

Name _____

Date _____

8.1 Polygons — worksheet

Name and classify polygons by their properties, and use the angle sum and the exterior-angle rule. · 68 questions · Show your working.

Remember

- A **polygon** is a closed shape with straight sides. It is **regular** only if the sides *and* the angles are all equal.
- The interior angles of an n -sided polygon total $180(n - 2)^\circ$ — it splits into $n - 2$ triangles.
- For a regular polygon, each interior angle is $180(n - 2) \div n$.
- The **exterior angles of any polygon total 360°** , whatever the number of sides.
- So each exterior angle of a regular n -gon is $360 \div n$.
- An interior angle and its exterior angle lie on a straight line, so they add to 180° .
- Going through the exterior angle is usually the quicker route: one fixed total and one division.
- If $360 \div (\text{exterior angle})$ is not a whole number, no such regular polygon exists.

A · Fluency — Names, sides and angles.

- 1 How many sides does a **triangle** have?

- 2 How many sides does a **quadrilateral** have?

- 3 How many sides does a **pentagon** have?

- 4 How many sides does a **hexagon** have?

- 5 How many sides does a **heptagon** have?

- 6 How many sides does a **octagon** have?

- 7 How many sides does a **nonagon** have?

- 8 How many sides does a **decagon** have?

- 9 How many sides does a **hendecagon** have?

- 10 How many sides does a **dodecagon** have?

- 11 What is the name of a polygon with 3 sides?

- 12 What is the name of a polygon with 4 sides?

- 13 What is the name of a polygon with 5 sides?

- 14 What is the name of a polygon with 6 sides?

- 15 What is the name of a polygon with 7 sides?

- 16 What is the name of a polygon with 8 sides?

- 17 What is the name of a polygon with 9 sides?

- 18 What is the name of a polygon with 10 sides?

- 19 What is the name of a polygon with 11 sides?

- 20 What is the name of a polygon with 12 sides?

- 21 What do the interior angles of a **quadrilateral** add up to, in degrees?

- 22 What do the interior angles of a **pentagon** add up to, in degrees?

- 23 What do the interior angles of a **hexagon** add up to, in degrees?

- 24 What do the interior angles of a **heptagon** add up to, in degrees?

- 25 What do the interior angles of a **octagon** add up to, in degrees?

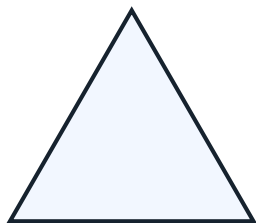
- 26 What do the interior angles of a **nonagon** add up to, in degrees?

- 27 What do the interior angles of a **decagon** add up to, in degrees?

- 28 What do the interior angles of a **hendecagon** add up to, in degrees?

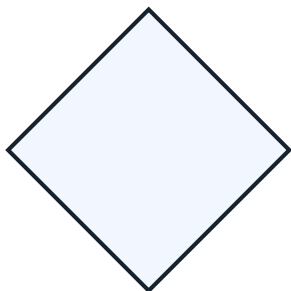
- 29 What do the interior angles of a **dodecagon** add up to, in degrees?

- 30 Each interior angle of a **regular triangle** is how many degrees?



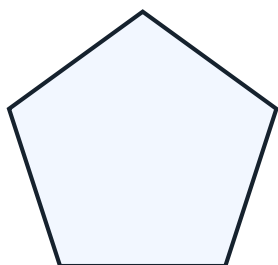
regular triangle

- 31** Each interior angle of a **regular quadrilateral** is how many degrees?



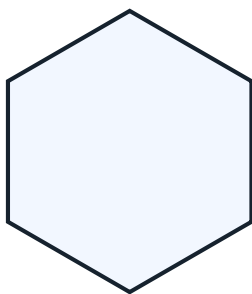
regular quadrilateral

- 32** Each interior angle of a **regular pentagon** is how many degrees?



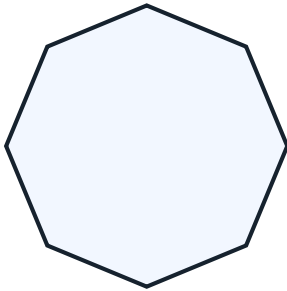
regular pentagon

- 33** Each interior angle of a **regular hexagon** is how many degrees?



