Chapter notes: 8 Binomial expansion

Overview

This chapter has no prerequisites other than knowledge of binomial coefficients from sections 1C and 1D. It will be applied in section 15I linking complex numbers with trigonometric identities. A relatively small chapter, we think it needs approximately two teaching hours.

Introductory problem

This problem highlights an important use of the binomial expansion. You might like to put it into an historical context – hundreds of years ago people did have to do calculations like this manually. The worked solution is given at the end of the chapter, page 229; the idea being that students should be able to answer the question using the methods covered in the chapter.

8A Introducing the binomial theorem, p217

Pascal's triangle is a good source of patterns and ideas for exploration. It has links to triangular numbers, Fibonacci numbers, fractals and much more. The fractal formed by the shading described in the 'Research explorer' box is called Sierpinski's triangle.

Fill-in proof sheet 7 makes explicit the link between the binomial expansion and the counting work covered in chapter 1.

8B Applying the binomial theorem, p219

Hints for the grade 7 questions:

12. You will need to use the factorial form of the binomial coefficient.

8C Products of binomial expansions, p223

Students should be encouraged to think ahead and find only the terms required for the solution. They often find too many!

In question 6, students may rush in without realising that the expression can also be written as $(1-x^2)^{10}$.

Hints for the grade 7 questions:

7. Factorise the quadratic expression.

8. Start by finding the quadratic term of the right hand expression.

9. You will need to use the factorial form of the binomial coefficients. The terms in x and x^2 will allow two simultaneous equations to be formed.

8D Binomial expansions as approximations, p226

You might like to encourage students to think about just how a calculator finds $\sqrt{2}$.

