

## What do I need to be able to do?

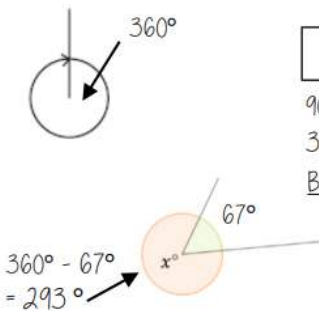
- By the end of this unit you should be able to:
- Understand/use the sum of angles at a point
  - Understand/use the sum of angles on a straight line
  - Understand/use equality of vertically opposite angles
  - Know and apply the sum of angles in a triangle
  - Know and apply the sum of angles in a quadrilateral

## Keywords

- Vertically Opposite:** angles formed when two or more straight lines cross at a point  
**Interior Angles:** angles inside the shape  
**Sum:** total, add all the interior angles together  
**Convex Quadrilateral:** a four-sided polygon where every interior angle is less than  $180^\circ$   
**Concave Quadrilateral:** a four-sided polygon where one interior angle exceeds  $180^\circ$   
**Polygon:** a 2D shape made with straight lines  
**Scalene triangle:** a triangle with all different sides and angles  
**Isosceles triangle:** a triangle with two angles the same size and two sides the same size  
**Right-angled triangle:** a triangle with a right angle.

## Sum of angles at a point

The sum of angles around a point is  $360^\circ$



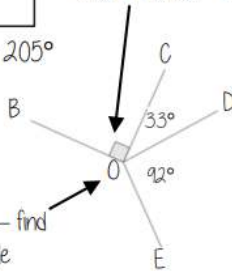
Find angle BOE

$$90^\circ + 33^\circ + 92^\circ = 205^\circ$$

$$360^\circ - 205^\circ$$

$$\text{BOE} = 155^\circ$$

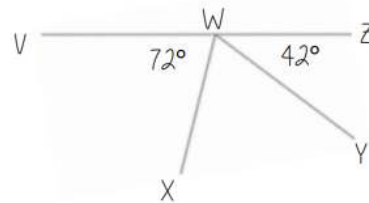
Angle notation -  $90^\circ$



Angle notation - find this missing angle

## Sum of angles on a straight line

Adjacent angles that share a common point on a line add up to  $180^\circ$

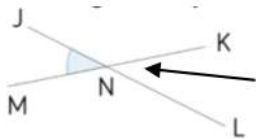


Find angle XWY

$$72^\circ + 42^\circ = 114^\circ$$

$$180^\circ - 114^\circ = 66^\circ$$

## Vertically opposite angles

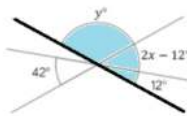


Angle JNM is vertically opposite to angle KNL

$$\text{JNM} = \text{KNL}$$

Vertically opposite angles are the same

Other angle rules still apply. Look for straight line sums and angles around a point.

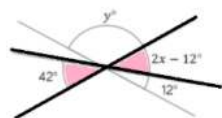


Form equations with information from diagrams:

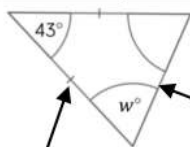
$$2x - 12 = 42$$

$$2x = 54$$

$$x = 27^\circ$$



## Sum of angles in triangles



The two base angles will be the same size

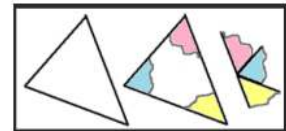
Look at triangle notation. This indicates an isosceles triangle

$$\therefore 180 - 43 = 137$$

$$137 \div 2 = 68.5^\circ$$

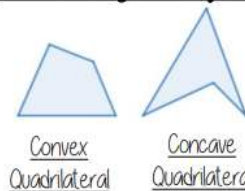
A triangle can only have ONE right angle

Sum of interior angles in a triangle =  $180^\circ$



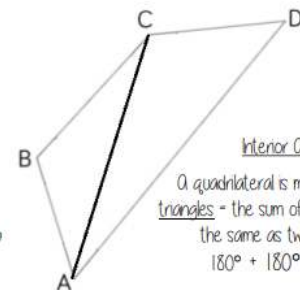
Have a go! Tearing the corners from triangles forms a straight line which is therefore  $180^\circ$

## Sum of angles in quadrilaterals



Interior angles are those that make up the perimeter (outline) of the shape

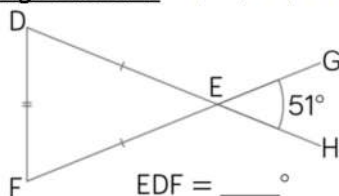
Sum of interior angles in a quadrilateral =  $360^\circ$



Interior Angles  
A quadrilateral is made up of two triangles - the sum of interior angles is the same as two triangles:  $180^\circ + 180^\circ = 360^\circ$

## Angle Problems

Split up the problem into chunks and explain your reasoning at each point using angle notation



- Angle DEF =  $51^\circ$  because it is a vertically opposite angle DEF = GEH
- Triangle DEF is isosceles (triangle notation)  $\therefore$  EDF = EFD and the sum of interior angles is  $180^\circ$   
 $180^\circ - 51^\circ = 129^\circ$        $129^\circ \div 2 = 64.5^\circ$
- Angle EDF =  $64.5^\circ$

Keep working out clear and notes together