

ANGLES IN POLYGONS

Note Title

18/03/2010

Any polygon

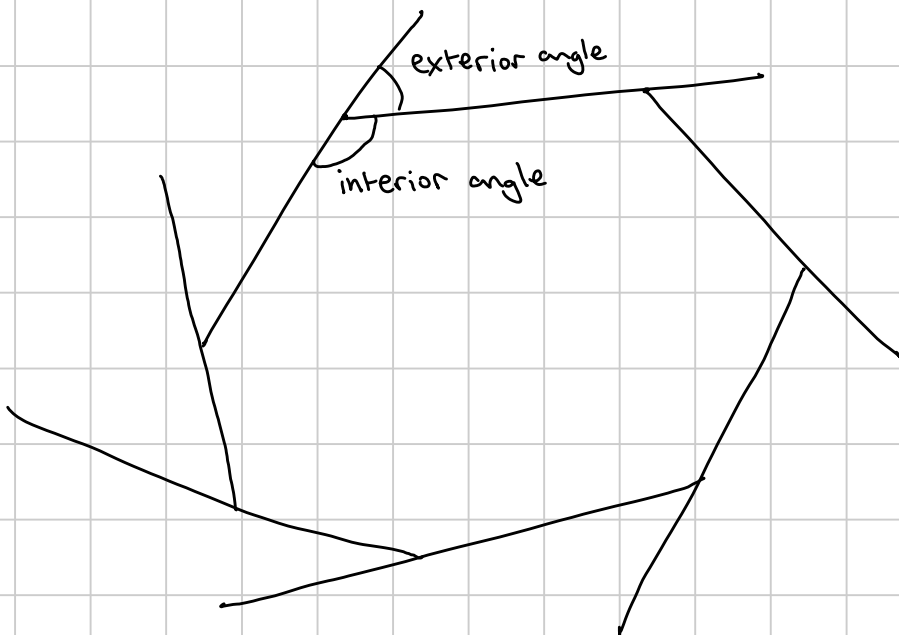
A polygon with n sides can be divided into $n-2$ triangles. So its interior angles add up to

$$180(n-2)^{\circ}$$

e.g.

Name	No of sides	Total of angles
Quadrilateral	4	$180 \times 2 = 360^{\circ}$
Pentagon	5	$180 \times 3 = 540^{\circ}$
Hexagon	6	$180 \times 4 = 720^{\circ}$
⋮	⋮	⋮
Dodecagon	12	$180 \times 10 = 1800^{\circ}$

Interior and Exterior Angles



$$\text{interior angle} + \text{exterior angle} = 180^{\circ}$$

The exterior angles of any polygon add up to 360° .

[Imagine a small creature walking round the polygon - by the time it gets back to its starting place it has turned 360° .]

Regular Polygons

These have all sides equal and all angles equal.

When working out angles it is easiest to start with the exterior angles.

Examples

① In a regular 10-sided polygon (decagon)

(a) What is the size of each exterior angle?

(b) What is the size of each interior angle?

$$(a) \quad \frac{360}{10} = \underline{\underline{36^\circ}}$$

$$(b) \quad 180 - 36 = \underline{\underline{144^\circ}}$$

② A regular polygon has exterior angles of 40° . How many sides does it have?

$$\frac{360}{40} = 9 \text{ sides}$$

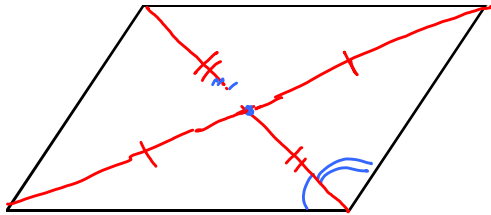
③ A regular polygon has interior angles of 170° . How many sides does it have?

$$\text{Exterior angle} = 180 - 170 = 10^\circ$$

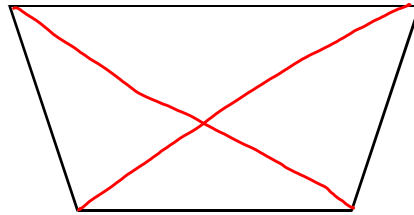
$$\text{No of sides} = \frac{360}{10} = \underline{\underline{36}}$$

Properties of Quadrilaterals

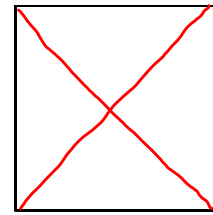
	Kite	Parallelogram	Isosceles Trapezium	Rhombus	Rectangle	Square
Number of Lines of Symmetry	1	0	1	2	2	4
Order of Rotational Symmetry	1	2	1	2	2	4
No of pairs of parallel sides	0	2	1	2	2	2
No of pairs of opposite sides equal	0	2	1	2	2	2
No of pairs of adjacent sides equal	2	0	0	all	0	all
No of pairs of opposite angles equal	1	2	0	2	2	2
No of pairs of adjacent angles equal	0	0	2	0	all	all
Diagonals equal in length?	N	N	Y	N	Y	Y
Diagonals meet at right angles?	Y	N	N	Y	N	Y
Diagonals bisect each other?	1 does	Y	N	Y	Y	Y
Diagonals bisect the corner angles?	1 does	N	N	Y	N	Y



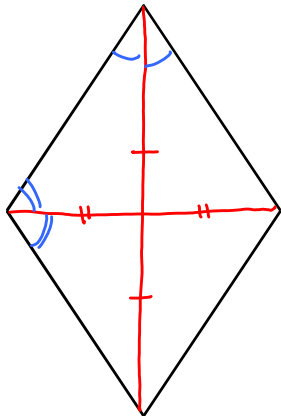
PARALLELOGRAM



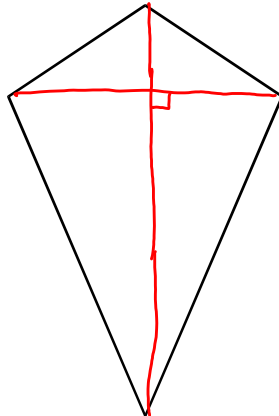
ISOSCELES TRAPEZIUM



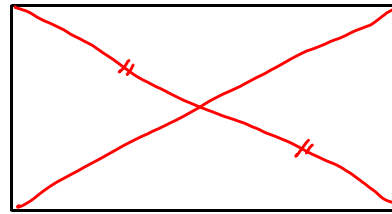
SQUARE



RHOMBUS



KITE



RECTANGLE.