Higher : Polynomials — Revision

2019 P2 Q10

(a)

•1 use −3 in synthetic division or in evaluation of quartic	•1 $\begin{array}{r\|rrrrr} -3 & 3 & 10 & 1 & -8 & -6 \\ \hline & 3 & & & & \end{array}$ or $3\times(-3)^4+10\times(-3)^3+(-3)^2$ $-8\times(-3)-6$
•2 complete division/evaluation and interpret result	•2 $\begin{array}{r\|rrrrr} -3 & 3 & 10 & 1 & -8 & -6 \\ & & -9 & -3 & 6 & 6 \\ \hline & 3 & 1 & -2 & -2 & 0 \end{array}$ Remainder $=0 \therefore (x+3)$ is a factor or $f(-3)=0 \therefore (x+3)$ is a factor

$(b)\ (x+3)(x-1)(3x^2+4x+2)$

2018 P1 Q7

$(a)\ P\ (0,5)$

$(b)\ y=2x+5$

$(c)\ Q\ (3,11)$

2018 P1 Q7(a)

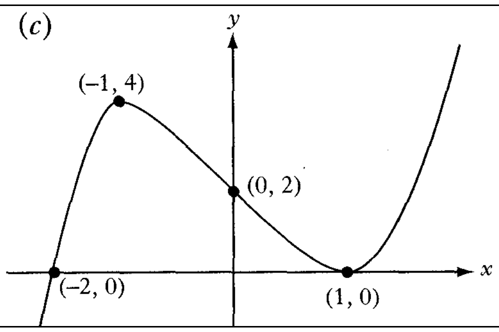
$(a)\ (i)$ *Use 2 in synthetic division or in cubic evaluation*

$(ii)\ (x-2)(2x-1)(x+1)$

2018 P1 Q15

•1 root at $x=-4$ identifiable from graph	•1
•2 stationary point touching x-axis when $x=2$ identifiable from graph	•2
•3 stationary point when $x=-2$ identifiable from graph	•3
•4 identify orientation of the cubic curve and $f'(0)>0$ identifiable from graph	•4 

2017 P2 Q2	(a) $\begin{array}{r\|rrrr} 1 & 2 & -5 & 1 & 2 \\ & & 2 & -3 & -2 \\ \hline & 2 & -3 & -2 & 0 \end{array}$ Remainder $=0$ $\therefore (x-1)$ is a factor (b) $x = -\frac{1}{2}, 1, 2$	
2016 P1 Q15	(a) $a = 4, b = -5, k = -\frac{1}{12}$	
2016 P2 Q3	(a) (i) Use synthetic division or substitution (ii) $x = -1,\ 2,\ 3.5$	
2015 P1 Q3	$\begin{array}{r\|rrrr} -3 & 1 & -3 & -10 & 24 \\ & & -3 & & \\ \hline & 1 & & & \end{array}$ $(x+3)(x-4)(x-2)$	
2014 P1 Q22	(a) $a = -1$ or $b = -2$ (b) $(x+1)(6x^2+x-2)$ $(x+1)(3x+2)(2x-1)$	

2013 P2 Q3a	$(x-1)(x^2+4x+5)$ with valid reason $b^2-4ac=16-20<0$, so does not factorise.	
2012 P1 Q21	$(x-4)(x^2-x-2)$ $(x-4)(x-2)(x+1)$ $-1, 2, 4$	
2011 P2 Q2c	(ii) $(x-1)(3x+1)(x+2)$	
2010 P1 Q22	(ii) $(2x+5)(x-1)^2$ (b) $x = 1, -\frac{5}{2}$ (d) $H(-\frac{5}{2}, -8)$	
2009 P2 Q3	(a) $(x-1)(x+4)(x+5)$ (b) $x=1$ *or* $x=-4$ *or* $x=-5$ **Stated explicitly here** $x=1$ *only*	
2008 P1 Q21	(*a*) (–1, 4) maximum (1, 0) minimum (*b*) (i) $x = 1$, $f(x) = 0$ so $(x-1)$ is a factor (ii) $(x-1)(x-1)(x+2)$ (*c*) 	

2008 P1 Q22	(a) (1,3), (3,-3) (b) (1,3)	
2007 P1 Q8	(*a*) To cut the x-axis, $y = 0$. So $0 = x^3 - 4x^2 + x + 6$ $= (x - 3)(x^2 - x - 2)$ $= (x - 3)(x - 2)(x + 1)$ So graph cuts x-axis at $x = -1, 3, 2$. (*b*) (2,0)	
2007 P2 Q10	(*a*) (i) $a = 2$, $b = 4$ (ii) $k = \frac{3}{4}$	
2005 P1 Q8	(*a*)$(x - 3)(2x - 3)(x + 1)$ (*b*)$(-1,0)$, $(\frac{3}{2}, 0)$, $(3, 0)$ (*c*)greatest value = 9 least value = −35	
2005 P2 Q11	(*a*)$f(-1) = -1 + p - p + 1 = 0$ (*b*)$p \leq -1$, $p \geq 3$	
2004 P1 Q2	$(x + 1)(x + 1)(x - 3)$ $(-1, 0)$	
2003 P2 Q1	(*b*) $(x - 2)(2x + 3)(3x - 1)$	
2002W P1 Q5	$c = -19$, $d = 6$	

2001 P2 Q1	(*a*) $k = -5$ (*b*) $x = -2, \frac{1}{2}, 1$	
2000 P2 Q1	(*a*) $x + y = 1$ (*b*) $(-1, -6)$	
Spec 2 P1 Q1	$\begin{array}{r\|rrrr} 2 & 2 & 1 & -13 & 6 \\ & & 4 & 10 & -6 \\ \hline & 2 & 5 & -3 & 0 \end{array}$ remainder = 0 $\Rightarrow x = 2$ is a root $2x^2 + 5x - 3 = 0 \Rightarrow x = \frac{1}{2}, -3$	
Spec 1 P1 Q3	(*a*) $f(1) = 0$, $(x - 4)$, $(x - 1)$ (*b*) $(1,0)$, $(4,0)$, $(0, -4)$	