Q	Marking instructions	AO	Marks	Typical solution
13(a)	Substitutes $x=-\frac{1}{2}$ into $\mathrm{P}(x)$ and obtains zero. Must see $-\frac{1}{2}$ bracketed correctly. If bracket(s) missing must see a further step to indicate correct evaluation eg $-\frac{4}{8}+\frac{8}{4}-\frac{11}{2}+4=0$ or better.	1.1a	M1	$\mathrm{P}\left(-\frac{1}{2}\right)=4\left(-\frac{1}{2}\right)^3+8\left(-\frac{1}{2}\right)^2+11\left(-\frac{1}{2}\right)+4$ $=0$ $\therefore(2x+1)$ is a factor of $\mathrm{P}(x)$
	Completes factor theorem argument by showing $\mathrm{P}\left(-\frac{1}{2}\right)=0$ and stating $\therefore(2x+1)$ is a factor of $\mathrm{P}(x)$ OE	2.1	R1	
	Subtotal		**2**	

Q	Marking instructions	AO	Marks	Typical solution
13(b)	Obtains two correct coefficients of $2x^2+3x+4$	1.1a	M1	$\mathrm{P}(x)=(2x+1)\left(2x^2+3x+4\right)$
	Obtains $(2x+1)\left(2x^2+3x+4\right)$	1.1b	A1	
	Subtotal		**2**	

Q	Marking instructions	AO	Marks	Typical solution
13(c)	Begins argument by explaining that either $(2n+1) \neq 1$ Or $(an^2+bn+c) \neq 1$ Or $(2n+1) \neq$ the cubic expression Or $(an^2+bn+c) \neq$ the cubic expression Condone x instead of n	2.1	M1	$4n^3+8n^2+11n+4=(2n+1)(2n^2+3n+4)$ There are two factors. Both factors are integers not equal to 1 so $4n^3+8n^2+11n+4$ is never prime.
	States that Either **both** $(2n+1) \neq 1$ **and** their $(an^2+bn+c) \neq 1$ Or **both** $(2n+1)$ is not equal to $4n^3+8n^2+11n+4$ **and** their (an^2+bn+c) is not equal to $4n^3+8n^2+11n+4$ Or $(2n+1) \neq 1$ **and** $(2n+1)$ is not equal to $4n^3+8n^2+11n+4$ Or their $(an^2+bn+c) \neq 1$ **and** their (an^2+bn+c) is not equal to $4n^3+8n^2+11n+4$	2.2a	R1F	
	Subtotal		**2**	

	Question 13 Total		**6**	