

## Chapter notes: 3 Polynomials

### Overview

*This chapter adds to the knowledge base of functions, graphs and techniques, primarily for use in chapters 4, 5 and 6. We recommend approximately five teaching hours.*

### Introductory problem

This problem allows a comparison to be made with the methods of solving quadratic equations to develop an understanding of why cubics are so much more difficult to deal with. The worked solution is given at the end of the chapter, page 83; the idea being that students should be able to answer the question using the methods covered in the chapter.

### 3A Working with polynomials, p58

For students who think that Key point 3.1 is trivial, you might like to point out that a similar rule for fractions (i.e.  $\frac{a}{b} = \frac{c}{d}$  if and only if  $a = c$  and  $b = d$ ) is clearly not correct.

This section presents a ‘synthetic division’ method for polynomials. Some people prefer a ‘long division’ method which is equally acceptable.

The statement in 7(b) is not true since, for example, the sum of  $x^2 + 5x$  and  $6 - x^2$  is not a quadratic.

### 3B Remainder and factor theorems, p63

*Hints for the grade 7 questions:*

10. You do not need to find  $a$  and  $b$  individually – just the value of  $a + b$ .
11. If  $x^2 - 5x + 6$  is a factor then deduce two linear factors.

### 3C Sketching polynomial functions, p68

There are some polynomials with complex roots which are not easy to write down from their graph (e.g.  $y = x^3 - x + 5$ ).

It might be interesting to discuss with some students how many points are needed to define a quadratic, a cubic, etc. The formula for a quadratic through three points  $(x_1, y_1)$ ,  $(x_2, y_2)$  and  $(x_3, y_3)$  illustrates this nicely:

$$y = \frac{y_1(x-x_2)(x-x_3)}{(x_1-x_2)(x_1-x_3)} + \frac{y_2(x-x_1)(x-x_3)}{(x_2-x_1)(x_2-x_3)} + \frac{y_3(x-x_1)(x-x_2)}{(x_3-x_1)(x_3-x_2)}$$

### 3D The quadratic formula and the discriminant, p76

*Hints for the grade 7 questions:*

11. This question can be interpreted as meaning that the quadratic has no zeros.
12. The quadratic formula can be used to find an expression for the difference between roots.