Triangle and polygon angles — Teacher answers

Year 8, upper volume • text pp. 5–12 • foundation lessons 3–6

Use the worked model and guided attempt selectively, then the eight core questions. Keep further practice and extensions optional. Ask for a reason and an original-equation or expansion check.

Worked example 1

Two interior angles are 42° and 68°. Find the third angle with a reason.

Reference answer

70 °.

$$180 - 42 - 68$$

1. The three interior angles total 180°.
2. The missing angle is 180−42−68=70°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Guided attempt 2

A convex pentagon is divided from one vertex into triangles. Complete the count and find its interior-angle sum.

1. Number of triangles=5−___=___.
2. Interior sum=___×180°=___.

Reference answer

540 °.

$$(5 - 2) * 180$$

1. A pentagon gives 5−2=3 triangles without overlap.
2. Its interior sum is 3×180°=540°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Prerequisite 3

An interior angle is 65°. Find its adjacent exterior angle.

Reference answer

115 °.

$$180 - 65$$

1. Adjacent interior and exterior angles form a straight angle.
2. 180−65=115°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Prerequisite 4

A right triangle has one acute angle 32°. Find the other acute angle.

Reference answer

58 °.

$$180 - 90 - 32$$

1. The two acute angles total 90°.
2. 90−32=58°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Independent practice 5

Two interior angles of a triangle are 37° and 76°. Find the remaining angle.

Reference answer

67 °.

$$180 - 37 - 76$$

1. Use the triangle interior-angle sum.
2. 180−37−76=67°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Independent practice 6

The two remote interior angles to a triangle exterior angle are 48° and 57°. Find the exterior angle.

Reference answer

105 °.

$$48 + 57$$

1. An exterior angle equals the sum of the remote interior angles.
2. 48+57=105°; the adjacent interior angle is 75°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Independent practice 7

Find the sum of the interior angles of a convex hexagon.

Reference answer

720 °.

$$(6 - 2) * 180$$

1. A hexagon has 6−2=4 triangles in the vertex triangulation.
2. 4×180°=720°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Independent practice 8

Every exterior angle of a regular convex polygon is 24°. How many sides does it have?

Reference answer

15.

$$360/24$$

1. One exterior angle at each vertex, taken in the same turning direction, totals 360°.
2. The number of sides is 360/24=15.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Exit question 9

A triangle interior angle is 112°. Find its adjacent exterior angle.

Reference answer

68 °.

$$180 - 112$$

1. Use the straight angle at that vertex.
2. 180−112=68°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Exit question 10

What is the sum of one exterior angle at each vertex of a convex nonagon, all taken in the same direction?

Reference answer

360 °.

$$360$$

1. Traversing a convex polygon makes one complete turn.
2. The exterior-angle sum is 360°, independent of the number of sides.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 11

A triangle has angles x°,2x° and 3x°. Find x.

Reference answer

30.

$$180/6$$

1. x+2x+3x=180, so 6x=180.
2. x=30; the angles 30°,60°,90° are positive and total 180°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 12

An exterior angle is 121° and one remote interior angle is 54°. Find the other remote interior angle.

Reference answer

67 °.

$$121 - 54$$

1. The two remote interior angles total 121°.
2. The required angle is 121−54=67°; the adjacent interior angle is 59°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 13

Find the interior-angle sum of a convex octagon.

Reference answer

1080 °.

$$(8-2)*180$$

1. Use (n−2)180° with n=8.
2. 6×180°=1080°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Further practice 14

Find each interior angle of a regular convex decagon.

Reference answer

144 °.

$$((10-2)*180)/10$$

1. The interior sum is (10−2)180°=1440°.
2. Divide by 10: each angle is 144°. Its exterior angle is 36°.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Extension 15

A convex polygon has interior-angle sum 1980°. Find its number of sides.

Reference answer

13.

$$1980/180+2$$

1. (n−2)180=1980, so n−2=11.
2. Thus n=13, an integer at least 3.

- Use the stated relationship and show the calculation.
- State the result with its unit where appropriate.

Extension 16

Can 20°,70°,100° be the interior angles of a triangle?

A. Yes: all are positive.
B. Yes: one angle is obtuse.
C. Only for an isosceles triangle.
D. No: their sum is 190°.

Reference answer

No: their sum is 190°.

1. Triangle angles must be positive and total exactly 180°.
2. 20+70+100=190, so the proposed triple is impossible.

- Choose the statement justified by the stated conditions and explain why.