Exercise walk-through

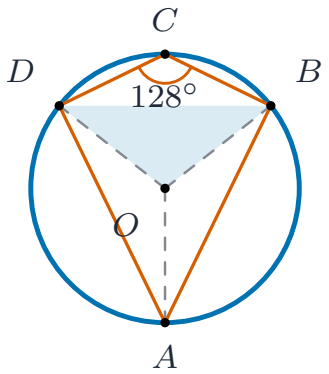
4.1 Geometry

Pearson Edexcel · International GCSE · Mathematics A

Angles, polygons and symmetry (2)

- The angles in a triangle add up to $180°$. The exterior angle of a triangle equals the sum of the two opposite interior angles.
- An isosceles triangle has two equal sides and two equal base angles. An equilateral triangle has three $60°$ angles.
- parallelogram: opposite sides parallel and equal, opposite angles equal, diagonals bisect each other

Figure: Circle geometry with reasons (2)



cyclic quad: $\angle BAD = 52°$
centre $= 2\times$ rim: $\angle BOD = 104°$
$OB = OD$ (radii): isosceles
$\angle OBD = \frac{180-104}{2} = 38°$

every numerical step names its reason

- Worked example 2: a circle centre O with **cyclic quadrilateral** ABCD, angle BCD = 128°, and the chain BAD = 52°, BOD = 104°, OBD = 38°.
- Match each part of the diagram to the text.

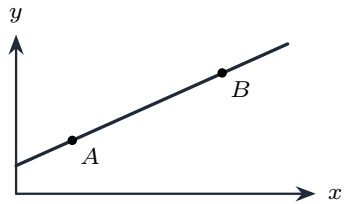
Pythagoras and trigonometry in 2D

- $\tan 62° = \frac{h}{50}$, so $h = 50 \tan 62° = 94.0$ m (3 s.f.).
- The **sine rule** , $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$, works when you know a side and its opposite angle.
- The **cosine rule** , $a^2 = b^2 + c^2 - 2bc\cos A$, works when you know two sides and the angle between them, or all three sides.

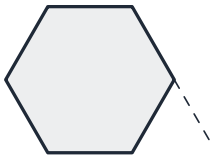
$$\sin\theta = \frac{\text{opp}}{\text{hyp}}, \quad \cos\theta = \frac{\text{adj}}{\text{hyp}}, \quad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

Exercises 2.1·2.2

2.1 Two angles on a straight line are $3x$ and x. Find x. [2]

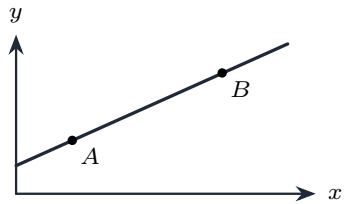


2.2 Find the interior angle of a regular pentagon. [2]



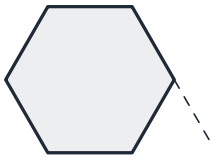
Exercises 2.1·2.2

2.1 Two angles on a straight line are $3x$ and x. Find x. [2]



2.1 $4x = 180$, so $x = 45$ (angles 135° and 45°).

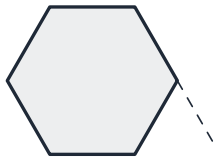
2.2 Find the interior angle of a regular pentagon. [2]



2.2 Exterior $= 360/5 = 72°$, so interior $= 180 - 72 = 108°$.

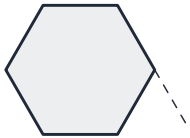
Setup for exercise 2.3

2.3 Find the exterior angle of a regular octagon. [2]

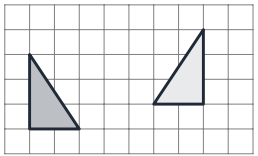


Exercise 2.3

2.4 Find the sum of the interior angles of a decagon. [2]

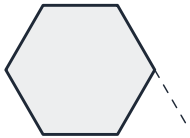


2.5 Write down the number of lines of symmetry and the order of rotational symmetry of a rectangle. [2]

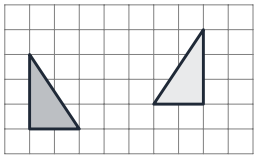


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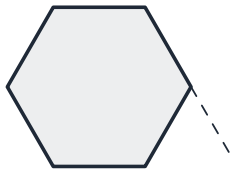
2.3 $360/8 = 45°$.

2.4 $(10 - 2) \times 180 = 1440°$.

2.5 2 lines of symmetry; order 2.

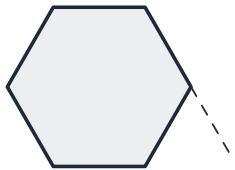
Exercise 3.1

3.1 *(Original.)* In triangle ABC, $\angle A = 47°$ and $\angle B = 71°$. The exterior angle at C is extended. (a) Find $\angle C$. (b) Explain how the exterior angle at C relates to $\angle A$ and $\angle B$. [3]



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3.1 (a) $\angle C = 180 - 47 - 71 = 62°$. (b) The exterior angle equals the sum of the two remote interior angles: $47 + 71 = 118°$, and $62 + 118 = 180$ (angles on a line).

Exercise 3.2

3.2 *(Original.)* A regular polygon has an interior angle of 150°. (a) Find its exterior angle. (b) Hence find the number of sides. (c) Name the polygon. [4]



3.3 *(Original.)* In parallelogram $PQRS$, $\angle P = 2x + 30°$ and $\angle Q = 3x - 10°$. Find all four angles, with reasons. [4]



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3.2 (a) $180 - 150 = 30°$. (b) $360/30 = 12$ sides. (c) A regular dodecagon.

3.3 Adjacent angles of a parallelogram are supplementary (co-interior between parallels): $(2x + 30) + (3x - 10) = 180$, so $5x = 160$, $x = 32$. $\angle P = 94°$, $\angle Q = 86°$; opposite angles equal: $\angle R = 94°$, $\angle S = 86°$.

Local review guidance: the correct angle fact named before use; exact values; reasons in words, not just arithmetic. This is authored classroom guidance.