Chapter notes: 11 Geometry of triangles and circles

Overview

This chapter follows on from chapter 10 as it uses trigonometric equations particularly applied to the sine rule. Many of the concepts may already be familiar so we would recommend approximately four hours of teaching time.

Introductory problem

This problem should encourage students to visualise and consider whether given information is sufficient to solve a given problem. The worked solution is given at the end of the chapter, page 338; the idea being that students should be able to answer the question using the methods covered in the chapter.

11A Right-angled triangles, p305

This section shows how the definitions of sine and cosine, given in section 9B, are consistent with the trigonometry within presumed knowledge.

11B The sine rule, p307

The 'Research explorer' box (page 308) refers to the spherical sine rule which is:

$$\frac{\sin A}{\sin \alpha} = \frac{\sin B}{\sin \beta} = \frac{\sin C}{\sin \gamma}$$

where α, β, and γ are the angles at the centre of the sphere subtended by the three arcs of the spherical surface triangle *a, b,* and *c,* respectively. A, B, and C are the surface angles opposite their respective arcs.

Hints for the grade 7 questions:

6. Try to find a sine which is greater than one, as this would be impossible.

11C The cosine rule, p312

ERRATA: The 'From another perspective' box on p. 317 should refer to Extension sheet 11b.

Hints for the grade 7 questions:

7. Use the cosine rule to form a quadratic equation.

11D Area of a triangle, p318

The 'Research explorer' box (page 319) refers to Heron's formula:

$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)}$$

where, $s = \frac{1}{2}(a + b + c)$.

Copyright Cambridge University Press 2013. All rights reserved.

11E Trigonometry in three dimensions, p321

Hints for the grade 7 questions:

7. Use Pythagoras in triangle ABR.

11F Length of an arc, p326

Students may already know how to find arc length when in degrees. This provides an opportunity for discussing whether degrees or radians are 'more natural'.

Hints for the grade 7 questions:

12. The radius of the sector is the slant length of the cone. The arc length is the perimeter of the base of the cone.

11G Area of a sector, p330

There are no specific teacher notes for this section.

11H Triangles and circles, p333

Hints for the grade 7 questions:

5. (c) Split the area into two segments.

Copyright Cambridge University Press 2013. All rights reserved.