MATHEMATICS · GRADES 7-9

Similar figures

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you work out the real height of a tree from its photo, or how big to print a picture so it fits a frame without stretching it. A surveyor measuring a tree from its shadow uses the same idea, comparing the tree's shadow with a stick of known height. A framer sizing a print knows the photo must keep its shape, so the width and height change together. Knowing similar figures tells you how to use a scaled copy to find a real length you cannot measure directly.



Rule

Similar figures: similar figures have exactly the same shape.

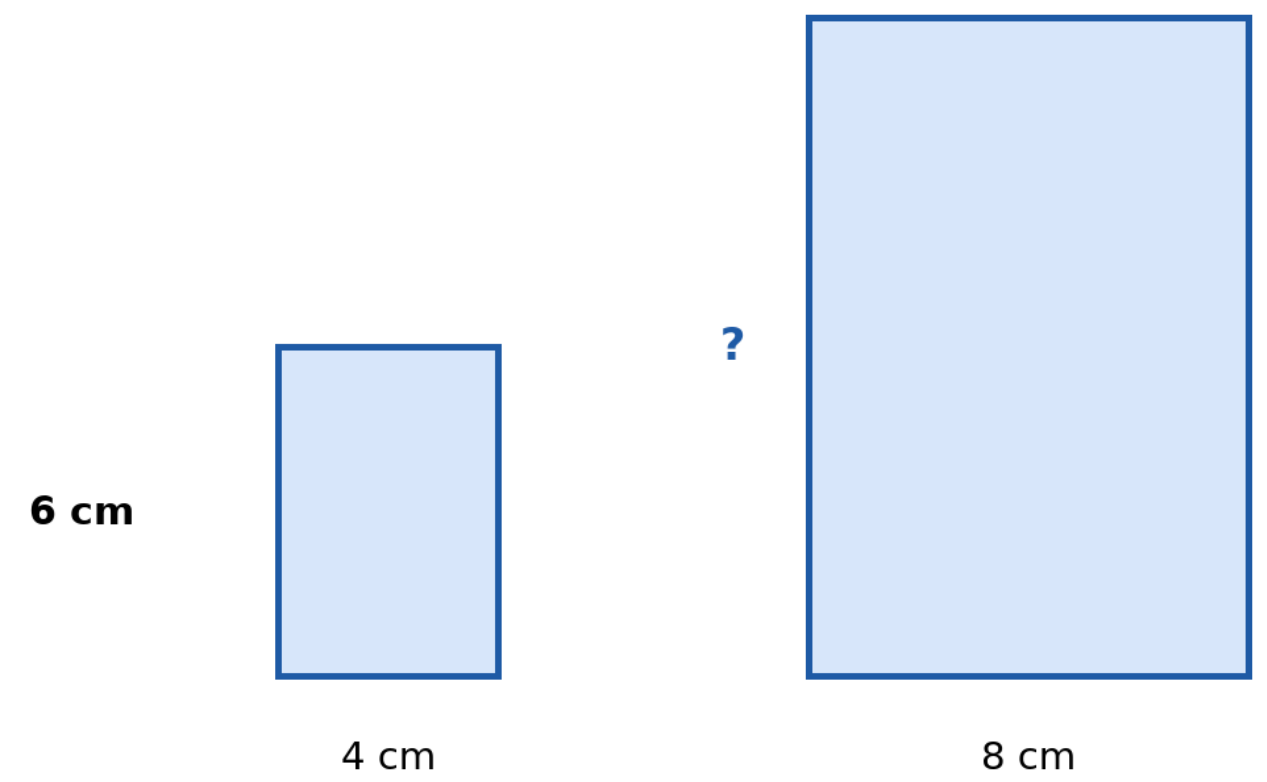
Matching angles are equal, and matching sides are in the same ratio. Any side = matching side × scale factor.

