

# GCSE Maths – Ratio, Proportion and Rates of Change

## Scale Factors and Scale Diagrams

Worksheet

NOTES



SOLUTIONS



This worksheet will show you how to work out different types of scale factors and scale diagrams questions. Each section contains a **worked example**, a **question with hints** and then **questions for you to work through** on your own.

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## Section A

### Worked Example

Each side of square  $abcd$  has a length of 7 cm. An enlargement of this square,  $ABCD$ , has sides of length 35 cm. Work out the scale factor for this enlargement.

**Step 1:** Identify corresponding sides of the smaller and larger shapes.

*Since this shape is a square, all sides are the same length, so all sides are corresponding between the larger and smaller square.*

**Step 2:** Work out  $\frac{\text{larger}}{\text{smaller}}$  to find the scale factor. If trying to find the length of a side of a larger shape, multiply the smaller length by the scale factor.

$$\text{Scale factor} = \frac{35 \text{ cm}}{7 \text{ cm}} = 5$$

*Therefore, the scale factor is 5, because the sides of the larger square are 5 times larger than the smaller square.*

### Guided Example

An equilateral triangle  $ABC$  has sides of length 2.5 cm. It is enlarged by scale factor 3. Calculate the lengths of the larger triangle.

**Step 1:** Identify corresponding sides of the smaller and larger shapes.

**Step 2:** Multiply the smaller length by the scale factor.





## Section B

### Worked Example

On a floor plan of a house, the kitchen is shown as being 4 cm in length and 6 cm in width. The scale factor of the plan is 1:100. Calculate the actual length and width of the kitchen.

**Step 1:** Convert all distances into the same units if possible.

*As we only know the diagram distance, we cannot convert any others. If we needed to convert any others, we convert them to the smallest unit available (usually cm).*

**Step 1:** Use the equation  $Scale\ Factor = \frac{Real\ Life\ Distance}{Diagram\ Distance}$  to calculate the quantity required.

*The scale factor is 100, meaning that 1 cm on the plan is equal to 100 cm in real life.*

*Substituting what we know into the equation gives:*

$$100 = \frac{Real\ Life\ Distance}{4\ cm} \text{ for the length}$$

$$100 = \frac{Real\ Life\ Distance}{6\ cm} \text{ for the width}$$

*Multiplying the scale factor by the diagram distance gives us the real-life measurements:*

*Length:*  $100 \times 4\ cm = 400\ cm\ (4\ m)$

*Width:*  $100 \times 6\ cm = 600\ cm\ (6\ m)$

### Guided Example

On a map, the distance between points A and B is 8 cm. In real life, the distance between points A and B is 8 km. Calculate the scale factor of this map.

**Step 1:** Convert all distances into the same units if possible.

**Step 2:** Use the equation  $Scale\ Factor = \frac{Real\ Life\ Distance}{Diagram\ Distance}$  to calculate the quantity required.





8. The grid shows a shape called Shape A. It has an area of  $12 \text{ cm}^2$ . Work out the area of Shape A after an enlargement of scale factor 2.

