Understanding and Using Scale Drawings

Apply the skill to decisions and designs

Name _____ **Date** _____ **Score** _____ / 8

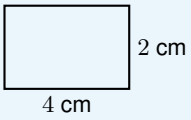
QUICK REVIEW

Use the labeled drawing-to-actual conversion, and keep units explicit. With 1 cm representing 3 m, a 4 cm by 2 cm room is 12 m by 6 m. Its area is 72 m^2; length scale 3 produces area scale $3^2 = 9$.

Worked example

A drawing has scale $1 : 3$. Its rectangular base is 4 cm by 2 cm. Find the actual dimensions in cm.

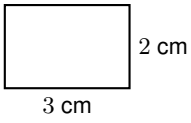
1. The scale means actual/model $= 3$.
2. $4 \times 3 = 12$ cm and $2 \times 3 = 6$ cm are the actual sides.
3. Working backward: $12 \div 3 = 4$ cm and $6 \div 3 = 2$ cm.
Answer: 12 cm by 6 cm.



Practice Problems

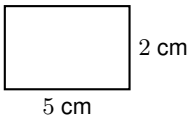
Show your thinking.

1. A plan uses 1 cm for 4 m. A 3 cm by 2 cm room needs skirting on all sides. How many meters of skirting are needed?



2. A route is 3 cm on a map where 4 cm means 20 km. A walker can cover 14 km. Is that enough? Find the remaining distance.

3. A garden plan 5 cm by 2 cm uses 1 cm for 6 m. Sod covers 1 m^2 per square. How many square-meter units are needed?



4. A display can hold a plan line no longer than 4 cm. At 1 cm for 3 m, will a 18 m wall fit? Find the plan-length excess.

5. A map has 7 cm for 14 m. Design a scale bar representing 6 m: how many cm should it span?

6. A $1 : 1000$ plan has a 8 cm route. A cable spool holds 75 m. Find the actual route and extra cable needed.

7. A 12 m by 8 m room must fit a 4 cm by 3 cm plan panel. Compare scales 1 cm to 4 m and 1 cm to 2 m, without rotating. Which fits?

8. A garden plan is 6 cm by 3 cm at 5 m per cm. A cover kit handles 440 m^2. Find the garden area and extra coverage needed.

Answer Key

1. Plan 3 cm by 2 cm; actual 12 m by 8 m; perimeter 40 m.
2. 5 km per cm; 3 cm represents 15 km. Walk 1 km more.
3. 360 m^2.
4. No; needs 6 cm, exceeding by 2 cm.
5. 3 cm.
6. Actual 80 m; plan 8 cm. Need 5 m extra.
7. Use 4 m/cm: 3 cm by 2 cm.
8. 450 m^2; need 10 m^2 extra.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Actual length: $3(4) = 12$ m.
2. Actual width: $2(4) = 8$ m.
3. Perimeter $= 2(12 + 8) = 40$ m; inverse plan lengths are $12/4 = 3$ and $8/4 = 2$ cm.

Problem 2

1. Scale: $20/4 = 5$ km per cm.
2. Route: $3(5) = 15$ km.
3. Inverse: $15/5 = 3$ cm. Shortfall $15 - (14) = 1$ km.

Problem 3

1. Actual sides: $5(6) = 30$ m and $2(6) = 12$ m.
2. Area: $30(12) = 360$ m^2.
3. Check area scale: $10 \times 6^2 = 360$, not 10×6.

Problem 4

1. The wall needs $18/3 = 6$ cm on the drawing.
2. That exceeds the maximum of 4 cm.
3. Find the excess: $6 - 4 = 2$ cm too long.

Problem 5

1. Unit scale: $14/7 = 2$ m per cm.
2. Scale bar: $6/2 = 3$ cm.
3. Check: $3(2) = 6$ m.

Problem 6

1. Actual centimeters: $8(1000) = 8000$ cm.
2. Convert to meters: $8000/100 = 80$ m.
3. Inverse: $80(100)/1000 = 8$ cm. Gap $80 - (75) = 5$ m.

Problem 7

1. At 4 m per cm, sides are $12/4 = 3$ cm and $8/4 = 2$ cm.
2. At 2 m per cm, sides are $12/2 = 6$ cm and $8/2 = 4$ cm.
3. The panel limits are 4 cm by 3 cm. Only the 4-m-per-cm plan stays inside both limits.

Problem 8

1. Actual sides are $6(5) = 30$ m and $3(5) = 15$ m.
2. Actual area is $30(15) = 450$ m^2.
3. The kit falls short by $450 - 440 = 10$ m^2.

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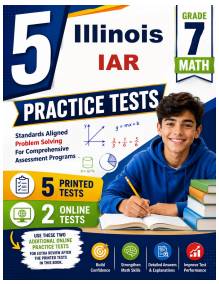

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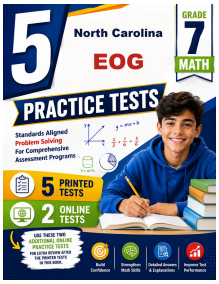

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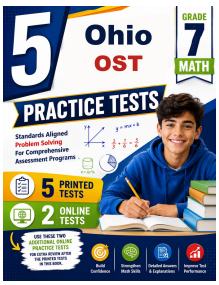

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