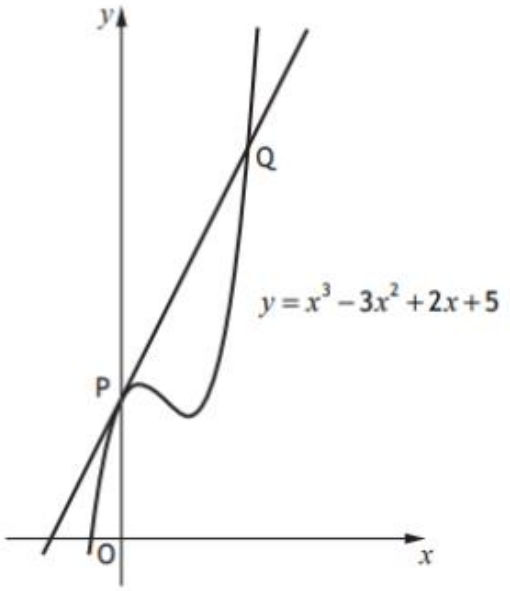
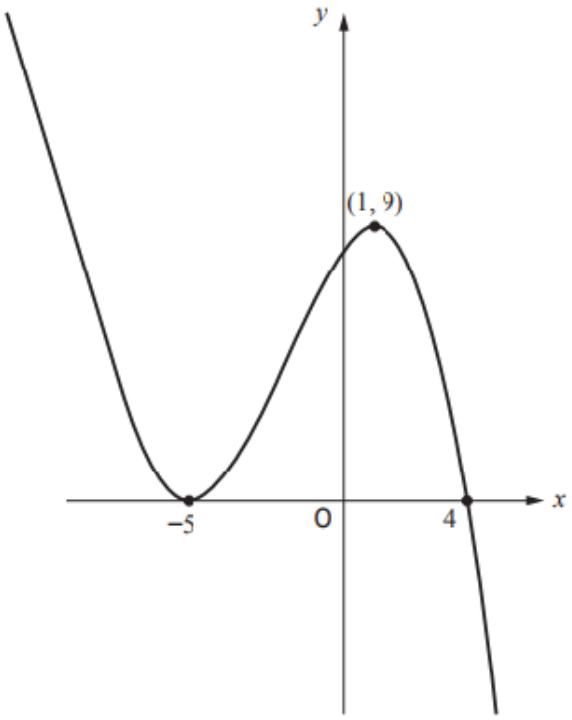
Higher : Polynomials Revision

2019 P2 Q10	(a) Show that $(x+3)$ is a factor of $3x^4+10x^3+x^2-8x-6$.	2
	(b) Hence, or otherwise, factorise $3x^4+10x^3+x^2-8x-6$ fully.	5
2018 P1 Q7	The curve with equation $y=x^3-3x^2+2x+5$ is shown on the diagram. 	
	(a) Write down the coordinates of P, the point where the curve crosses the y-axis .	1
	(b) Determine the equation of the tangent to the curve at P.	2
	(c) Find the coordinates of Q, the point where this tangent meets the curve again.	3
2018 P1 Q7(a)	(a) (i) Show that $(x-2)$ is a factor of $2x^3-3x^2-3x+2$.	2
	(ii) Hence, factorise $2x^3-3x^2-3x+2$ fully.	2
2018 P1 Q15	A cubic function, f, is defined on the set of real numbers. • $(x+4)$ is a factor of $f(x)$ • $x=2$ is a repeated root of $f(x)$ • $f'(-2)=0$ • $f'(x)>0$ where the graph with equation $y=f(x)$ crosses the y-axis Sketch a possible graph of $y=f(x)$ on the diagram in your answer booklet.	4

2017 P2 Q2	(a) Show that $(x-1)$ is a factor of $f(x)=2x^3-5x^2+x+2$. (b) Hence, or otherwise, solve $f(x)=0$.	2 3
2016 P1 Q15	The diagram below shows the graph with equation $y=f(x)$, where $f(x)=k(x-a)(x-b)^2$.  (a) Find the values of a, b and k.	3
2016 P2 Q3	(a) (i) Show that $(x+1)$ is a factor of $2x^3-9x^2+3x+14$. (ii) Hence solve the equation $2x^3-9x^2+3x+14=0$.	2 3
2015 P1 Q3	Show that $(x+3)$ is a factor of $x^3-3x^2-10x+24$ and hence factorise $x^3-3x^2-10x+24$ fully.	4

