

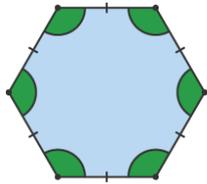
Angles in Polygons – W/C 4th May 2020

Thank you to everyone who has submitted the work on mathswatch (Vectors) and mymaths (work with decimals). If you have not already done so, or you did not get 70% or above, it is not too late to complete these tasks. Try not to fall behind, there is another assignment this week and the topics will not be taught again, until we meet them on your GCSE papers.

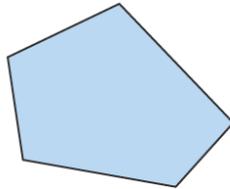
This week your aim should be to:

- Understand the **vocabulary** connected to the topic
- Be able to find the **sum of angles in polygons** and calculate both **interior and exterior angles**.
- Answer more complex questions based on the previous statement.

Polygons - A polygon is a 2D shape with at least three sides.



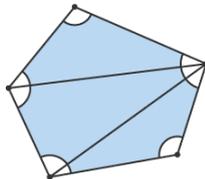
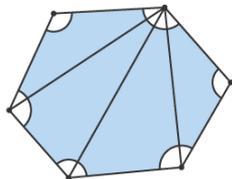
Regular polygon



Irregular polygon

Polygons can be **regular** or **irregular**. If the angles are all equal and all the sides are equal length it is a **regular** polygon.

Interior angles of polygons



To find the sum of interior angles in a polygon divide the polygon into triangles.

The sum of interior angles in each triangle is 180° . To find the sum of interior angles of a polygon, multiply the number of triangles in the polygon by 180° .

Example 1.

Calculate the sum of interior angles in a pentagon.

ANSWER: A pentagon (5 sides) contains 3 triangles.

So, the sum of the interior angles is $= 180 \times 3 = 540^\circ$

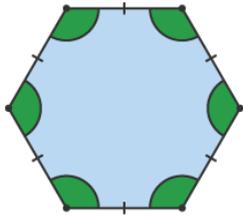
The number of triangles in each polygon is always two less than the number of sides.

The formula for calculating the sum of interior angles is:

Sum of Interior angles in a polygon = $(n - 2) \times 180$ (where n is the number of sides)

Example 2.

Calculate the size of the interior angle of a regular hexagon. (6 sides)



ANSWER: Sum of interior angles = $(6-2) \times 180 = 720^\circ$

As all angles are equal (regular)

One interior angle is $720 \div 6 = 120^\circ$

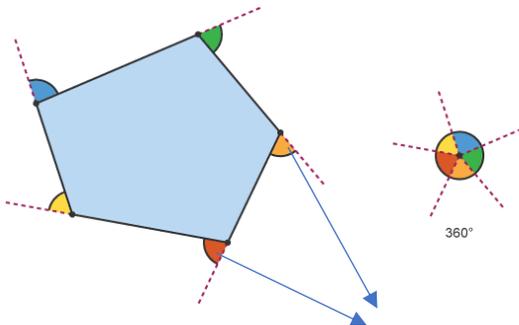
$6-2 = 4$ (this represents the number of triangles)

For a Regular polygon: **One Interior Angle = sum of interior angles \div number of sides**

Exterior angles of polygons

If the side of a polygon is extended, the angle formed outside the polygon is the **exterior angle**.

The sum of the exterior angles of a polygon is ALWAYS 360° .



These are of 2 of the 5 exterior angles

Calculating the exterior angles of **regular polygons**

The formula for calculating the size of an exterior angle is:

Exterior Angle = $360 \div$ number of sides

Remember the interior and exterior angle add up to 180° .

Example 3.

Calculate the size of the exterior and interior angle in a regular pentagon. (5 sides)

METHOD 1

The sum of exterior angles is 360°

The exterior angle is $360 \div 5 = 72^\circ$

The interior and exterior angles add up to 180°

The interior angle is $180 - 72 = 108^\circ$

METHOD 2

The sum of interior angles is $(5 - 2) \times 180 = 540^\circ$

The interior angle is $540 \div 5 = 108^\circ$

The interior and exterior angles add up to 180° .

The exterior angle is $180 - 108 = 72^\circ$

Re-read this and make sure it makes sense. If you can't print it out, make notes in your book. You should now be ready for a little more teaching to reinforce the comments above and then you can start working your way through some questions!

Task 1: Copy and complete the table below in your book:

Number of sides	Name	Sum of exterior angles	For Regular Polygons	
			Interior angle	Exterior Angle
n		$(n - 2) \times 180^\circ$	Sum \div n	$360 \div n$ (or $180 - \text{Int angle}$)
3	Triangle	180°	$180 \div 3 = 60^\circ$	$360 \div 3 = 120^\circ$
4	Quadrilateral	$(4-2) \times 180 = 360^\circ$	$360 \div 4 = 90^\circ$	$360 \div 4 = 90^\circ$
5	Pentagon	$(5-2) \times 180 = 540^\circ$		
6	Hexagon			
7	Heptagon			
8	Octagon			
10	Decagon			

Remember that the interior and exterior angle always add up to 180°

Task 2: Work through the [mymaths lesson on Interior and Exterior angles](#) – do each part – it is a very visual way of showing you Exterior angles.

To find it – First set the curriculum to GCSE 9-1 England, then go to Geometry, then Angle Properties, then Interior and Exterior Angles.

Task 3: Work through a selection of questions from [Pages 180 – 183](#) of your [on-line book](#). Remember once this is set up, you only have to enter your username and password – not the code! Just go on to 'my resources' and the book will be ready for you to open.

You do not need to do all questions but you should do as many as you can over a total of approximately 2 hours. (Remember this work is supposed to be equivalent to a week's lessons and 1 homework task!)

[Page 183 Exercise 2 Question 7](#) involves setting up equations to solve, so great if you wish to challenge yourself!

Task 4: Finally, when you have plenty of notes and clear workings of the questions that you have done in your book, then you should complete the **Assignment** that I have set up on [mathswatch](#). Some of the questions are quite complicated and involve you working out several angles before getting to the one you want. **The work is due for Monday 11th May**

As always, if you have any difficulty then please get in touch with me via e-mail.

Mrs Richards