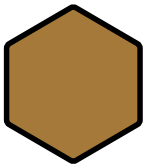
Name & Surname: _____ Class: _____ Date: _____

Angles in Polygons

From triangles to regular polygons

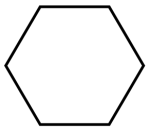
About 50 minutes Level ★★★☆☆



Angle sums you need

A triangle always has angles adding to 180°. Tear off the three corners and they fit exactly on a **straight** line.

- Split any polygon into triangles from one vertex. An n-sided polygon makes n − 2 triangles.
- Sum of **interior** angles = (n − 2) × 180°. Example: pentagon = 3 × 180° = 540°.
- At each vertex interior + exterior = 180°. Exterior angles of any polygon add to 360°.
- In a **regular** polygon all sides and angles are equal, so divide the total by n.



Task A

/4

Practise the arithmetic you need for angle sums. Set out each sum in columns.

1

	1	8	0
+	1	8	0

2

	9	0	0
−	7	7	3

3

	1	8	0
×			5

4

8)	3	6	0

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Find the totals

Practise interior sums and first regular polygon angles.

Key words

interior: angle inside the shape

exterior: angle outside made by extending one side

regular: all sides and all angles equal

irregular: sides and angles not all equal

vertex: corner where two sides meet

Task B /12

Work out each total carefully. Show your triangle split or formula.

WARM UP

1. In a **triangle**, two angles are 60° and 80°. Find the third angle.

Answer: _____

2. Find the **sum** of interior angles in a quadrilateral.

Answer: _____

3. Find the **sum** of interior angles in a pentagon.

Answer: _____

4. Find the **sum** of interior angles in a hexagon.

Answer: _____

PRACTISE

5. Find the **sum** of interior angles in a heptagon (7 sides).

Answer: _____

6. Find the **sum** of interior angles in an octagon (8 sides).

Answer: _____

7. A regular hexagon has **sum** 720°. Find each interior angle.

Answer: _____

8. An irregular pentagon has angles 106°, 135°, 115° and 90°. Find the **missing** angle.

Answer: _____

PROBLEM SOLVING

9. Find each **exterior** angle of a regular pentagon.

Answer: _____

10. A regular polygon has exterior angles of 40°. How many **sides** does it have?

Answer: _____

11. Find each **interior** angle of a regular octagon.

Answer: _____

12. **Explain** how you know the angles in any triangle add to 180°. You can tear the corners or use parallel lines.

Answer: _____

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Spot the mistakes

Find the wrong step in each pupil's working.

Task C /6

Find the wrong step, explain the mistake and write the correct answer.



Student A

Find the sum of interior angles of a hexagon.

1. n = 6
2. Sum = n × 180° = 6 × 180°
3. So the sum = 1080°

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____



Student B

Find each exterior angle of a regular pentagon.

1. Sum of exterior angles = 360°
2. Each angle = 180° ÷ 5 = 36°
3. So each exterior angle = 36°

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____



Student C

Find the exterior angle of a regular octagon with interior angle 135°.

1. Interior angle = 135°
2. Interior + exterior = 180°
3. So exterior = 135° + 180° = 315°

The mistake is in step: _____

What went wrong?

.....

Correct answer: _____

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Use polygon rules

Solve harder polygon problems including real-life contexts.

Task D /12

Use the rules for interior and exterior angles to solve each problem.

WARM UP

1. Find the **sum** of interior angles in a decagon (10 sides).

Answer: _____

2. Find the **sum** of interior angles in a nonagon (9 sides).

Answer: _____

3. Find each **exterior** angle of a regular hexagon.

Answer: _____

4. Find each **exterior** angle of a regular decagon.

Answer: _____

PRACTISE

5. An irregular hexagon has angles 120°, 130°, 110°, 125° and 115°. Find the **missing** angle.

Answer: _____

6. The interior angle of a regular polygon is 156°. How many **sides** does it have?

Answer: _____

7. Find each **interior** angle of a regular dodecagon (12 sides).

Answer: _____

8. A quadrilateral has angles 80°, 95° and 100°. Find the **missing** angle.

Answer: _____

PROBLEM SOLVING

9. Three regular hexagonal floor tiles meet at a point with no gap. Each interior angle is 120°. What **total** do the three angles make?

