

Question	Working	Answer	Mark	Notes
22	$(-k)^3 + 4(-k)^2 - 20(-k) - (-k) [= 0]_{\text{or}}$ $-k^3 + 4k^2 + 20k + k [= 0]_{\text{oe}}$		5	M1 substitutes $x = -k$ Allow 1 sign error if brackets removed or long division to obtain 2 correct terms $x^2 + (4 - k)x + (-20 - 4k + k^2)$ or two of 1 or $4 - k$ or $-20k - 4k + k^2$ attempt to expand $(x + k)(x^2 + gx + 1)$ with at least 4 out of 6 terms correct cubic is $x^3 + kx^2 + gx^2 + gkx + x + k$ oe
	$-k^3 + 4k^2 + 21k = 0$ or $-20 - 4k + k^2 = 1$ or $k + g = 4$ and $1 + kg = -20$ oe			A1 correct simplified 3 term cubic equation or a correct quadratic equation or both correct equations from comparing x^2 and x coefficients.
	$(k)(-k^2 + 4k + 21) = 0$ or $k^2 - 4k - 21 = 0$ oe			M1 dep on first M mark. Divide by or take k out as a common factor from a cubic in k to form a 3-term quadratic equation. An answer of 7 or -3 can imply this mark
	$(k)(-k + 7)(k + 3) = 0$ or $(k - 7)(k + 3) = 0$			M1 dep on second M mark. Correct method for solving their 3-term quadratic – either by formula, completing the square or factorising. By factorising: brackets must expand to give 2 out of 3 correct terms By formula: correct substitution into fully correct formula (allow 1 sign error) By completing the square: must see $(k - 2)^2 \pm \dots$ An answer of 7 or -3 can imply this mark
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	7, -3		A1 cao (both) condone 0, 7, -3 but do not allow any other incorrect extras
				Total 5 marks