Understanding and Using Scale Drawings

Explore ideas and representations

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

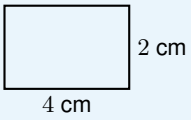
QUICK REVIEW

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.

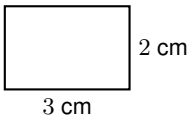
1. The scale means actual/model $= 3$.
2. $4 \times 3 = 12$ cm and $2 \times 3 = 6$ cm are the actual sides.
3. Working backward: $12 \div 3 = 4$ cm and $6 \div 3 = 2$ cm.
Answer: 12 cm by 6 cm.



Practice Problems

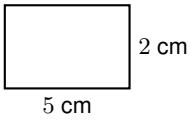
Show your thinking.

1. A room plan uses 1 cm for 4 m. Its sides are 3 cm and 2 cm. Find the actual sides and perimeter.



2. On a map, 4 cm represents 20 km. Find km per cm and the distance represented by 3 cm.

3. A rectangular garden on a plan is 5 cm by 2 cm at 1 cm for 6 m. Find actual area; do not multiply the plan area by 6 alone.



4. At 1 cm for 3 m, how long should a 12 m wall appear on the plan?

5. A 7 cm plan line represents 14 m. Complete the scale statement 1 cm represents how many meters? Then convert a 3 cm line.

6. A $1 : 1000$ scale plan line is 8 cm. Convert its actual length to meters; 100 cm $= 1$ m.

7. On a map at 2 km per cm, one route has segments 3.5 cm and 2 cm. A direct route measures 4 cm. How many actual kilometers does the direct route save?

8. A garden drawing at 5 m per cm is a 6 cm by 3 cm rectangle with a 2 cm by 1 cm corner removed. Find the actual area.

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.
3. 360 m^2.
4. 4 cm.
5. 1 cm represents 2 m; 3 cm represents 6 m.
6. Actual 80 m; plan 8 cm.
7. 3 km.
8. 400 m^2.

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.

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. Each 3 actual meters uses one plan centimeter, so divide 12 by 3.
2. Drawing length $= 12/3 = 4$ cm.
3. Check: $4(3) = 12$ m.

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

Problem 7

1. First route: $3.5 + 2 = 5.5$ drawing cm.
2. Direct route saves $5.5 - 4 = 1.5$ drawing cm.
3. Actual distance saved: $1.5(2) = 3$ km.

Problem 8

1. Drawing area: $6(3) - 2(1) = 16$ cm^2.
2. Each square centimeter represents $5(5) = 25$ m^2.
3. Actual area: $16(25) = 400$ m^2.

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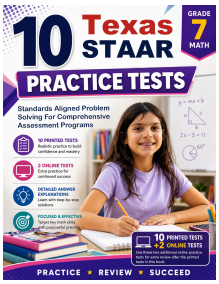

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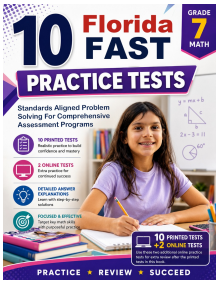

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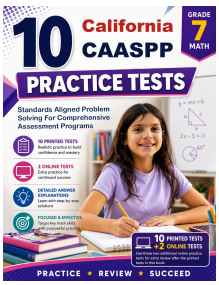

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