Answer: _____

10. A picture frame is an irregular pentagon. Four angles are 90°, 90°, 110° and 100°. Find the **missing** angle.

Answer: _____

11. A fence panel is a regular nonagon (9 sides). Find each **exterior** angle.

Answer: _____

12. A student says a regular polygon with interior angle 175° has 72 sides. **Explain** how you know they are right.

Answer: _____

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Finish and check

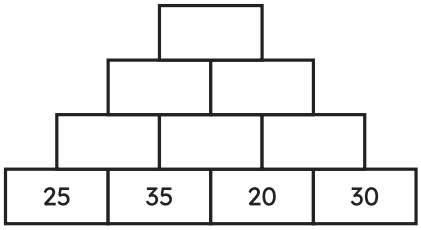
Add quickly, then use angle facts on diagrams.

Task E

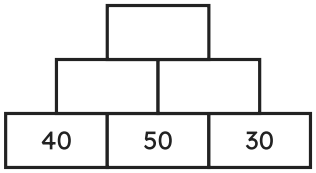
/9

Each brick is the sum of the two bricks below it. Fill the pyramid.

1



2

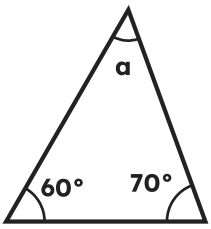


Task F

/4

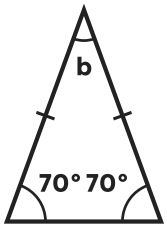
Find the missing angle in each diagram.

1



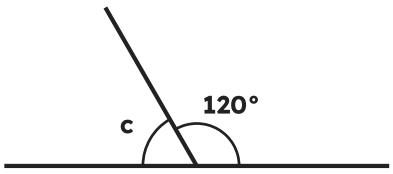
a = _____ °

2



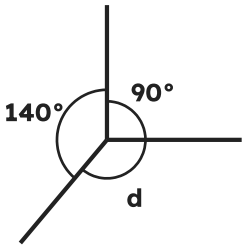
b = _____ °

3



c = _____ °

4



d = _____ °

The diagrams are drawn to size.

How did I do?

Circle a face for each line.

I can use 180° in a triangle to find the angle sum of any polygon.	☹	😐	☺
I can find missing interior angles in irregular polygons.	☹	😐	☺
I can find interior and exterior angles of regular polygons.	☹	😐	☺

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Answer sheet: Angles in Polygons

Task A

1. 180 + 180 = 360
2. 900 − 773 = 127
3. 180 × 5 = 900
4. 360 ÷ 8 = 45

Task B

1. 40°
2. 360°
3. 540°
4. 720°
5. 900°
6. 1080°
7. 120°
8. 94°
9. 72°
10. 9 sides
11. 135°
12. The three corners fit exactly on a straight line, which is 180°.

Task C

1. Step 2 is wrong: They multiplied by n without subtracting 2. A hexagon splits into 4 triangles, not 6. Correct answer: 720°
2. Step 2 is wrong: They divided 180° instead of 360°. Exterior angles of any polygon add to 360°. Correct answer: 72°
3. Step 3 is wrong: They added instead of subtracting. Exterior = 180° − interior. Correct answer: 45°

Task D

1. 1440°
2. 1260°
3. 60°
4. 36°
5. 120°
6. 15 sides
7. 150°
8. 85°
9. 360°
10. 150°
11. 40°
12. Exterior is 5° and 360° ÷ 5° = 72 sides, so they are right.

Task E

1. 220 | 115, 105 | 60, 55, 50 | 25, 35, 20, 30 (top to bottom)
2. 170 | 90, 80 | 40, 50, 30 (top to bottom)

Task F

a = 50° (angles in a triangle add up to 180°)

b = 40° (the two base angles are equal, and the angles add up to 180°)

c = 60° (angles on a straight line add up to 180°)

d = 130° (angles around a point add up to 360°)

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