Polynomials (AS)

B6 Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem.

For a brief commentary on this content go to the MEI outline SoW.

Pre-requisites

- Transition to A level Maths: Essential Skills: There are relevant resources within the Expanding and Factorising sections. 'More brackets' in the Expanding section is useful as an introduction to working with cubics.
- GCSE: Expanding and factorising quadratics.
- AS Quadratic functions.

Common student errors

- Dividing by $x + a$ rather than $x - a$ when a is the known root.
- Making errors with signs, especially when carrying out polynomial division.
- Attempting to answer by other methods such as polynomial division in questions which specify 'by using the factor theorem'.

Teaching it!

- A series of five videos designed to support students on this topic.
- Equations of cubic equations: A task designed to make links between factorised form of a cubic and its graph.
- Polynomial division: This interactive GeoGebra file illustrates the technique and the Divide it up activity from Underground Mathematics is a helpful resource for students.
- Constructing Polynomials: A Desmos Classroom activity considering properties of polynomial functions.
- The Factor Theorem (student task): Autograph, Casio, Desmos, GeoGebra

Getting them thinking

- How would you explain how to divide $2x^3 - 5x^2 + 3x - 2$ by $x - 2$?
- What is the same and what is different about the factor theorem and dividing polynomials?
- The sum of the roots of the cubic $y = x^3 - 3x^2 - 4x + 12$ is $2 + 3 + (-2) = 3$, and this is equal to the coefficient of x^2 multiplied by -1. Prove that this is true for all cubics of the form $y = x^3 + ax^2 + bx + c$ which have three real roots.
- Prove the factor theorem.