

Exercise walk-through

C4.6

Angles

IGCSE Mathematics

You must be able to

- Use angle sums and straight-line or point facts
- Recognise corresponding, alternate and co-interior angles
- Find regular polygon angles and give geometrical reasons

1

The method

Method — Key knowledge: Angles

Angles on a straight line sum to 180° ; at a point, 360° . Vertically opposite angles are equal. A triangle sums to 180° , a quadrilateral to 360° . With parallel lines, corresponding and alternate angles are equal; co-interior angles sum to 180° . Give the geometric reason with each result. For an n -gon, interior sum is $(n - 2)180^\circ$; regular exterior angle is $360^\circ/n$.

Exercises 2.1·2.3

2.1 An angle on a straight line is 124° . Find the adjacent angle and give a reason. [2]

2.2 Three angles at a point are 95° , 140° , x . Find x with a reason. [2]

2.3 Parallel lines have co-interior angles 68° and y . Find y with a reason. [2]

Exercises 2.1·2.3

2.1 An angle on a straight line is 124° . Find the adjacent angle and give a reason. [2]

2.1

- $a = 180 - 124 = \mathbf{56^\circ}$; angles on a straight line.
-

2.2 Three angles at a point are 95° , 140° , x . Find x with a reason. [2]

2.2

- $x = 360 - 95 - 140 = \mathbf{125^\circ}$; angles at a point.
-

2.3 Parallel lines have co-interior angles 68° and y . Find y with a reason. [2]

2.3

- $y = 180 - 68 = \mathbf{112^\circ}$; co-interior angles on parallel lines sum to 180 degrees.

Exercise 2.4

2.4 Find each interior angle of a regular decagon.

[2]

3 Exam-style questions

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[2]

3 Exam-style questions

2.4

- $e = 360/10 = 36^\circ$; $i = 180 - e = \mathbf{144^\circ}$.

Exercise 3.1 (a)

3.1 Apply the angles methods below. Show working and include units where appropriate.

(a) A regular polygon has exterior angle 45° . Find its number of sides. [2]

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(a)

- $n = 360/e = 360/45 = 8.$

Exercise 3.1 (b)

3.1 Apply the angles methods below. Show working and include units where appropriate.

(b) Find each interior angle.

[2]

Exercise 3.1 (b)

3.1 Apply the angles methods below. Show working and include units where appropriate.

(b) Find each interior angle.

[2]

(b)

- $i = 180 - 45 = \mathbf{135^\circ}.$

Exercise 3.1 (c)

3.1 Apply the angles methods below. Show working and include units where appropriate.

(c) Find its total interior angle sum and show that this agrees with the individual angles.[2]

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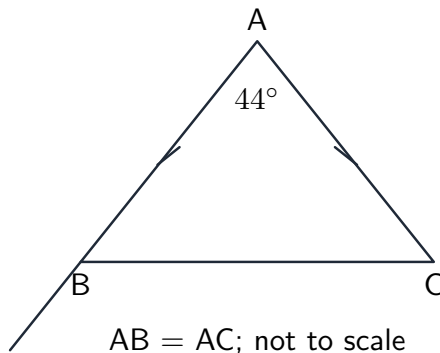
(c) Find its total interior angle sum and show that this agrees with the individual angles.[2]

(c)

- $S = (8 - 2)180 = \mathbf{1080^\circ}$; check $8(135) = 1080$.

Exercise 3.2 (a)

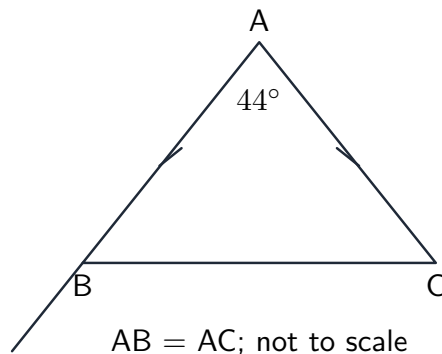
3.2 Triangle ABC is isosceles with $AB = AC$ and angle $BAC = 44^\circ$.



(a) Find angles ABC and ACB . Find the exterior angle at B formed by extending AB past B , giving reasons. [3]

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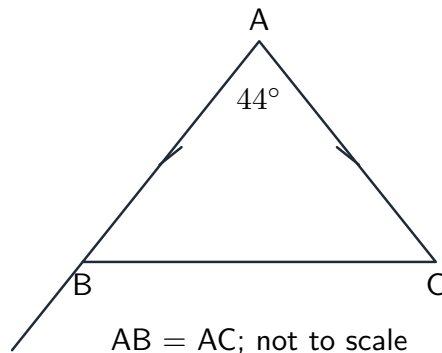
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(a)

- Base angles are equal, so $\beta = (180 - 44)/2 = \mathbf{68^\circ}$ at B and C.
- The exterior angle is $e = 180 - 68 = \mathbf{112^\circ}$, using a straight-line sum.

Exercise 3.2 (b)

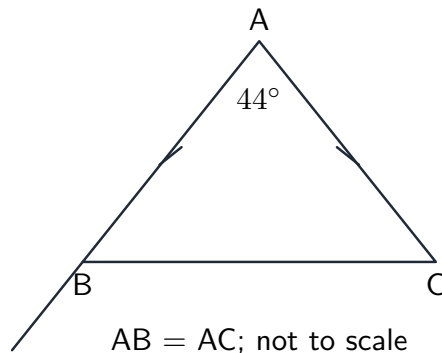
3.2 Triangle ABC is isosceles with $AB = AC$ and angle $BAC = 44^\circ$.



(b) On a separate diagram two parallel lines are cut by a transversal. One angle is 68° . Find an alternate angle and its co-interior partner, naming the facts. [3]

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(b) On a separate diagram two parallel lines are cut by a transversal. One angle is 68° . Find an alternate angle and its co-interior partner, naming the facts. [3]

(b)

- The alternate angle is **68°** , because alternate angles are equal for parallel lines.
- Co-interior angles sum to 180° , giving $c = 180 - 68 = \mathbf{112^\circ}$.