

**Key focus**

This objective develops students' understanding of shape relationships, specifically similarity and congruence. Students learn to identify when shapes are similar (same shape, different size) versus congruent (identical in both shape and size), and to use scale factors to find missing dimensions. This is foundational for understanding proportional reasoning and for later trigonometry work.

Suggested teaching sequence

1. Introduce congruence: Show two identical shapes and explain that congruent shapes are exactly the same in shape and size. All corresponding sides are equal, and all corresponding angles are equal.
2. Introduce similarity: Show shapes that have the same shape but different sizes (e.g., two rectangles with the same proportions but different lengths). Explain that similar shapes have equal corresponding angles, but corresponding sides are in proportion.
3. Find corresponding sides: Using two similar shapes, identify which sides correspond to each other. Practice labelling and matching sides systematically.
4. Calculate scale factors: Compare the lengths of corresponding sides to find the scale factor (ratio of enlargement or reduction). Show that all corresponding sides have the same ratio.
5. Apply scale factors: Use the scale factor to calculate missing side lengths in similar shapes. Practice with both enlargement (scale factor > 1) and reduction (scale factor < 1).
6. Identify similarity from angles: Show that two shapes are similar if all corresponding angles are equal, and use this to verify similarity before calculating side lengths.
7. Solve real-world problems: Apply similarity to problems such as finding the height of a building using similar triangles, or scaling recipes or models.
8. Connect to congruence: Explain that congruent shapes are a special case of similar shapes where the scale factor is 1.

Core examples to model

- Identifying similarity: Two triangles with angles 50° , 60° , and 70° are similar to each other. The first has sides 3 cm, 4 cm, and 5 cm; the second has sides 6 cm, 8 cm, and 10 cm. The scale factor is 2.
- Finding missing sides: A rectangle is similar to another rectangle. The first has length 8 cm and width 5 cm. The second has length 12 cm. Find the width: $\text{width} = 5 \times \frac{12}{8} = 7.5$ cm.
- Scale factor from areas: If the linear scale factor is 2, the area scale factor is $2^2 = 4$. A shape with area 10 cm^2 becomes 40 cm^2 when enlarged by scale factor 2.
- Congruent shapes: Two squares each with side 4 cm are congruent (scale factor = 1).
- Corresponding angles in similarity: If triangle ABC is similar to triangle DEF , then $\angle A = \angle D$, $\angle B = \angle E$, and $\angle C = \angle F$.

Watch for

- Confusing similarity with congruence: Remind students that similar shapes have proportional sides but may not be the same size. Congruence requires both shape and size to be identical.
- Incorrectly matching corresponding sides: Students may match sides by position rather than by correspondence. Reinforce systematic labelling (e.g., side AB corresponds to side DE).
- Forgetting to apply the scale factor consistently: All corresponding sides must use the same scale factor. If one side doesn't match the ratio, the shapes are not similar.
- Confusing scale factor with area factor: The area scale factor is the square of the linear scale factor, not the same value.
- Assuming shapes are similar just because they have the same angles: While equal angles suggest similarity, students should verify by checking that sides are proportional.

Checks for understanding

- Can students identify which sides are corresponding in two similar shapes?
- Can they calculate the scale factor between two similar shapes?
- Can they find missing side lengths using the scale factor?
- Do they understand the difference between similar and congruent shapes?
- Can they explain why corresponding angles must be equal in similar shapes?
- Can they apply similarity to solve practical problems?
- Do they recognise that all corresponding sides must have the same ratio for shapes to be similar?