

Polygon Angles

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Find the sum of the interior angles of a hexagon

Step 1 · A hexagon has 6 sides

$$n = 6$$

Step 2 · Number of triangles from one corner

$$6 - 2 = 4$$

Step 3 · Multiply by 180°

$$4 \times 180^\circ = 720^\circ$$

Answer: 720°

Check: A regular hexagon has six 120° angles: $6 \times 120 = 720$ ✓

2. Now try one with the steps

Find each interior angle of a regular octagon

Step 1 · Exterior angle = $360^\circ \div 8$

Step 2 · Interior = $180^\circ - \text{exterior}$

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Find the sum of the interior angles of a pentagon. [1]

2. What do the exterior angles of any polygon add up to? [1]

3. Find each exterior angle of a regular hexagon. [1]

4. Find each interior angle of a regular hexagon. [1]

5. A quadrilateral has angles of 85° , 95° , 110° and x . Find x . [1]
6. Find the sum of the interior angles of a decagon (10 sides). [1]
7. Find each exterior angle of a regular decagon. [1]
8. Find each interior angle of a regular nonagon (9 sides). [2]
9. Each exterior angle of a regular polygon is 30° . How many sides does it have? [1]
10. Each interior angle of a regular polygon is 156° . How many sides does it have? [2]
11. A hexagon has five angles of 115° . Find the sixth angle. [2]
12. A polygon's interior angles add up to 1800° . How many sides does it have? [2]
13. Could a regular polygon have interior angles of 100° ? Explain. [2]
14. A hexagon has angles x , x , $2x$, $2x$, 120° and 120° . Find x . [3]
15. Explain why regular hexagons fit together with no gaps (tessellate). [2]

4. Before you hand it in

Sum of the angles of a hexagon = $6 \times 180^\circ = 1080^\circ$

From one corner a hexagon splits into 4 triangles, not 6, so the sum is $(6 - 2) \times 180^\circ = 720^\circ$.

Finding 'each angle' of an irregular pentagon by doing $540 \div 5$

Only a REGULAR polygon has equal angles. For an irregular one, use the total (540°) and the angles you know to find the missing one.

Each interior angle of a regular octagon = $360 \div 8 = 45^\circ$

$360 \div n$ gives the EXTERIOR angle. The interior angle is $180^\circ - 45^\circ = 135^\circ$.

Thinking the exterior angles of an octagon add up to more than those of a triangle

Every polygon's exterior angles add up to 360° — you always make one full turn walking round it.