



Angles in polygons

About 50 minutes No calculator 42 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

A1 [2 marks] **A2** [2 marks]

Needed today

From chapter 1

Two parallel lines are crossed by a third line. A pair of alternate angles are $(3x - 4)^\circ$ and $(5x - 74)^\circ$. Find x .

Work out $\frac{0.32 \times 1.2}{0.048}$.

Answer

Answer

A3 [2 marks] **A4** [2 marks]

From chapter 4

Key Stage 3

The n th term of a sequence is $2n^2 + n - 8$. Which term of the sequence is equal to 163?

Work out $-8 - 2(3 - 5)^2$.

Answer

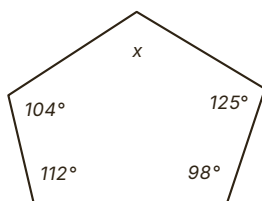
Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

The diagram shows a pentagon. Work out the size of angle x .

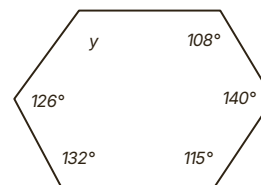


Not drawn accurately

Hint Split the pentagon into triangles from one corner: the angles add to $(5 - 2) \times 180^\circ$.

B1 [2 marks]

The diagram shows a hexagon. Work out the size of angle y .



Not drawn accurately

Answer

EXAMPLE 2

Each interior angle of a regular polygon is 168° . How many sides does it have?

Hint Work out one exterior angle first. The exterior angles add to 360° .

- B2** Each interior angle of a regular polygon is 172° . How many sides does it have? [2 marks]

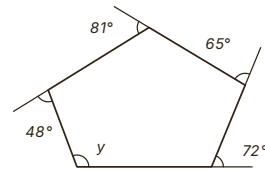
Answer

c Practice

- C1** The interior angles of a polygon add up to 3060° . How many sides does the polygon have? [2 marks]

Answer

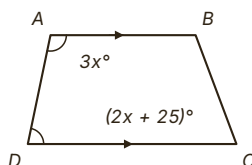
- C2** The diagram shows a pentagon and four of its exterior angles. Work out the size of angle y . [3 marks]



Not drawn accurately

Answer

- C3** $ABCD$ is a trapezium with AB parallel to DC . Work out the size of angle D . [3 marks]



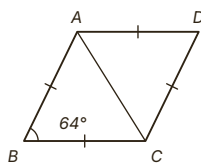
Not drawn accurately

Answer

- C4** Each interior angle of a regular polygon is 132° more than each exterior angle. How many sides does the polygon have? [3 marks]

Answer

- C5** $ABCD$ is a rhombus and AC is a diagonal. Work out the size of angle BAC . [2 marks]



Answer

- C6** A regular hexagon, a square and a third regular polygon fit together round a point with no gaps. How many sides does the third polygon have? [2 marks]

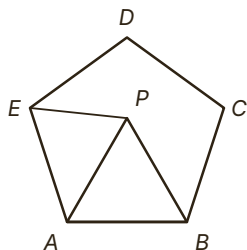
Answer

D Exam-style questions

- D1** Ella says, "If you double the number of sides of a polygon, the sum of its interior angles doubles." [2 marks]

Use a pentagon and a decagon to show that Ella is wrong.

- D2** $ABCDE$ is a regular pentagon. ABP is an equilateral triangle.



- (a) Work out the size of each interior angle of the pentagon. [2 marks]

Answer

- (b) Work out the size of angle PAE . [1 mark]

Answer

- (c) Work out the size of angle AEP . Give reasons for your working. [3 marks]

Total for D2: 6 marks

- D3** The interior angles of a pentagon are $(2x + 10)^\circ$, $(x + 65)^\circ$, $(3x + 5)^\circ$, $(4x - 10)^\circ$ and $(2x + 50)^\circ$. Work out the largest angle. You must show your working. [4 marks]

Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** One regular polygon has n sides. Another has $2n$ sides. Each interior angle of the second polygon is 15° more than each interior angle of the first. Work out n . [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

E1 **Hint 1** Compare the exterior angles instead of the interior angles.

Hint 2 The first exterior angle, $\frac{360}{n}$, is 15° more than $\frac{360}{2n}$.

Hint 3 $\frac{360}{n} - \frac{180}{n} = \frac{180}{n} = 15$, so $n = 12$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can find the angle sum of a polygon and a missing angle.



I can find the number of sides of a regular polygon.



I can use the angles of the special quadrilaterals.

