Year 10 – Geometry
Angles, Circles and Vectors

Essential knowledge

- Know line and angle notation
- Understand bearings
- Know the parts of a circle
- Calculate the area of circles and sectors
- Know and use angle facts
- Know how to calculate and determine vectors

Key Vocabulary

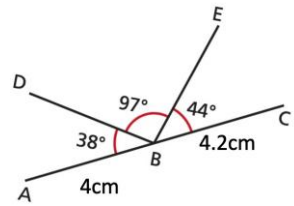
Angle: a measure of turn
Bearing: an angle in degrees, measured clockwise from north, written as a 3-digit number
Radius: line segment from the centre of a circle to the circumference.
Diameter: any straight line segment that passes through the centre of the circle and whose endpoints lie on the circle.
Circumference: the perimeter of a circle.
Pi: the ratio of a circle's circumference to its diameter, ≈ 3.14159
Vector: a vector indicates both size and direction

Prior learning links

Developing geometric reasoning (Y7)
Area of trapezia and circles (Y8)
Reasoning with geometry (Y9)

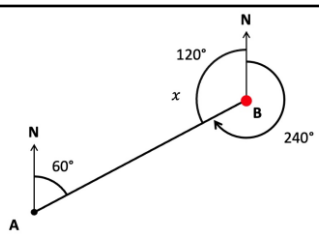
Angle and line notation

Line segment BC = 4.2cm
∠ABC = 38°
∠DBE = 97°
∠ABE = 135° (38° + 97°)

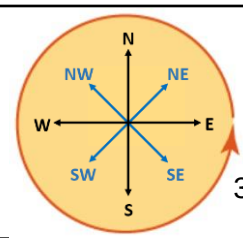


Bearings

A bearing is an angle in degrees measured clockwise from north, given as a three-figure number. For example, 30° clockwise from north is written as 030°



In the example (left) the bearing from A ***to*** B is 60° (clockwise from north). The bearing of A ***from*** B is 240° (clockwise from north).



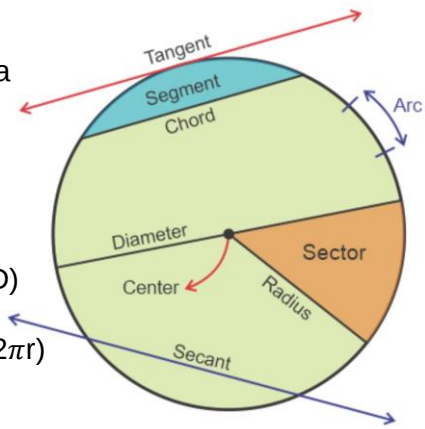
360°

Parts of a circle

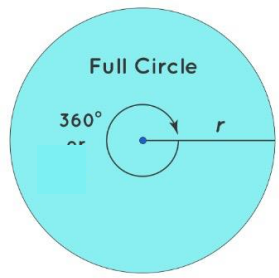
The radius (r) of a circle is ½ the diameter (d).

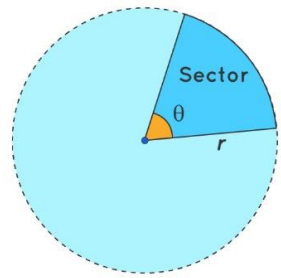
The length of the circumference is:

π × diameter (πD)
or …
2 × π × radius (2πr)



Area of circles and sectors



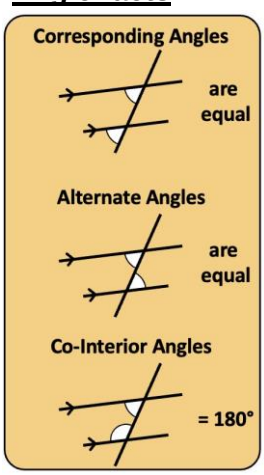


Area of a circle = πr^2 ($\pi \times radius^2$)

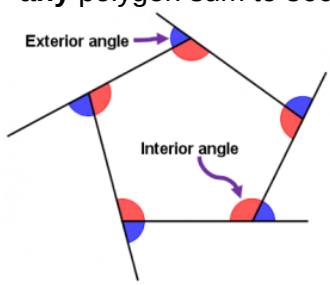
Area of sector = $\frac{\Theta}{360} \times \pi r^2$

Area is measured in units²

Angle facts



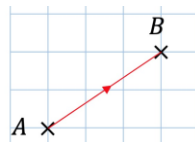
The exterior angles of **any** polygon sum to 360°



The interior angles of a **regular** polygon sum to (n−2) × 180 (where *n* is the number of sides).

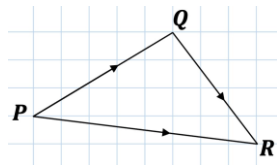
Vectors

Vectors show both direction and magnitude (size). The following example shows vector A to B $\binom{3}{2}$.



