

Chapter notes: 12 Further trigonometry

Overview

This chapter builds on the work from chapter 11, applying more complex identities. We recommend approximately six hours of teaching time.

Introductory problem

This problem illustrates the types of situations when it makes sense to add two trigonometric functions together. It also provides an opportunity to improve visualisation skills when you ask students to sketch the path of P . The worked solution is given at the end of the chapter, page 370; the idea being that students should be able to answer the question using the methods covered in the chapter.

12A Double angle identities, p347

The proof in this section is unlikely to be tested in examinations. However, it shows useful ways of thinking about geometrical proofs.

Hints for the grade 7 questions:

10. Express $\cos 4\theta$ first in terms of $\cos 2\theta$.
11. Use the substitution $x = 2A$.
12. Express $\sin 4x$ in terms of $\sin 2x$ and $\cos 2x$. Then link $\cos 2x$ to $\sin x$.

12B Compound angle identities, p354

Hints for the grade 7 questions:

10. (b) You will need to use the fact that the gradient of a line is given by $\tan \theta$ where θ is the angle between the line and the positive x -axis.
11. (b) Set $y = 2x$ in the expression from (a).
12. (a) Apply the tan compound-angle formula with $x = \arctan 1.2$ and $y = \arctan 0.5$.
13. (b) Be careful to justify excluding the negative square root.

12C Functions of the form $a \sin x + b \cos x$, p359

Although this topic is not explicitly mentioned in the syllabus, it is a common application of the compound-angle formula.

Hints for the grade 7 questions:

8. Remember that the maximum value of $\cos A$ is 1 and this occurs when $A = 0$.
9. Do not be put off by the $2x$. Apply exactly the same methods as normal.

12D Reciprocal trigonometric functions, p364

The graphs of these functions should be derived using the methods of section 6F.

Hints for the grade 7 questions:

15. If $y = \sec^{-1} x$, then $x = \sec y = \frac{1}{\cos y}$. Rearrange this to find y in another form.