

E.g. 3 How many sides does the regular polygon have given that each *interior* angle is:

(a) 140°

(b) 170°

Working: (a) Exterior angle = $180^\circ - 140^\circ = 40^\circ$

$$\text{Each exterior angle} = \frac{360^\circ}{n} : 40^\circ = \frac{360^\circ}{n}$$

$$n = \frac{360^\circ}{40^\circ} = 9 \text{ sides}$$

(b) Exterior angle = $180^\circ - 170^\circ = 10^\circ$

$$\text{Each exterior angle} = \frac{360^\circ}{n} : 10^\circ = \frac{360^\circ}{n}$$

$$n = \frac{360^\circ}{10^\circ} = 36 \text{ sides}$$

E.g. 4 Mary claims that she has found a regular polygon whose exterior angles are all 27° . Is she correct? Show your working.

Working: $\text{Each exterior angle} = \frac{360^\circ}{n} : 27^\circ = \frac{360^\circ}{n}$

$$n = \frac{360^\circ}{27^\circ} = 13.\dot{3} \text{ sides}$$

Mary is not correct because the number of sides should be an integer.

E.g. 5 Abdul claims that he has found a regular polygon whose interior angles are four times the size of the exterior angle. If the polygon exists, how many sides does it have?

Working: Let the size of an exterior angle be x .

The size of an interior angle is $4x$.

Exterior angle + Interior angle = 180° :

$$x + 4x = 180^\circ$$

$$5x = 180^\circ$$

$$x = 36^\circ$$

$\text{Each exterior angle} = \frac{360^\circ}{n} : 36^\circ = \frac{360^\circ}{n}$

$$n = \frac{360^\circ}{36^\circ} = 10 \text{ sides}$$

The polygon has 10 sides.

Video: [Angles in polygons](#)

[Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook:

p68 M3.4 Qu 1-8 even, 9-16

A*-G class textbook:

p61 M3.4 Qu 1-15

9-1 homework book:

p22 M3.4 Qu 1-12

A*-G homework book:

p16 M3.4 Qu 1-9