Year 7
Knowledge Organisers

Block: Summer 1
Lines and Angles

- Constructing, measuring and using geometric notation
- Developing geometric reasoning

YEAR 7 – LINES AND ANGLES

Constructing, measuring and using geometric notation

What do I need to be able to do?

By the end of this unit you should be able to:

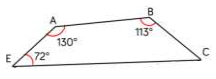
- Use letter and labelling conventions
- Draw and measure line segments and angles
- Identify parallel and perpendicular lines
- Recognise types of triangle
- Recognise types of quadrilateral
- Identify polygons
- Construct triangles (SAS, SSS, ASA)
- Draw Pie charts

Keywords

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 angles the same size
Right-angled triangle: a triangle with a right angle
Frequency: the number of times a data value occurs
Sector: part of a circle made by two radii touching the centre
Rotation: turn in a given direction
Protractor: equipment used to measure angles
Compass: equipment used to draw arcs and circles

Letter and labelling convention

The letter in the middle is the angle
The arc represents the angle

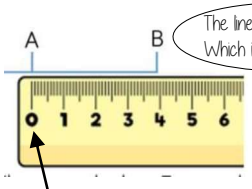


Angle Notation: three letters ABC
This is the angle at B = 113 °

Line Notation: two letters EC
The line that joins E to C.

Draw and measure line segments

Conversions 1cm = 10mm, 1m = 100cm



The line segment is 3.9cm
Which is 39mm

AB is a line segment (part of the line)

Make sure the start of the line is at 0.

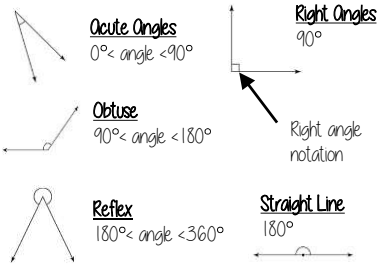
Angles as measures of turn

Clockwise | Anti-Clockwise

East to South is a quarter turn clockwise

Quarter Turn	Half Turn	Three-quarter Turn	Full Turn
90° Clockwise	180°	270° Anti-Clockwise	360°

Classify angles



Acute Angles 0°< angle <90°

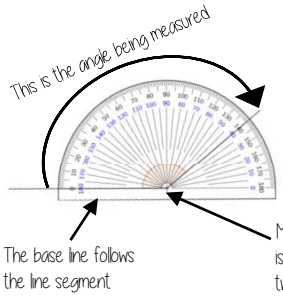
Right Angles 90°
Right angle notation

Obtuse 90°< angle <180°

Reflex 180°< angle <360°

Straight Line 180°

Measure angles to 180°



Read from 0° on the base line. Remember to use estimation. This is an obtuse angle so between 90 ° and 180 °

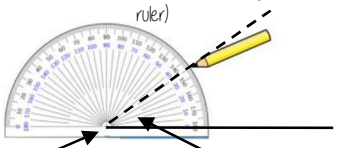
The base line follows the line segment

Make sure the cross is at the point the two lines meet

Draw angles up to 180°

Draw a 35° angle

Make a mark at 35° with a pencil and join to the angle point (use a ruler)

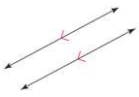


Make sure the cross is at the end of the line (where you want the angle)

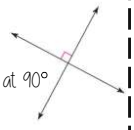
The angle

Parallel and Perpendicular lines

Parallel lines
Straight lines that never meet
(Have the same gradient)



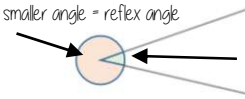
Perpendicular lines
Straight lines that meet at 90°



Angles over 180°

Use your knowledge of straight lines 180 ° and angles around a point 360 °

360 ° - smaller angle = reflex angle



Measure the smaller angle first (less than 180 °

Properties of Quadrilaterals

Square
All sides equal size
All angles 90°
Opposite sides are parallel

Rectangle
All angles 90°
Opposite sides are parallel

Rhombus
All sides equal size
Opposite angles are equal

Parallelogram
Opposite sides are parallel
Opposite angles are equal
Co-interior angles

Trapezium
One pair of parallel lines

Kite
No parallel lines
Equal lengths on top sides
Equal lengths on bottom sides
One pair of equal angles

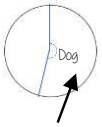
Draw Pie Charts

Type of pet	Dog	Cat	Hamster
Frequency	32	25	3

$\frac{32}{60}$ "32 out of 60 people had a dog"

This fraction of the 360 degrees represents dogs

$\frac{32}{60} \times 360 = 192°$

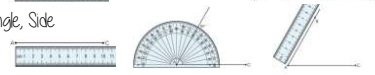


Use a protractor to draw
This is 192°

SAS, SSS, ASA constructions

Side, Angle, Angle

Side, Angle, Side



Side, Side, Side

Polygons

3	- Triangle	5	- Pentagon	8	- Octagon
4	- Quadrilateral	6	- Hexagon	9	- Nonagon
		7	- Heptagon	10	- Decagon

If all the sides and angles are the same, it is a **regular** polygon

YEAR 7 – LINES AND ANGLES

Geometric reasoning

What do I need to be able to do?

