt that their graph intersects (1,1) Ignore anything outside of quadrant 1	1.1a	M1	
	Sketches a fully correct graph of $y = x^2$ for $x \geq 0$ Their curve must be in quadrant 1 only.	1.1b	A1	
	Subtotal		2	

Q	Marking instructions	AO	Marks	Typical solution
12(d)(i)	Obtains $\sqrt{x^2 + 5}$ No ISW	1.1b	B1	$\sqrt{x^2 + 5}$
	Subtotal		1	

Q	Marking instructions	AO	Marks	Typical solution
12(d)(ii)	Deduces the range of h Accept $y \geq \sqrt{5}$, $gf(x) \geq \sqrt{5}$ Condone $h \geq \sqrt{5}$, $gf \geq \sqrt{5}$ Or accept set notation in ACF	2.2a	R1	$h(x) \geq \sqrt{5}$
	Subtotal		1	

	Question 12 Total		8	
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