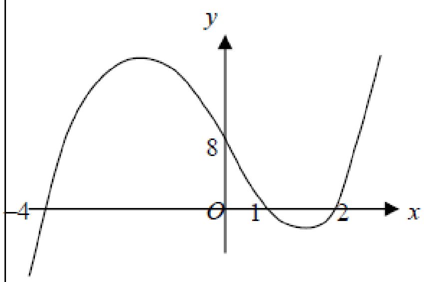
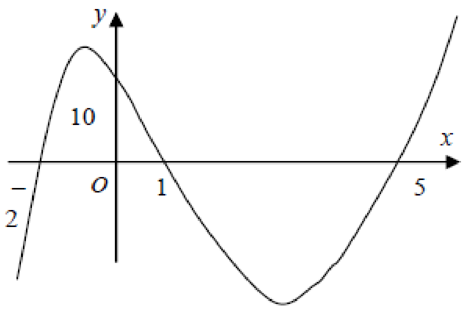
Core 1 Polynomials Answers

6(a)(i)	$p(2)=8+4-20+8$ $=0$, $\Rightarrow$ $x-2$ is a factor	M1 A1	 2	Finding p(2) M0 *long division* Shown = 0 **AND** conclusion/ statement about $x-2$ being a factor
(ii)	Attempt at quadratic factor x^2+3x-4 $p(x)=(x-2)(x+4)(x-1)$	M1 A1 A1	 3	or factor theorem again for 2nd factor or $(x+4)$ or $(x-1)$ proved to be a factor
(b)		B1 B1√ M1 A1	 4	Graph through (0,8) 8 marked Ft "their factors" 3 roots marked on x-axis Cubic curve through their 3 points Correct including x- intercepts correct Condone max on y-axis etc or slightly wrong concavity at ends of graph
	Total		**9**	

6(a)	p(3) = 27 – 36 + 9 p(3) = 0 $\Rightarrow$ $x-3$ is a factor	M1 A1	 2	Finding p(3) and **not** long division Shown = 0 **plus a statement**
(b)	$x(x^2-4x+3)$ or $(x-3)(x^2-x)$ attempt $p(x)=x(x-1)(x-3)$	M1 A1	 2	Or p(1) = 0 $\Rightarrow$ $x-1$ is a factor attempt Condone $x+0$ or $x-0$ as factor
(c)(i)	$p(2)=8-16+6$ (Remainder is) -2	M1 A1	 2	Must use p(2) and **not** long division
(ii)	Attempt to multiply out and compare coefficients $a=-2$ $b=-1$ $r=-2$ SC B1 for r = –2 if M0 scored	M1 A1 A1 A1	 4	Or long division (2 terms of quotient) $x^2-2x\ldots$ -1 Withhold final A1 for long division unless written as $(x-2)(x^2-2x-1)-2$
	Total		**10**	

1(a)(i)	$p(-2) = -8 - 16 + 14 + k$ $p(-2) = 0 \Rightarrow -10 + k = 0 \quad \Rightarrow k = 10$ Must have statement if k=10 substitute	M1 A1	 2	or long division or $(x+2)(x^2-6x+5)$ **AG** likely withhold if $p(-2) = 0$ not seen
(ii)	$p(x) = (x+2)(x^2 + \ldots \quad 5)$ $p(x) = (x+2)(x^2 - 6x + 5)$ $\Rightarrow p(x) = (x+2)(x-1)(x-5)$	M1 A1 A1	 3	Attempt at quadratic or second linear factor $(x-1)$ or $(x-5)$ <u>from factor theorem</u> Must be written as product
(b)	$p(3) = 27 - 36 - 21 + k$ (Remainder) $= k - 30 = \underline{-20}$	M1 A1	 2	long division scores M0 Condone $k - 30$
(c)		B1 B1√ M1 A1	 4	Curve thro' 10 marked on y-axis **FT** their 3 roots marked on x-axis Cubic shape with a max and min Correct graph (roughly as on left) going beyond -2 and 5 (condone max anywhere between $x = -2$ and 1 and min between 1 and 5)
	Total		**11**	

6(a)(i)	$f(1) = 1 + 4 - 5$ $\Rightarrow f(1) = 0 \Rightarrow (x-1)$ is factor	M1 A1	 2	must find $f(1)$ NOT long division shown $= 0$ plus a statement
(ii)	Attempt at $x^2 + x + 5$ $f(x) = (x-1)(x^2 + x + 5)$	M1 A1	 2	long division leading to $x^2 \pm x + \ldots$ or equating coefficients $p = 1,\ q = 5$ by inspection scores B1, B1
(iii)	$(x =)\ 1$ is real root Consider $b^2 - 4ac$ for their $x^2 + x + 5$ $b^2 - 4ac = 1^2 - 4 \times 5 = -19 < 0$ Hence no real roots (or only real root is 1)	B1 M1 A1	 3	 not the cubic! CSO; all values correct plus a statement