Name _____ Date _____

Unit 8 · Shapes and symmetry — revision sheet

Everything you need from every section. Read it before the end-of-unit test.

8.1 Polygons

• 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)°** — it splits into n − 2 triangles.
• For a regular polygon, each interior angle is 180(n − 2) ÷ 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 ÷ 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 ÷ (exterior angle) is not a whole number, no such regular polygon exists.

Key words: *polygon · regular polygon · vertex · interior angle · exterior angle · angle sum · pentagon · hexagon · octagon*

```
3 sides triangle 6 sides hexagon
4 sides quadrilateral 8 sides octagon
5 sides pentagon 10 sides decagon
rhombus sides ✓ angles ✗
rectangle sides ✗ angles ✓
square sides ✓ angles ✓ → regular
quadrilateral: 2 triangles → 360°
```

8.2 The parts of a circle

- The **centre** is the middle; the **radius** reaches from it to the edge.
- The **diameter** goes right across through the centre, so **d = 2r** and **r = d ÷ 2**.
- The **circumference** is the distance all the way round — the perimeter of a circle.
- A **chord** joins two points on the circle. The diameter is the longest chord.
- An **arc** is a part of the circumference.
- A circle has **infinitely many lines of symmetry** — every line through the centre.
- Its order of rotational symmetry is infinite: any turn about the centre leaves it unchanged.
- Read the question carefully: “how wide across” means the diameter, “how far from the middle” means the radius.

Key words: *centre · radius · diameter · circumference · chord · arc*

```
centre → edge radius
edge → centre → edge diameter
all the way round circumference
r = 7 cm → d = 14 cm
d = 26 cm → r = 13 cm
every diameter is a chord ✓
every chord is a diameter ✗
```

8.3 Symmetry

- A **line of symmetry** is a fold line: the two halves match exactly.
- The **order of rotational symmetry** is how many times a shape looks the same in one full turn.
- The smallest turn that works is **360 ÷ order**.
- The smallest possible order is **1**, not 0 — every shape returns to itself after a full turn.
- A **regular n-gon** has exactly **n lines of symmetry** and order **n**.
- The two kinds of symmetry are independent: a parallelogram has **no lines** but order **2**.
- A circle has infinitely many lines and infinite order.
- Check a fold line by imagining the paper folded — “it looks about right” is not enough.

Key words: *line of symmetry · reflective symmetry · rotational symmetry · order of rotational symmetry · centre of rotation*

```
rectangle 2 lines
equilateral triangle 3 lines
parallelogram 0 lines
circle infinitely many
square: same at 90°, 180°, 270°, 360°
order 4, smallest turn 90°
scalene triangle → order 1
```

8.4 3D shapes and nets

- A **face** is a flat surface, an **edge** is where two faces meet, a **vertex** is a corner.
- A **net** is the flat shape that folds up into the solid — a box cut open and laid out.
- A **prism** has the same cross-section all the way along; a **pyramid** rises to a single apex.
- A prism on an n-sided shape has **n + 2 faces**, **3n edges** and **2n vertices**.
- A pyramid on an n-sided base has **n + 1 faces**, **2n edges** and **n + 1 vertices**.
- **Euler's rule**: faces + vertices − edges = **2** for any solid with flat faces and no holes.
- Use Euler's rule as a check on every count you make.
- A cube has **eleven** different nets — there is rarely only one right answer.

Key words: *face · edge · vertex · net · prism · pyramid · cross-section*

```
cube: 6 faces, 12 edges, 8 vertices
tetrahedron: 4 faces, 6 edges, 4 vertices
triangular prism: 2 + 3 = 5 faces
hexagonal prism: 2 + 6 = 8 faces
edges: 3n vertices: 2n
square-based: 1 + 4 = 5 faces, 5 vertices, 8 edges
hexagonal: 1 + 6 = 7 faces, 7 vertices, 12 edges
```