Unit 15 · Congruent Figures

STUDY NOTES

Key terms

Congruent figures: the **same shape and the same size**; one fits exactly on the other.

Corresponding corners, sides, angles: the ones that lie on each other when one figure is laid on the other.

Similar figures: the same shape, different sizes (Grade 8); **not** congruent.

Testing for congruence

- surest test: **lay one on the other**; every edge and corner matches, nothing sticks out
- set squares from the same kind of box: congruent; a 45°, 45°, 90° and a 30°, 60°, 90° set square: not
- a rectangle folded in half and cut along the fold: two congruent halves
- trace one figure on tracing paper, cut it out, lay it on the other
- sides written on the figures: compare the **shapes**, then the matching **sides**
  - squares of side 2 cm and 2 cm: congruent; rectangle 4 cm by 3 cm: neither
  - on squared paper: count the squares for each side

Writing it

- in congruent figures: corresponding sides equal, corresponding angles equal
- $\triangle ABC \cong \triangle XYZ$: "is congruent to"; letters in **matching order**: A with X, B with Y, C with Z
- so $AB = XY$, $BC = YZ$, $CA = ZX$ and $\angle A = \angle X$, $\angle B = \angle Y$, $\angle C = \angle Z$

Slide, turn, flip

- moving a figure by **sliding**, **turning** or **flipping** (turning over) changes neither its shape nor its size: still congruent
- a mirror image fits only after it is flipped
- hands in *namaskar*: outlines congruent, each the other **flipped**; real hands are solids and can't be flipped (a left glove won't fit the right hand)
- Rs 1 and Rs 2 coins: both circles, different sizes → **not** congruent; two Rs 2 coins of one issue are
- not congruent:
  - **same shape, bigger**: a photo printed small and large; a triangle with every side 1.3 times as long
  - **same area, different shape**: a square and a rectangle covering as much paper

Back to the tiles

- tiles from one box: one mold → congruent; the spare fits with no measuring
- key and copy: the machine moves the old key along a guide while the cutter cuts the blank → each notch as deep
- a tile fits turned round or upside down (turning and flipping keep it congruent); a key must go in the right way up, but is the same key

Where it is used

- **interchangeable parts**: Honoré Blanc's musket locks, about 1778: any spare fits; nuts and bolts, bulbs and sockets, chargers
- tiles and bricks from one mold: no gaps
- photocopy at 100%: congruent; at 50% or 200%: similar

COMMON MISTAKES

✗ same shape, so congruent (small and large prints)
✓ same shape **and** same size.

✗ same area, so congruent (a square and a rectangle)
✓ the shapes must match too.

✗ a flipped copy is not congruent
✓ sliding, turning and flipping keep it congruent.

✗ $\triangle ABC \cong \triangle XYZ$ with A matching Y
✓ matching corners in matching order.