

ANGLES IN POLYGONS

Mastery Worksheet & Algebraic Problems

I DO

A regular n -sided polygon has an interior angle of $(10x + 18)^\circ$ and an exterior angle of $(2x - 18)^\circ$.
Work out the value of n .

WE DO

A regular n -sided polygon has an interior angle of $(7x + 10)^\circ$ and an exterior angle of $(3x - 30)^\circ$.
Work out the value of n .

YOU DO 1

A regular n -sided polygon has an interior angle of $(13x + 26)^\circ$ and an exterior angle of $(2x + 4)^\circ$.
Work out the value of n .

YOU DO 2

A regular n -sided polygon has an interior angle of $(12x - 4)^\circ$ and an exterior angle of $(3x + 4)^\circ$.
Work out the value of n .

CHALLENGE 1 (RATIO)

The interior angle of a regular polygon is 11 times the size of its exterior angle.

Work out the number of sides, n , of the polygon.

CHALLENGE 2 (TESSELLATION)

An equilateral triangle and two identical regular n -sided polygons meet at a point without any gaps. Work out the value of n .

ANSWERS & WORKED SOLUTIONS

I Do

Step 1: Int + Ext = 180, so $(10x + 18) + (2x - 18) = 180$

Step 2: $12x = 180 \Rightarrow x = 15$

Step 3: Exterior angle = $2(15) - 18 = 12^\circ$

Step 4: $n = 360 \div 12 = 30$

Answer: 30

We Do

Step 1: Int + Ext = 180, so $(7x + 10) + (3x - 30) = 180$

Step 2: $10x - 20 = 180 \Rightarrow 10x = 200 \Rightarrow x = 20$

Step 3: Exterior angle = $3(20) - 30 = 30^\circ$

Step 4: $n = 360 \div 30 = 12$

Answer: 12

You Do 1

Step 1: Int + Ext = 180, so $(13x + 26) + (2x + 4) = 180$

Step 2: $15x + 30 = 180 \Rightarrow 15x = 150 \Rightarrow x = 10$

Step 3: Exterior angle = $2(10) + 4 = 24^\circ$

Step 4: $n = 360 \div 24 = 15$

Answer: 15

You Do 2

Step 1: Int + Ext = 180, so $(12x - 4) + (3x + 4) = 180$

Step 2: $15x = 180 \Rightarrow x = 12$

Step 3: Exterior angle = $3(12) + 4 = 40^\circ$

Step 4: $n = 360 \div 40 = 9$

Answer: 9

Challenge 1

Step 1: Ratio of Int : Ext = 11 : 1

Step 2: Total parts = 12. Exterior angle = $180 \div 12 = 15^\circ$

Step 3: $n = 360 \div 15 = 24$

Answer: 24

Challenge 2

Step 1: Angles around a point sum to 360° . Equilateral triangle angle = 60°

Step 2: $60 + 2 \times \text{Interior Angle} = 360 \Rightarrow 2 \times \text{Interior Angle} = 300 \Rightarrow \text{Interior Angle} = 150^\circ$

Step 3: Exterior angle = $180 - 150 = 30^\circ$

Step 4: $n = 360 \div 30 = 12$

Answer: 12