MATHEMATICS · GRADES 7-9

Scale drawings

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how an architect draws a whole house on one sheet of paper, or a builder reads that plan to know exactly how long each real wall should be. A builder who misreads the scale on a plan can frame a wall a metre too short. A model maker building a miniature house works from a scale drawing to get every room in proportion. Knowing scale drawings tells you how to shrink a real thing onto paper, and how to read it back to full size without error.



Rule

Scale drawings: the scale tells you what one unit on the drawing stands for in real life.

Real length = drawing length × scale, and drawing length = $\frac{\text{real length}}{\text{scale}}$.

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Worked examples

EXAMPLE 1

Q A drawing uses a scale of 1 cm to 4 m. A wall measures 5 cm on the drawing. How long is the real wall?



SOLUTION

Picture it

$\frac{1}{4}$

Write the scale as a ratio: 1 cm stands for 4 m.

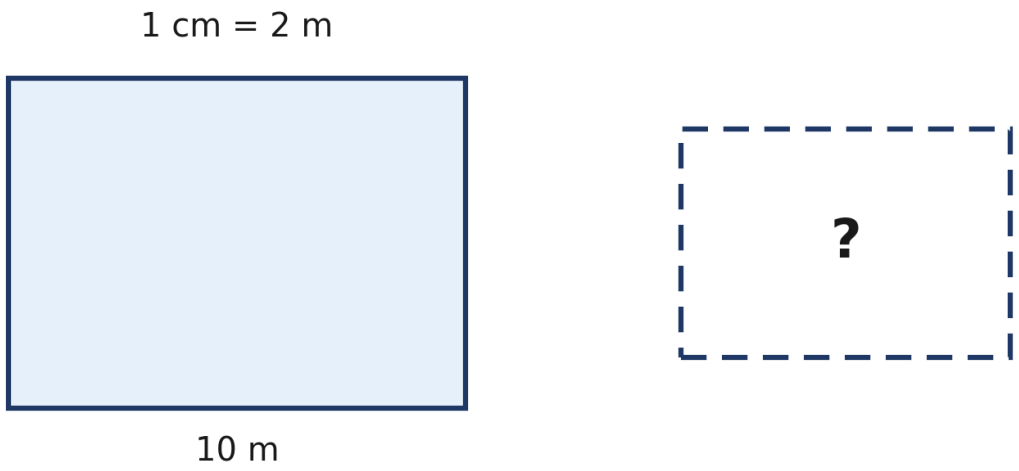
Multiply the drawing length by 4: $5 \times 4 = 20$.

So the real wall is 20 m long.

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EXAMPLE 2

Q A drawing uses a scale of 1 cm to 2 m. A real room is 10 m long. How long is it on the drawing?



SOLUTION

Picture it

$\frac{1}{2}$

Write the scale as a ratio: 1 cm stands for 2 m.

Divide the real length by 2: 10 ÷ 2 = 5.

So the room is 5 cm on the drawing.

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Practice questions

1. An architect's plan uses a scale of 1 cm to 3 m. A wall measures 4 cm on the plan. How long is the real wall?

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2. A plan uses a scale of 1 cm to 5 m. A real room is 25 m long. How long is it on the plan?

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3. A wall is 4 cm long on a plan and 8 m long in real life. How many metres does 1 cm on the plan stand for?

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4 A model house uses a scale of 1:50. A model wall is 6 cm long. How long is the real wall in centimetres?

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5 A map uses a scale of 1 cm to 10 km. Two towns are 3 cm apart on the map. How far apart are they really, in metres?

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6 A plan uses a scale of 1 cm to 4 m. A room measures 9 cm by 5 cm on the plan. What is the real perimeter of the room?

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7 A drawing uses a scale of 1:100. A door measures 2 cm on the drawing. How long is the real door in metres?

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8 A floor plan uses a scale of 1 cm to 6 m. A room measures 8 cm by 5 cm on the plan. What is the real area of the room?

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9 A plan uses a scale of 1 cm to 3 m. A real fence is 2100 cm long. How long is it on the plan, in centimetres?

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10 A model car uses a scale of 1:20. The real car is 100 cm long. How long is the model in centimetres?

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ANSWER KEY

1. 12 m

2. 5 cm

3. 2 m

4. 300 cm

5. 30000 m

6. 112 m

7. 2 m

8. 1440 m^2

9. 7 cm

10. 5 cm

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