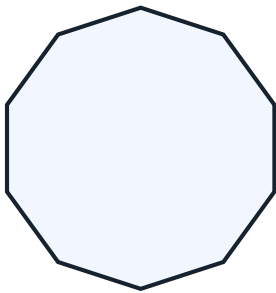
regular hexagon

- 34 Each interior angle of a **regular octagon** is how many degrees?



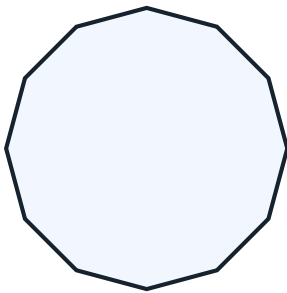
regular octagon

- 35 Each interior angle of a **regular decagon** is how many degrees?



regular decagon

- 36 Each interior angle of a **regular dodecagon** is how many degrees?



regular dodecagon

- 37 Each exterior angle of a **regular pentagon** is how many degrees?

- 38 Each exterior angle of a **regular hexagon** is how many degrees?

- 39 Each exterior angle of a **regular octagon** is how many degrees?

- 40 Each exterior angle of a **regular decagon** is how many degrees?

- 41 Each exterior angle of a **regular dodecagon** is how many degrees?
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- 42 Each exterior angle of a **regular triangle** is how many degrees?
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- 43 Each exterior angle of a **regular quadrilateral** is how many degrees?
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B · Reasoning — Where the rules come from.

- 44 What makes a polygon **regular**?
- ☐ All its sides are equal
 - ☐ All its angles are equal
 - ☐ All its sides are equal and all its angles are equal
 - ☐ It has an even number of sides
- 45 Why do the interior angles of a pentagon total 540° ?
- ☐ Because $5 \times 108 = 540$
 - ☐ Because it splits into 3 triangles, and $3 \times 180 = 540$
 - ☐ Because $540 \div 5 = 108$
 - ☐ There is no reason
- 46 What do the exterior angles of **any** polygon add up to?
- ☐ 180°
 - ☐ 360°
 - ☐ 540°
 - ☐ It depends on the number of sides
- 47 An interior angle and its exterior angle always ...
- ☐ are equal
 - ☐ add to 90°
 - ☐ add to 180°
 - ☐ add to 360°
- 48 Is every rectangle a regular polygon?
- ☐ Yes
 - ☐ No
- 49 Is a square a regular polygon?
- ☐ Yes
 - ☐ No
- 50 Can a polygon have exactly two sides?
- ☐ Yes
 - ☐ No
- 51 Which of these is **not** a polygon?
- ☐ a triangle
 - ☐ a circle
 - ☐ a hexagon
 - ☐ a square

52 A regular polygon has an exterior angle of 40° . How many sides has it?

- ☐ 6
- ☐ 8
- ☐ 9
- ☐ 10

53 Why is the exterior-angle route usually quicker?

- ☐ The numbers are smaller and the total is always 360°
- ☐ Because interior angles are hard
- ☐ It is not quicker
- ☐ Because polygons are regular

C · Challenge — Working backwards to the shape.

54 A regular polygon has an interior angle of 150° . How many sides has it?

55 A regular polygon has an interior angle of 140° . How many sides has it?

56 The interior angles of a polygon total 1440° . How many sides has it?

57 The interior angles of a polygon total 900° . How many sides has it?

58 A regular polygon has 15 sides. What is each exterior angle, in degrees?

59 A regular polygon has 18 sides. What is each interior angle, in degrees?

60 Can a regular polygon have an interior angle of 100° ?

- ☐ Yes
- ☐ No

D · Word problems — Polygons in the real world.

61 A stop sign is a regular octagon. What is each interior angle, in degrees?

62 A honeycomb cell is a regular hexagon. What is each interior angle, in degrees?

63 A 50p coin has 7 sides. What is the name of that polygon? Give the number of sides.

64 A floor tile is a regular pentagon. What is each interior angle, in degrees?

65 Three regular hexagons meet at a point on a honeycomb. Do their angles fit exactly? Give the total, in degrees.

66 A road sign is a triangle. What do its angles total, in degrees?

67 A window frame is a regular dodecagon. What is each exterior angle, in degrees?

68 A garden bed is a regular decagon. What do its interior angles total, in degrees?
