

Exercise walk-through

C4.4

Similarity

IGCSE Mathematics

You must be able to

- Match corresponding vertices and lengths
- Use a length scale factor in both directions
- Check that all corresponding side ratios agree

1

The method

Method — Key knowledge: Similarity

Similar shapes have equal corresponding angles and equal ratios of corresponding lengths. Match sides in the same relative position; do not match only by appearance. Find the length scale factor $k = \text{new length} / \text{original length}$ and multiply every original length by k . In reverse, divide by k . Core similarity calculations are about lengths, not area or volume factors.

Exercises 2.1·2.3

2.1 Corresponding sides are 3 cm and 12 cm. Find the scale factor from small to large.[2]

2.2 With scale factor 3, a 7 cm side becomes what length? [2]

2.3 A 24 cm side is in a larger shape of scale factor 4. Find the corresponding smaller side. [2]

Exercises 2.1·2.3

2.1 Corresponding sides are 3 cm and 12 cm. Find the scale factor from small to large.[2]

2.1

- $k = 12/3 = 4$.

2.2 With scale factor 3, a 7 cm side becomes what length? [2]

2.2

- $L = kl = 3(7) = \mathbf{21}$ cm.

2.3 A 24 cm side is in a larger shape of scale factor 4. Find the corresponding smaller side. [2]

2.3

- $l = L/k = 24/4 = \mathbf{6}$ cm.

Exercise 2.4

2.4 Rectangles are 4×6 cm and 6×9 cm. Are they similar? Show the ratios. [2]

3 Exam-style questions

Exercise 2.4

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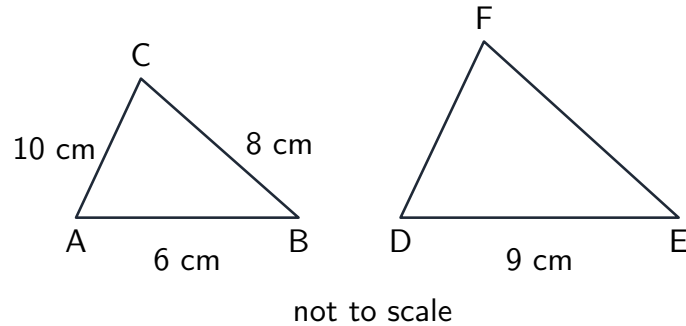
3 Exam-style questions

2.4

- $6/4 = 1.5$ and $9/6 = 1.5$ with equal right angles, so **yes**.

Setup for exercise 3.1

3.1 Apply the similarity methods below. Show working and include units where appropriate.



Exercise 3.1 (a)

(a) Similar triangles ABC and DEF have corresponding vertices in order. $AB = 6$ cm, $BC = 8$ cm, $AC = 10$ cm and $DE = 9$ cm. Find the scale factor. [2]

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(a)

- AB corresponds to DE : $k = 9/6 = \mathbf{1.5}$.

Exercise 3.1 (b)

(b) Find EF and DF.

[2]

Exercise 3.1 (b)

(b) Find EF and DF .

[2]

(b)

- $EF = 1.5(8) = \mathbf{12}$ cm; $DF = 1.5(10) = \mathbf{15}$ cm.

Exercise 3.1 (c)

- (c) Find the perimeter of DEF and compare it with the perimeter of ABC. [2]

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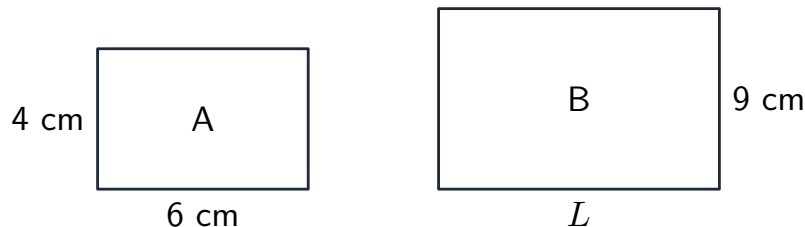
(c) Find the perimeter of DEF and compare it with the perimeter of ABC. [2]

(c)

- $P_{DEF} = 9 + 12 + 15 = \mathbf{36}$ cm; $P_{ABC} = 24$ cm, so the perimeter is **1.5 times** as large.

Exercise 3.2 (a)

3.2 Similar rectangles A and B have corresponding shorter sides 4 cm and 9 cm. The longer side of A is 6 cm.



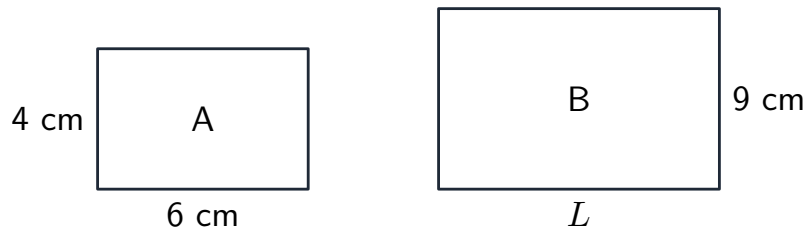
not to scale

(a) Find the length scale factor from A to B and the longer side of B.

[3]

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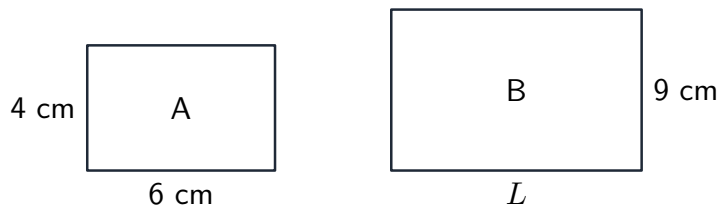
[3]

(a)

- Use $k = \text{new/original} = 9/4 = \mathbf{2.25}$.
- Longer side $L = kl = 2.25(6) = \mathbf{13.5}$ cm.

Exercise 3.2 (b)

3.2 Similar rectangles A and B have corresponding shorter sides 4 cm and 9 cm. The longer side of A is 6 cm.

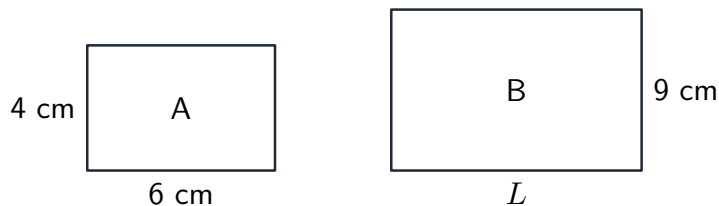


not to scale

(b) A third rectangle has sides 6 cm and 12 cm. Decide whether it is similar to A, supporting your decision with both side ratios. [3]

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not to scale

(b) A third rectangle has sides 6 cm and 12 cm. Decide whether it is similar to A, supporting your decision with both side ratios. [3]

(b)

- Shorter-side ratio $k_s = 6/4 = 1.5$.
- Longer-side ratio $k_l = 12/6 = 2$.
- They differ, so the third rectangle is **not similar** to A.