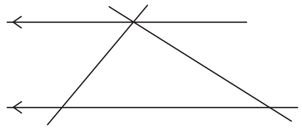
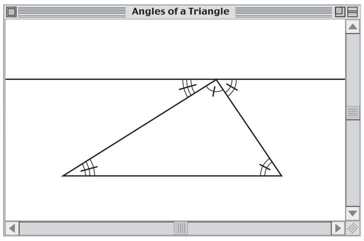
As outcomes, Year 8 pupils should, for example:

Understand a proof that the sum of the angles of a triangle is 180° and of a quadrilateral is 360°, and that the exterior angle of a triangle equals the sum of the two interior opposite angles.

Consider relationships between three lines meeting at a point and a fourth line parallel to one of them.



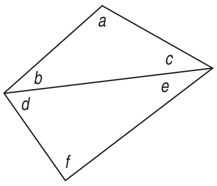
Use **dynamic geometry software** to construct a triangle with a line through one vertex parallel to the opposite side. Observe the angles as the triangle is changed by dragging any of its vertices.



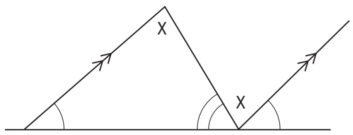
Use this construction, or a similar one, to explain using diagrams a proof that the sum of the three angles of a triangle is 180°.

Use the angle sum of a triangle to prove that the angle sum of a quadrilateral is 360°.

(a + b + c) + (d + e + f)
= 180° + 180° = 360°



Explain a proof that the exterior angle of a triangle equals the sum of the two interior opposite angles, using this or another construction.

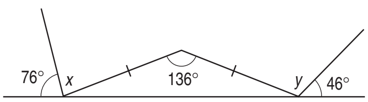


Given sufficient information, calculate:

- interior and exterior angles of triangles;
- interior angles of quadrilaterals.

For example:

- Calculate the angles marked by letters.

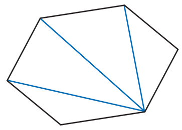


As outcomes, Year 9 pupils should, for example:

Explain how to find, calculate and use properties of the interior and exterior angles of regular and irregular polygons.

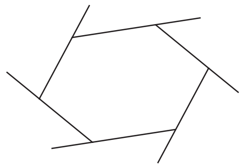
Explain how to find the interior angle sum and the exterior angle sum in (irregular) quadrilaterals, pentagons and hexagons. For example:

- A polygon with n sides can be split into n – 2 triangles, each with an angle sum of 180°.



So the interior angle sum is (n – 2) × 180°, giving 360° for a quadrilateral, 540° for a pentagon and 720° for a hexagon.

At each vertex, the sum of the interior and exterior angles is 180°.

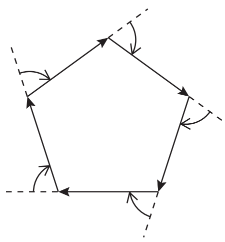


For n vertices, the sum of n interior and n exterior angles is n × 180°.
But the sum of the interior angles is (n – 2) × 180°, so the sum of the exterior angles is always 2 × 180° = 360°.

Find, calculate and use the interior and exterior angles of a regular polygon with n sides.
For example:

- The interior angle sum S for a polygon with n sides is S = (n – 2) × 180°.
  In a regular polygon all the angles are equal, so each interior angle equals S divided by n.
  Since the interior and exterior angles are on a straight line, the exterior angle can be found by subtracting the interior angle from 180°.

- From experience of using **Logo**, explain how a complete traverse of the sides of a polygon involves a total turn of 360° and why this is equal to the sum of the exterior angles.



  Deduce interior angle properties from this result.

Recall that the interior angles of an equilateral triangle, a square and a regular hexagon are 60°, 90° and 120° respectively.