

Question			Answer	Marks	AO	Guidance	
4	(a)		$(f'(x) =) 6x^2 - 2kx + 4$ $f'(2) = 16 \Rightarrow 6(2)^2 - 2(2)k + 4 = 16$ $24 - 4k + 4 = 16$ $-4k = -12 \Rightarrow k = 3$	M1* A1 M1dep* A1 [4]	3.1a 1.1 1.1 1.1	Attempt to differentiate $f(x)$ with at least one of the first two terms correct Correct derivative Using $f'(2) = 16$ to set up a linear equation in k AG so sufficient working must be shown (at least one step from substitution of $x = 2$ to given result)	Or checking $k = 3$ when $x = 2$ Obtaining 16 showing sufficient working
4	(b)		$f(-\frac{1}{2}) = 2(-\frac{1}{2})^3 - 3(-\frac{1}{2})^2 + 4(-\frac{1}{2}) + 3$ $= 0 \text{ therefore } (2x + 1) \text{ is a factor (of } f(x))$	M1 A1 [2]	1.1 2.4	Substitute $x = \pm\frac{1}{2}$ into given $f(x)$ AG so conclusion must be given	
4	(c)		$f(x) = (2x + 1)(x^2 + bx + c)$ $x^2 - 2x + 3$ $\Delta = (-2)^2 - 4(1)(3)$	M1* A1 M1dep*	1.1 1.1 1.1	Attempt to factorise $f(x)$ as the product of a linear and quadratic factor (allow any non-zero values for b and c) Correctly calculate the discriminant (oe) for their three-term quadratic. This discriminant may be in the quadratic formula	Or by long division to get $x^2 + px + q$ (possibly with a remainder). Allow any non-zero values for p and q Or correctly solve their three-term quadratic by any correct method or BC

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			$\Delta < 0$ so the only root of the equation is the solution of the linear equation $2x + 1 = 0$ (which is $x = -\frac{1}{2}$)	A1 [4]	2.2a	Showing the discriminant is negative and an indication of only one real root (e.g. stating the root)	Or stating the quadratic has no real roots and an indication of only one real root (e.g. stating the root)