1)

2	$6(-2)^3 + a(-2)^2 - (a+1)(-2) + b = 15$ $6a + b = 61$ when $x = -1$, $2a + b = 29$ leading to $a = 8$ and $b = 13$	M1 A1 A1 M1 A1 [5]	M1 for substitution of $x = -2$ or -1, or verification A1 for each correct (allow unsimplified) M1 for attempt to solve A1 for $a = 8$, $b = 13$

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2)

2	Find f(2) or f(–3) or long division to remainder $8 + 4a - 30 + b = 0$ or $4a + b = 22$ $-27 + 9a + 45 + b = 75$ or $9a + b = 57$ Solve simultaneous equations $a = 7$, $b = -6$	M1 A1 A1 M1 A1 [5]

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3)

6	$x = 2$ or -4 or $-\frac{1}{3}$	B1	B1 for spotting a solution
	Either $(x-2)(3x^2 + 13x + 4)$	M1	M1 for attempt to get quadratic factor
	or $(x+4)(3x^2 - 5x - 2)$		
	or $(3x+1)(x^2 + 2x - 8)$	A1	A1 for correct quadratic factor
	$(x-2)(x+4)(3x+1)$	M1, A1	M1 for dealing with quadratic factor
	$x = 2, -4, -\frac{1}{3}$	A1 [6]	A1 for correct factors A1 for all solutions

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4)

4	$f(2) = 8 + 4k - 10 - 3$ $f(-1) = -1 + k + 5 - 3$ $(4k - 5) = 5(k + 1)$ leading to $k = -10$	M1 M1 M1 A1 [4]	M1 for use of $x = 2$ M1 for use of $x = -1$ M1 for attempt to link the two remainders

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5)

4	$x = -1$ or 7 or $-\frac{1}{2}$ seen	M1	M1 for attempt to find a root
	Either $(x+1)(2x^2 - 13x - 7)$	DM1	DM1 for attempt to obtain quadratic factor
	or $(x-7)(2x^2 + 3x + 1)$	A1	A1 correct quadratic factor
	or $(2x+1)(x^2 - 6x - 7)$	DM1, A1	DM1 attempt to factorise quadratic factor
	leading to $(x+1)(x-7)(2x+1)$	[5]	

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6)

5	Search for first root or factor	M1	
	$x = -2$ or $\frac{1}{2}$ or 3 or $(x+2)$ or $(x-3)$ or $(2x-1)$	A1	
	Attempt to factorise cubic $(x+2)(2x^2-7x+3)$ or $(x-3)(2x^2+3x-2)$ or $(2x-1)(x^2-x-6)$	M1 A1	
	Solve 3 term quadratic	M1	
	$x = -2$ and $\frac{1}{2}$ and 3	A1	[6]

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7)

5 **(i)**	$2\left(\frac{1}{8}\right)-5\left(\frac{1}{4}\right)+10\left(\frac{1}{2}\right)-4$ $=0$	M1 A1	M1 for substitution of $x = 0.5$ or attempt at long division
(ii)	$(2x-1)(x^2-2x+4)$	M1A1	M1 attempt to obtain quadratic factor A1 for correct quadratic factor
	For (x^2-2x+4), '$b^2 < 4ac$'	M1	M1 for correct use of discriminant or solution of quadratic equation = 0
	so only one real root of $x = 0.5$	A1 [6]	A1, all correct with statement of root.

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8)

5 **(i)**	f(1) = 1 + 8 + p – 25 (= p – 16) f(–2) = –8 + 32 – 2p – 25 (= –2p – 1) p – 16 = 2p + 1 oe p = –17	B1 B1 M1 A1	
(ii)	Evaluates f(–3) or divides by $(x+3)$ to remainder 71 (= 20 – 3p)	M1 A1√	**[6]**

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