

Can I use my understanding of angles and shapes to work out missing angles?

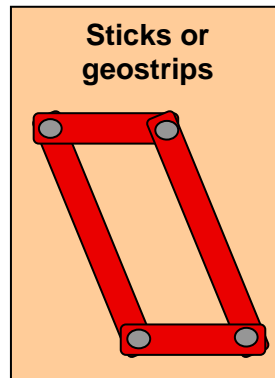
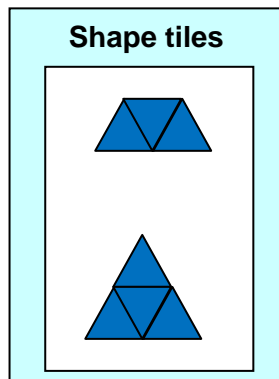
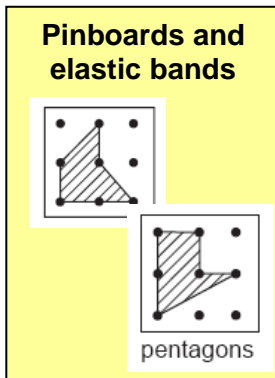
Teaching guidance

Key vocabulary

angle, degree ($^{\circ}$), protractor, right angle, acute, obtuse, reflex, parallel, perpendicular, regular, irregular

Models, images and resources

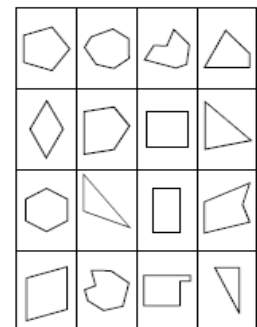
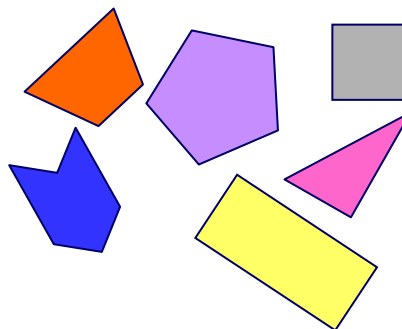
Equipment for making shapes



Sets of shapes on plastic or card

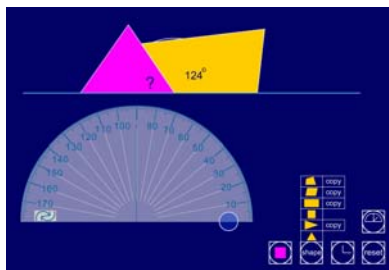
Provide children with sets of shapes that include irregular polygons.

Classify shapes using their angle properties, for example, into those where all angles are equal, pairs of angles are equal, no angles are equal.

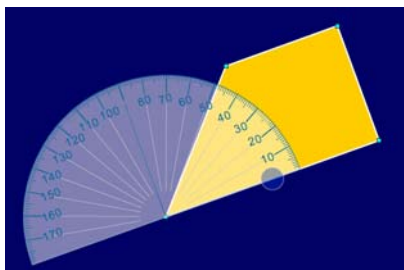


Interactive teaching programs

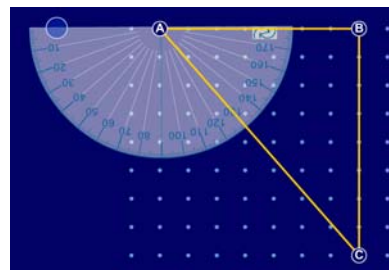
Calculating angles ITP



Polygon ITP

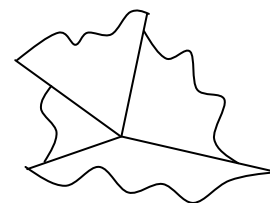


Fixing points ITP



Teaching tips

- Provide children with opportunities to use a range of equipment to make and draw shapes and explore their angle properties. Useful resources include: pinboards and bands, shape tiles, geostrips, isometric paper and ICT. For example, children could investigate the different quadrilaterals it is possible to make using two different lengths of geostrip and describe the angle properties of each shape they make.
- Ensure that children have had sufficient experience of exploring angles in shapes to compare and classify shapes using angle properties. For example they should be able to identify common shapes where all angles are equal and common quadrilaterals where opposite angles are equal.
- Use software/floor turtles to encourage children to use their knowledge of angle properties of shapes in order to draw them accurately. Ask children to make a sketch of the shape, annotating known angles to help them work out appropriate instructions for the floor turtle to follow.
- Give children opportunities to use rulers, set-squares and protractors to draw shapes accurately. For example, you might ask children to find the two unknown angles in a triangle that has sides of length 5 cm and 9 cm with a 55° angle between them.
- Ask children to draw and cut out a triangle then tear off the vertices and put them together. This provides a visual image that helps children to recall that the angles of a triangle together form a straight line, that is they total 180° . The angles of quadrilaterals can be explored in a similar way.



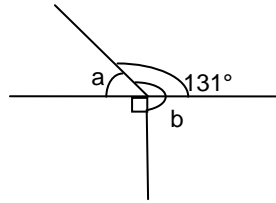
- Ensure that children understand the difference between an accurate drawing and a sketch diagram where angles and lengths are not drawn accurately. Model how to annotate diagrams to show the size of known angles to find less obvious angles.

3 of 3 The National Strategies | Primary
Overcoming barriers level 4–5

- Model how to identify and record the calculations required to find missing angles in a shape diagram:

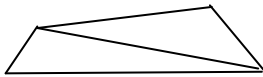
$$a = 180^\circ - 131^\circ = 49^\circ$$

$$b = 131^\circ + 90^\circ = 221^\circ$$

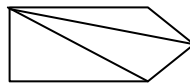


Encourage children to consider whether their answers are sensible.

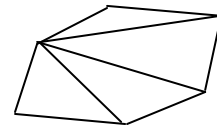
- Ask children to enlarge shapes using ICT or to create similar shapes on isometric paper and to measure their angles, in order to appreciate that the angles in a shape do not change when it is enlarged.
- Children can investigate the total of the internal angles of quadrilaterals, pentagons, and hexagons. One way of doing this is through splitting the shapes into triangles:



quadrilateral – two triangles
total of interior angles = $2 \times 180^\circ$



pentagon – three triangles
total of interior angles = $3 \times 180^\circ$



hexagon – four triangles
total of interior angles = $4 \times 180^\circ$