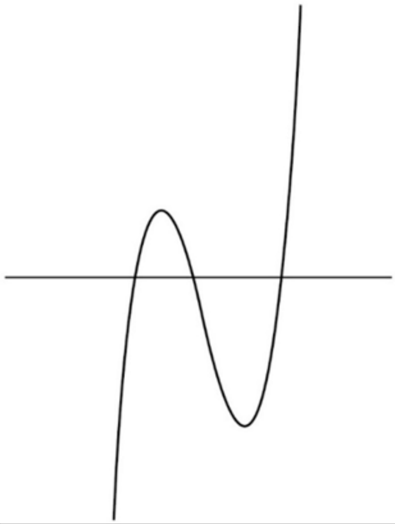
Q	Marking instructions	AO	Mark	Typical solution
7(a)	Sketches any cubic graph, crossing the x-axis in three places	1.2	B1	
	Sketches any cubic graph with a positive coefficient of x^3	1.2	B1	
7(b)(i)	Differentiates to obtain $\mathrm{f}'(x)$ Two terms with at least one correct - either $3x^2$ or $6px$	1.1a	M1	For a turning point $\mathrm{f}'(x) = 0$ $\mathrm{f}(x) = x^3 + 3px^2 + q$ $\mathrm{f}'(x) = 3x^2 + 6px$ $3x^2 + 6px = 0$ $3x(x + 2p) = 0$ $x = 0$ $x = -2p$ Since one of the roots is $x = 0$ there must be a turning point on the *y* axis
	Solves $3x^2 + 6px = 0$ to obtain $x = 0$ or $x = -2p$ or Substitutes $x = 0$ in $\mathrm{f}'(x) = 3x^2 + 6px$ and obtains 0	1.1b	A1	
	Obtains the correct two roots $x = 0$ and $x = -2p$ **OE** and states why there must be a turning point referring to root $x = 0$	2.4	R1	
7(b)(ii)	Deduces that turning point at $x = -2p$ is a maximum or deduces that turning point $x = 0$ is a minimum May have been seen in part **(b)(i)** Accept a sketch showing correct relative positions of turning points	2.2a	B1	Since $p > 0$ $x = -2p$ is the maximum $x = 0$ is the minimum $\mathrm{f}(0) = q$ $\mathrm{f}(-2p) = (-2p)^3 + 3p(-2p)^2 + q$ $= 4p^3 + q$
	Substitutes their $x = -2p$ into $\mathrm{f}(x)$	1.1a	M1	
	Obtains correct $\mathrm{f}(0) = q$ and $\mathrm{f}(-2p) = 4p^3 + q$	1.1b	A1	$-4p^3 < q < 0$
	Deduces either $q < 0$ or $-4p^3 < q$ Condone $\leq$	2.2a	R1	
	Deduces $-4p^3 < q < 0$ **CAO**	2.2a	R1	
	Total		**10**	