$\overrightarrow{AB} = \binom{3}{2}$

If the vector was reversed (i.e. B to A) it would be written as $\overrightarrow{BA} = \binom{-3}{-2}$



Vectors can be added or subtracted.

$\overrightarrow{PQ} + \overrightarrow{QR} = \overrightarrow{PR}$

$\binom{5}{3} + \binom{3}{-4} = \binom{8}{-1}$

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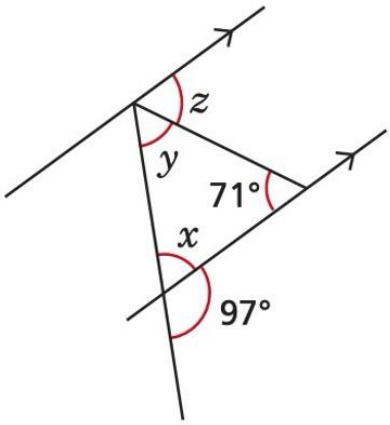
Prior learning links

What are the sizes of angles x, y and z? How do you know? (state the rules for each angle)



Key Vocabulary

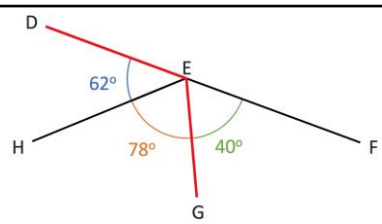
Use cover, look, write, check to write the definitions …

Angle:
Bearing:
Radius:
Diameter:
Circumference:
Pi:
Vector:

Angle and line notation

What is the size of …

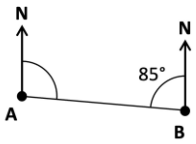
- ∠DEH
- ∠FEG
- ∠HEF



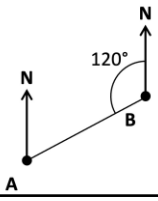
Bearings

Use your understanding of angle rules in parallel lines to help you calculate these bearings. NB: bearings are measured clockwise from north.

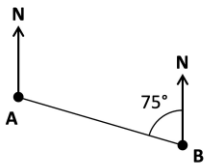
1) Calculate the bearing of **B** from **A**.



2) Calculate the bearing of **A** to **B**.

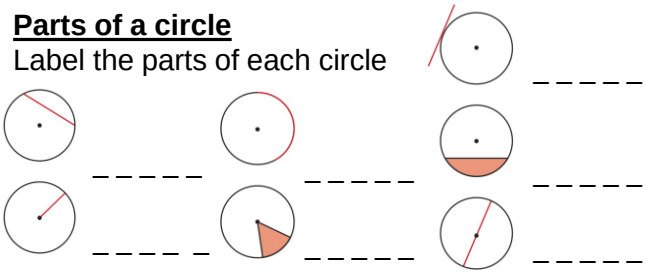


3) Calculate the bearing of **A** from **B**.

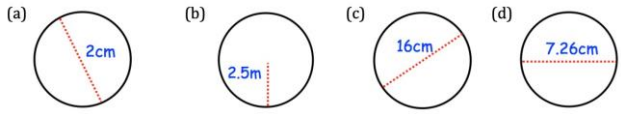


Parts of a circle

Label the parts of each circle

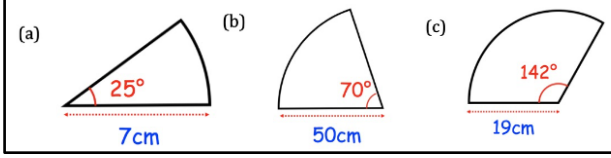


Calculate the circumference of each circle



Area of circles and sectors

1. A circle has a diameter of 5cm. Calculate its area (to 2 decimal places)
2. A circle has an area of 30cm^2. Calculate its radius (to 2 decimal places)
3. Calculate the area of the following sectors to 2 decimal places (include suitable units)



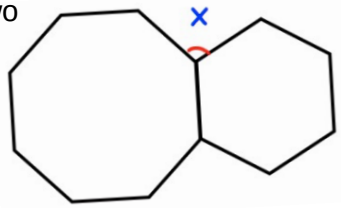
Angle facts

Calculate the size of the exterior angle in …

1. A regular hexagon
2. A regular octagon
3. A regular decagon

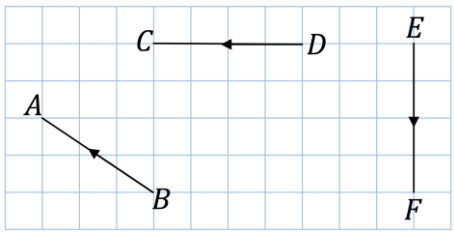
The interior angle of a regular polygon is 168.75° Calculate the number of sides the polygon has.

The diagram shows two regular polygons. Calculate the value of angle x



Vectors

Write the vectors shown using correct notation.



Write **a** as a column vector

Write **b** as a column vector

Write **a + b** as a column vector