Understanding and Using Scale Drawings

Spot mistakes, reason, and work backward

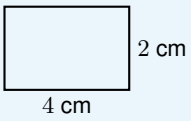
Name _____ **Date** _____ **Score** _____ / 8

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 12 m by 8 m room is drawn with 1 cm for 4 m. Recover plan dimensions and explain why multiplying again is wrong.

2. A map represents 20 km with 4 cm. A student calls the scale $4/20$ km per cm. Correct it and find the map length for 15 km.

3. A plan area is 10 cm^2, with sides 5 cm and 2 cm. Scale is 1 cm to 6 m. Correct the claim that actual area is 60 m^2.

4. Two plans show the same 18 m wall. Plan A uses 1 cm for 3 m and plan B 1 cm for 6 m. Which drawing is longer and by what factor?

5. A scale label is missing. A 7 cm line represents 14 m, and a 3 cm line represents 6 m. Recover the label and check both lines.

6. A $1 : 1000$ plan line represents 80 m. Recover its cm length, converting meters to centimeters first.

7. A uniform-scale plan shows a 20 m wall as 5 cm, but labels another 12 m wall as 4 cm. Which label must change if the first wall is correct? Give the new drawing length.

8. A 6 cm by 3 cm plan represents 450 m^2. Find the length scale in meters per cm.

Answer Key

1. 3 cm by 2 cm.
2. 5 km per cm; 3 cm represents 15 km.
3. 360 m^2.
4. A is twice as long: 6 cm versus 3 cm.
5. 1 cm represents 2 m; 3 cm represents 6 m.
6. Actual 80 m; plan 8 cm.
7. Change 4 cm to 3 cm.
8. 5 m per cm.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Each drawing centimeter represents 4 m, so divide the actual lengths by 4.

2. Drawing length $= 12/4 = 3$ cm; drawing width $= 8/4 = 2$ cm.

3. Check: multiplying the drawing lengths, not the actual lengths, by 4 gives 12 m and 8 m.

Problem 2

1. Divide actual kilometers by drawing centimeters: $20/4 = 5$ km per cm.

2. The reversed ratio $4/20$ is in cm per km, not km per cm.

3. Convert actual to map: $15/5 = 3$ cm.

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. Plan A: $18/3 = 6$ cm.

2. Plan B: $18/6 = 3$ cm.

3. Compare by division: $6 \div 3 = 2$. Plan A is twice as long.

Problem 5

1. Unit scale: $14/7 = 2$ m per cm.

2. The 3 cm line represents $3(2) = 6$ m.

3. Both pairs use the same scale: $6/3 = 2$ m per cm.

Problem 6

1. Convert the given actual length: $80(100) = 8000$ cm.

2. At $1 : 1000$, divide actual cm by 1000: $8000/1000 = 8$ cm on the plan.

3. Check: 8 cm represents 8000 cm, or 80 m.

Problem 7

1. The first wall sets the scale: $20/5 = 4$ m per drawing cm.

2. The second wall should use $12/4 = 3$ cm.

3. The old label would represent $4(4) = 16$ m, not 12 m.

Problem 8

1. Plan area is $6(3) = 18$ cm^2.

2. Each drawing square centimeter represents $450/18 = 25$ m^2.

3. Take the positive square root: $\sqrt{25} = 5$ actual m per plan cm.

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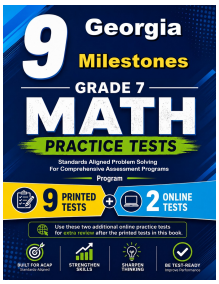

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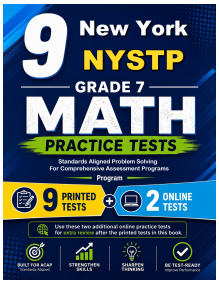

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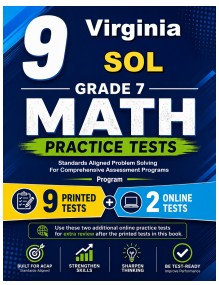

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