d

e

f

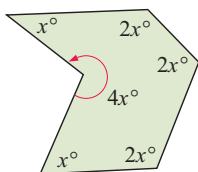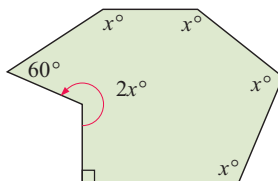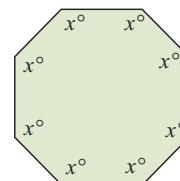**4** A pentagon has three right angles and two other equal angles.
What is the size of each of the two equal angles?

5 Find the size of each interior angle within a regular:

    a pentagon   **b** hexagon   **c** octagon   **d** decagon

6 The sum of the angles of a polygon is 1800°. How many angles has the polygon?

7 Joanna has found a truly remarkable polygon which has interior angles with a sum of 2060°. Comment on Joanna's finding.

**8** Copy and complete the following table for regular polygons:

Regular polygon	Number of sides	Number of angles	Size of each angle
equilateral triangle			
square			
pentagon			
hexagon			
octagon			
decagon			

9 Copy and complete:

- the sum of the angles of an n-sided polygon is ......
- the size of each angle θ, of a regular n-sided polygon, is $\theta = $ ......
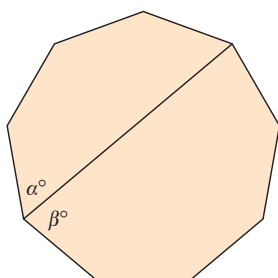
10 Answer the **Opening Problem** on page **93**.

11 The figure alongside is a regular heptagon.

    a Find the size of each interior angle.

   **b** Hence, find the value of each of the unknowns.
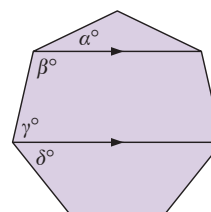
12

The figure alongside is a regular nonagon.
Find α and β.

13   A **tessellation** is a pattern made with a number of objects of the same shape and size, which can cover an area without leaving any gaps. Which regular polygons tessellate?

      Hint: For a regular polygon to tessellate, copies of its shape must be able to meet at a point with no gaps. What property must the size of its interior angle have?
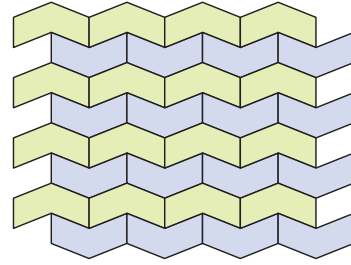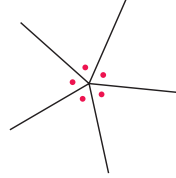
14
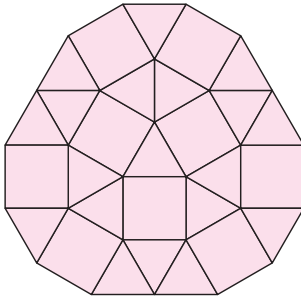
We can cover a region with tiles which are equilateral triangles and squares with sides of equal length.

    a   Copy this pattern and add to it the next outer layer.

    b   Can you construct a pattern without gaps, using a regular octagon and a square?

E   THE EXTERIOR ANGLES OF A POLYGON [4.4]
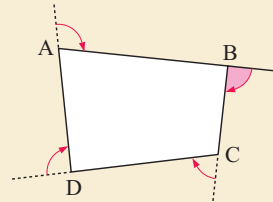
The **exterior angles** of a polygon are formed by extending the sides in either direction.

Discovery 2   *Exterior angles of a polygon*

The shaded angle is said to be an exterior angle of quadrilateral ABCD at vertex B.

The purpose of this Discovery is to find the sum of all exterior angles of a polygon.

What to do:

  1   In the school grounds, place four objects on the ground no more than 10 m apart, forming the vertices of an imaginary quadrilateral. Start at one vertex, and looking towards the next vertex, walk directly to it and turn to face the next vertex. Measure the angle that you have turned through.

  2   Repeat this process until you are back to where you started from, and turn in the same way to face your original direction of sight, measuring each angle that you turn through.

  3   Through how many degrees have you turned from start to finish?

  4   Would your answer in **3** change if an extra object was included to form a pentagon?

  5   Write a statement indicating what you have learnt about the sum of the exterior angles of any polygon.