2014 P1 Q22	For the polynomial $6x^3 + 7x^2 + ax + b$, • $x + 1$ is a factor • 72 is the remainder when it is divided by $x - 2$. (*a*) Determine the values of a and b. **4** (*b*) Hence factorise the polynomial completely. **3**	
2013 P2 Q3a	(*a*) Given that $(x - 1)$ is a factor of $x^3 + 3x^2 + x - 5$, factorise this cubic fully.	4
2012 P1 Q21	(*a*) (i) Show that $(x - 4)$ is a factor of $x^3 - 5x^2 + 2x + 8$. (ii) Factorise $x^3 - 5x^2 + 2x + 8$ fully. (iii) Solve $x^3 - 5x^2 + 2x + 8 = 0$.	6
2011 P2 Q2c	(*c*) (i) Show that $(x - 1)$ is a factor of $3x^3 + 4x^2 - 5x - 2$. (ii) Factorise $3x^3 + 4x^2 - 5x - 2$ fully.	5
2010 P1 Q22	(*a*) (i) Show that $(x - 1)$ is a factor of $f(x) = 2x^3 + x^2 - 8x + 5$. (ii) Hence factorise $f(x)$ fully. **5** (*b*) Solve $2x^3 + x^2 - 8x + 5 = 0$. **1** (*c*) The line with equation $y = 2x - 3$ is a tangent to the curve with equation $y = 2x^3 + x^2 - 6x + 2$ at the point G. Find the coordinates of G. **5** (*d*) This tangent meets the curve again at the point H. Write down the coordinates of H. **1**	
2009 P2 Q3	(*a*) (i) Show that $x = 1$ is a root of $x^3 + 8x^2 + 11x - 20 = 0$. (ii) Hence factorise $x^3 + 8x^2 + 11x - 20$ fully. **4** (*b*) Solve $\log_2(x + 3) + \log_2(x^2 + 5x - 4) = 3$. **5**	

2008 P1

21. A function f is defined on the set of real numbers by $f(x) = x^3 - 3x + 2$.

(a) Find the coordinates of the stationary points on the curve $y = f(x)$ and determine their nature. 6

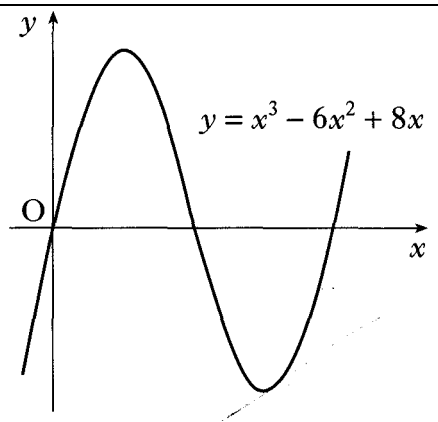
(b) (i) Show that $(x - 1)$ is a factor of $x^3 - 3x + 2$.

(ii) Hence or otherwise factorise $x^3 - 3x + 2$ fully. 5

(c) State the coordinates of the points where the curve with equation $y = f(x)$ meets both the axes and hence sketch the curve. 4

2008 P1

22. The diagram shows a sketch of the curve with equation $y = x^3 - 6x^2 + 8x$.

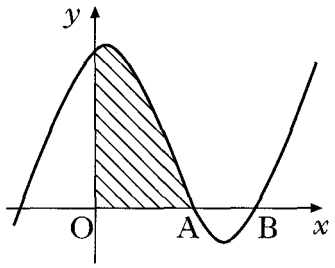


(a) Find the coordinates of the points on the curve where the gradient of the tangent is -1. 5

(b) The line $y = 4 - x$ is a tangent to this curve at a point A. Find the coordinates of A. 2