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Worked examples

EXAMPLE 1

Q Two similar rectangles: the first is 4 cm by 6 cm, the second has matching width 8 cm. Find its matching length.



SOLUTION

Picture it

$\frac{4}{6}$

Find the scale factor from matching widths: 8 ÷ 4 = 2.

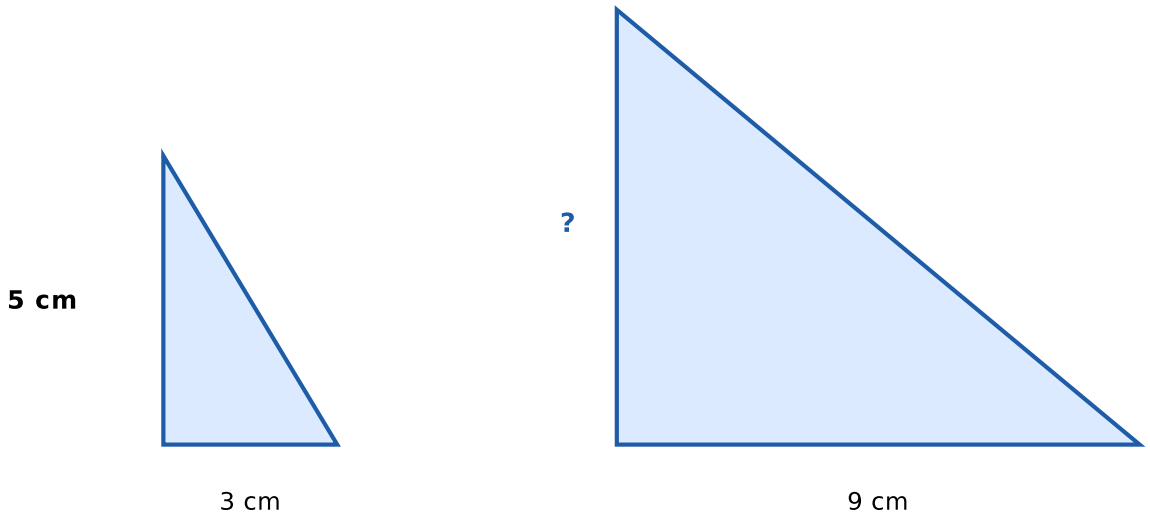
Multiply the other side by the same factor: 6 × 2 = 12.

So the matching length is 12 cm.

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EXAMPLE 2

Q **Two similar triangles: sides 3 cm and 9 cm match. Another side is 5 cm in the small triangle. Find its match.**



SOLUTION

Picture it

$\frac{3}{9}$

Find the scale factor: 9 ÷ 3 = 3.

Multiply the other side by 3: 5 × 3 = 15.

So the matching side is 15 cm.

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Practice questions

1 Similar squares: side 2 cm matches side 6 cm. Another side 2 cm matches what length?

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2 Are two rectangles with sides 3 cm by 5 cm and 6 cm by 9 cm similar? Answer yes or no.

A Yes

B No

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3 Two similar triangles have a scale factor of 2. The smaller triangle has perimeter 15 cm. What is the larger triangle's perimeter?

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4 Similar figures with scale factor 3. A side of 9 cm matches what?

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5 Similar figures with scale factor $\frac{1}{2}$. A side of 10 cm matches what?

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6 A map uses a scale where 1 cm represents 5 km. Two towns are 8 cm apart on the map. How far apart are they really?

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7 Are all squares similar? Answer yes or no.

A Yes

B No

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8 A photo 4 cm wide is enlarged by scale factor 2.5. What is the new width?

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9 What is the scale factor from a 3 cm side to a 12 cm side?

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10

Similar rectangles: length 12 cm matches 4 cm. Width 9 cm matches what?

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ANSWER KEY

1. 6 cm

2. No

3. 30 cm

4. 27 cm

5. 5 cm

6. 40 km

7. Yes

8. 10 cm

9. 4

10. 3 cm

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