Proportional Reasoning with Scale Models

Apply the skill to decisions and designs

Name _____ **Date** _____ **Score** _____ / 6

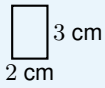
QUICK REVIEW

A $1 : k$ scale model preserves every length ratio: actual length $= k$ times model length. At $1 : 20$, a 3 cm model wing represents 60 cm, and a 100 cm wing needs 5 cm. Compare lengths in the same units.

Worked example

A model has scale $1 : 10$. Its rectangular base is 2 cm by 3 cm. Find the actual dimensions in cm.

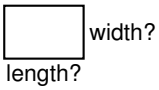
1. The scale means actual/model $= 10$.
2. $2 \times 10 = 20$ cm and $3 \times 10 = 30$ cm are the actual sides.
3. Working backward: $20 \div 10 = 2$ cm and $30 \div 10 = 3$ cm.
Answer: 20 cm by 30 cm.



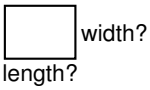
Practice Problems

Show your thinking.

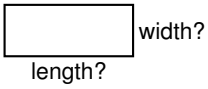
1. At scale $1 : 12$, an actual base 36 cm by 24 cm must fit a board 4 cm by 1 cm without rotation. Find the model dimensions, whether it fits, and any shortages.



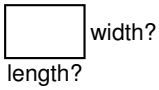
2. At scale $1 : 20$, an actual base 80 cm by 60 cm must fit a board 4 cm by 3 cm without rotation. Find the model dimensions, whether it fits, and any shortages. Complete the actual/model ratio for the long side and explain its direction.



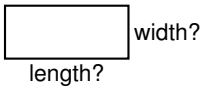
3. At scale $1 : 15$, an actual base 75 cm by 30 cm must fit a board 6 cm by 3 cm without rotation. Find the model dimensions, whether it fits, and any shortages. Find the actual area of the base and the model area, checking the area scale.



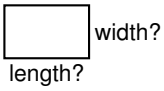
4. At scale $1 : 10$, an actual base 60 cm by 40 cm must fit a board 4 cm by 4 cm without rotation. Find the model dimensions, whether it fits, and any shortages. A second model uses $1 : 20$. Find its dimensions for the same actual object.



5. At scale $1 : 8$, an actual base 56 cm by 24 cm must fit a board 6 cm by 1 cm without rotation. Find the model dimensions, whether it fits, and any shortages. A proposed second model has sides 14 cm and 5 cm. Are both sides at one common scale?



6. At scale $1 : 5$, an actual base 40 cm by 25 cm must fit a board 9 cm by 6 cm without rotation. Find the model dimensions, whether it fits, and any shortages. Find total base area for three such models.



Answer Key

1. Model 3 cm by 2 cm; does not fit (width short by 1 cm).
2. Model 4 cm by 3 cm; fits. Actual/model $= 80/4 = 20$.
3. Model 5 cm by 2 cm; fits. Model 10 cm^2, actual 2250 cm^2; factor 225.
4. Model 6 cm by 4 cm; does not fit (length short by 2 cm). Second model 3 cm by 2 cm.
5. Model 7 cm by 3 cm; does not fit (length short by 1 cm, width short by 2 cm). No: $56/14 = 4$ but $24/5 = 4.8$.
6. Model 8 cm by 5 cm; fits. $3(8)(5) = 120$ cm^2.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The scale means actual/model $= 12$.
2. Divide actual sides by 12: $36 \div 12 = 3$ cm and $24 \div 12 = 2$ cm.
3. Compare corresponding sides: length $4 \geq 3$ cm; width $2 - 1 = 1$ cm short. It does not fit.

Problem 2

1. The scale means actual/model $= 20$.
2. Divide actual sides by 20: $80 \div 20 = 4$ cm and $60 \div 20 = 3$ cm.
3. Compare corresponding sides: length $4 \geq 4$ cm; width $3 \geq 3$ cm. It fits.
4. $80/4 = 20$, so actual lengths are 20 times model lengths.

Problem 3

1. The scale means actual/model $= 15$.
2. Divide actual sides by 15: $75 \div 15 = 5$ cm and $30 \div 15 = 2$ cm.
3. Compare corresponding sides: length $6 \geq 5$ cm; width $3 \geq 2$ cm. It fits.
4. Model $5(2) = 10$ cm^2; actual $75(30) = 2250$ cm^2, ratio $225 = 15^2$.

Problem 4

1. The scale means actual/model $= 10$.
2. Divide actual sides by 10: $60 \div 10 = 6$ cm and $40 \div 10 = 4$ cm.
3. Compare corresponding sides: length $6 - 4 = 2$ cm short; width $4 \geq 4$ cm. It does not fit.
4. Same actual object is 60 by 40 cm; divide by 20 to get 3 by 2 cm.

Problem 5

1. The scale means actual/model $= 8$.
2. Divide actual sides by 8: $56 \div 8 = 7$ cm and $24 \div 8 = 3$ cm.
3. Compare corresponding sides: length $7 - 6 = 1$ cm short; width $3 - 1 = 2$ cm short. It does not fit.
4. Compare actual/model ratios $56/14 = 4$ and $24/5 = 4.8$; these differ.

Problem 6

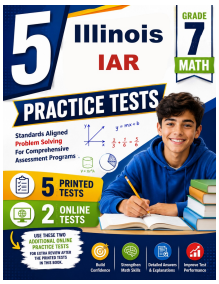
1. The scale means actual/model $= 5$.
2. Divide actual sides by 5: $40 \div 5 = 8$ cm and $25 \div 5 = 5$ cm.
3. Compare corresponding sides: length $9 \geq 8$ cm; width $6 \geq 5$ cm. It fits.
4. One base area is $8(5) = 40$ cm^2; three need $3(40) = 120$ cm^2.

TESTINAR

Keep Building Grade 7 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 7 books



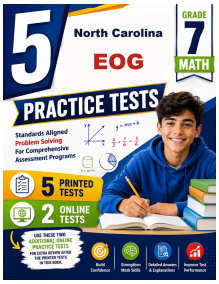
ILLINOIS IAR

5 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook



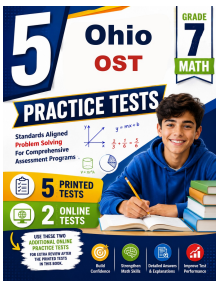
NORTH CAROLINA EOG

5 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook



OHIO OST

5 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 7 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/7