2007 P1

8. The diagram shows a sketch of the graph of $y = x^3 - 4x^2 + x + 6$.



(a) Show that the graph cuts the x-axis at $(3, 0)$. 1

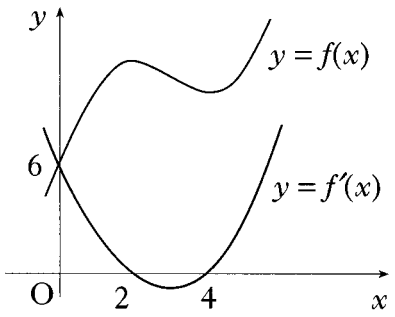
(b) Hence or otherwise find the coordinates of A. 3

2007 P2

10. The diagram shows the graphs of a cubic function $y = f(x)$ and its derived function $y = f'(x)$.

Both graphs pass through the point $(0, 6)$.

The graph of $y = f'(x)$ also passes through the points $(2, 0)$ and $(4, 0)$.



(a) Given that $f'(x)$ is of the form $k(x - a)(x - b)$:

(i) write down the values of a and b;

(ii) find the value of k. 3

2005 P1

8. A function f is defined by the formula $f(x) = 2x^3 - 7x^2 + 9$ where x is a real number.

(*a*) Show that $(x - 3)$ is a factor of $f(x)$, and hence factorise $f(x)$ fully. 5

(*b*) Find the coordinates of the points where the curve with equation $y = f(x)$ crosses the x- and y-axes. 2

(*c*) Find the greatest and least values of f in the interval $-2 \leq x \leq 2$. 5

2005 P2

11. (*a*) Show that $x = -1$ is a solution of the cubic equation $x^3 + px^2 + px + 1 = 0$. 1

(*b*) Hence find the range of values of p for which all the roots of the cubic equation are real. 7

2004 P1

2. $f(x) = x^3 - x^2 - 5x - 3$.

(*a*) (i) Show that $(x + 1)$ is a factor of $f(x)$.

(ii) Hence or otherwise factorise $f(x)$ fully. 5

(*b*) One of the turning points of the graph of $y = f(x)$ lies on the x-axis. Write down the coordinates of this turning point. 1

2003 P2

1. $f(x) = 6x^3 - 5x^2 - 17x + 6$.

(*a*) Show that $(x - 2)$ is a factor of $f(x)$.

(*b*) Express $f(x)$ in its fully factorised form. 4

2002W P1

5. Given that $(x - 2)$ and $(x + 3)$ are factors of $f(x)$ where $f(x) = 3x^3 + 2x^2 + cx + d$, find the values of c and d. 5

2001 P2

1. (*a*) Given that $x + 2$ is a factor of $2x^3 + x^2 + kx + 2$, find the value of k. 3

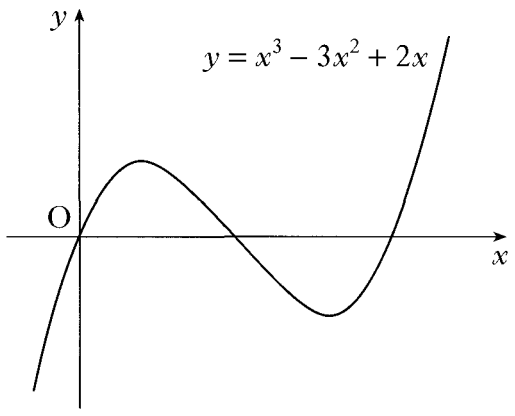
(*b*) Hence solve the equation $2x^3 + x^2 + kx + 2 = 0$ when k takes this value. 2

2000 P2

1. The diagram shows a sketch of the graph of $y = x^3 - 3x^2 + 2x$.

(*a*) Find the equation of the tangent to this curve at the point where $x = 1$. 5

(*b*) The tangent at the point (2, 0) has equation $y = 2x - 4$. Find the coordinates of the point where this tangent meets the curve again. 5



Specimen 2 P1	**1.** Show that $x = 2$ is a root of the equation $y = 2x^3 + x^2 - 13x + 6 = 0$ and hence, or otherwise, find the other roots.	4
Specimen 1 P1	**3.** (*a*) Show that $(x - 1)$ is a factor of $f(x) = x^3 - 6x^2 + 9x - 4$ and find the other factors.	3
	(*b*) Write down the coordinates of the points at which the graph of $y = f(x)$ meets the axes.	1