Chapter notes: 1 Quadratic functions

Overview

Factorisation of quadratic expressions is in Prior learning (see section N on the CD-ROM). This chapter focuses on converting between the different forms of quadratic expressions, their graphical interpretations and their different uses. It needs approximately five hours of teaching time.

Introductory problem

This problem should encourage students to think about the fact that a maximum profit does exist, and what this means for the shape of the graph. The worked solution is given at the end of the chapter, page 30; the idea being that students should be able to answer the question using the methods covered in the chapter.

1A The quadratic form $y = ax^2 + bx + c$, p1

There are no specific teacher notes for this section.

1B The completed square form $y = a(x – h)^2 + k$, p8

Although not explicitly part of the syllabus, in completing the square we recommend the use of comparing coefficients. Most students find this more obvious.

1C The factorised form $y = a(x – p)(x – q)$, p13

There are no specific teacher notes for this section.

1D The quadratic formula and the discriminant, p15

Hints for the grade 7 questions:

10. Since this is a positive quadratic, if it is always non-negative the discriminant must be at least zero.

11. We need both the expression to have no zeros and the curve to be a negative parabola.

12. Use the quadratic formula to find an expression for the difference between zeros.

1E Intersection of graphs and simultaneous equations, p21

Hints for the grade 7 questions:

5. You do not need to know that this equation is a circle – do not be intimidated. Consider the discriminant.

6. Consider the discriminant once you have intersected the functions.

1F Using quadratic functions to solve problems, p24

These problems can be solved using differentiation, so may be used as exercises in section 12J. However, they provide practice of the ideas from this chapter and work on developing the skills of interpreting ‘wordy questions’, which are more common in the new syllabus.

Hints for the grade 7 questions:

6. The expression for his profit is $200n - 4n^2$.