By the end of this unit you should be able to:

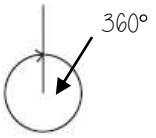
- Understand/use the sum of angles at a point
- Understand/use the sum of angles on a straight line
- Understand/use equality of vertically opposite angles
- Know and apply the sum of angles in a triangle
- Know and apply the sum of angles in a quadrilateral

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°
Concave Quadrilateral: a four-sided polygon where one interior angle exceeds 180°
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 angles the same size
Right-angled triangle: a triangle with a right angle

Sum of angles at a point

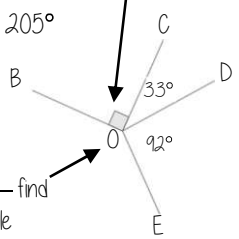
The sum of angles around a point is 360°

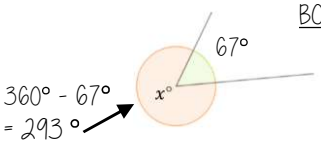


Find angle BOE

90° + 33° + 92° = 205°
360° - 205°
BOE = 155°

Angle notation – 90°



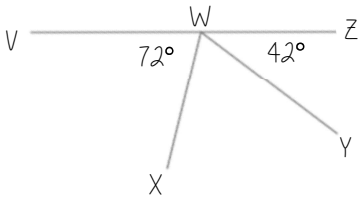


360° - 67°
= 293 °

Angle notation – find this missing angle

Sum of angles on a straight line

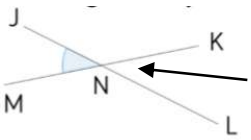
Adjacent angles that share a common point on a line add up to 180°



Find angle XWY

72° + 42° = 114°
180° - 114° = 66°

Vertically opposite angles

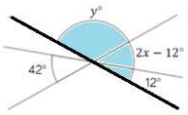


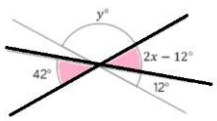
Angle JNM is vertically opposite to angle KNL

JNM = KNL

Vertically opposite angles are the same

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

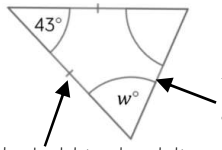




Form equations with information from diagrams:
$2x - 12 = 42$
$2x = 54$
$x = 27°$

Sum of angles in triangles

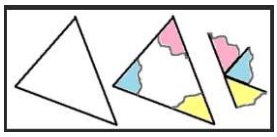
Sum of interior angles in a triangle = 180°



The two base angles will be the same size

Look at triangle notation. This indicates an isosceles triangle
∴ 180 - 43 = 137
137 ÷ 2 = 68.5°

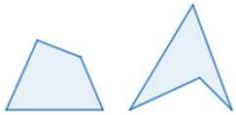
A triangle can only have ONE right angle



Have a go!
Tearing the corners from triangles forms a straight line which is therefore 180°

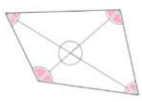
Sum of angles in quadrilaterals

Sum of interior angles in a quadrilateral = 360°

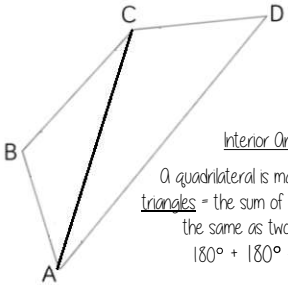


Convex Quadrilateral

Concave Quadrilateral



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



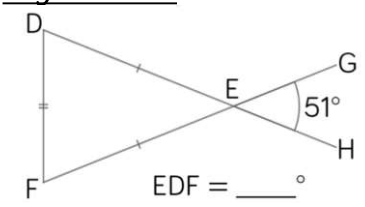
Interior Angles

A quadrilateral is made up of two triangles = the sum of interior angles is the same as two triangles:
180° + 180° = 360°

Angle Problems

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

Keep working out clear and notes together



1. Angle DEF = 51° because it is a vertically opposite angle DEF = GEH
2. Triangle DEF is isosceles (triangle notation) ∴ EDF = EFD and the sum of interior angles is 180°
   180° - 51° = 129° 129° ÷ 2 = 64.5°
3. Angle EDF = 64.5°