Similar Figures and Proportions

Spot mistakes, reason, and work backward

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

QUICK REVIEW

Similar figures have equal matching angles. Divide copy length by original length to find their common length factor k. Multiply a perimeter by k and an area by k^2. Keep corresponding sides in the same order.

Worked example

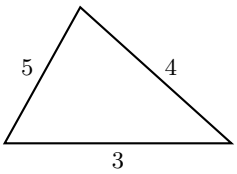
An original 7 cm side matches 10.5 cm in a similar copy. What matches an 8 cm original side?

1. Length factor $= 10.5/7 = 1.5$.
2. The matching side is $8(1.5) = 12$ cm.
3. Check $12/8 = 10.5/7 = 1.5$.
Answer: 12 cm.

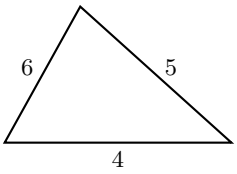
Practice Problems

Show your thinking.

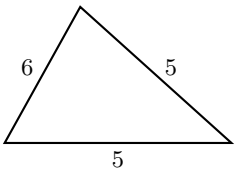
1. A student matches 3 cm to 6 cm in an enlargement but uses the inverse factor for the 4 cm side. Correct the matching length.



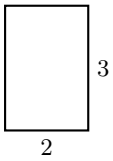
2. Check the claim that side triples $4, 5, 6$ cm and $12, 15, 19$ cm are similar. Identify the mismatching ratio.



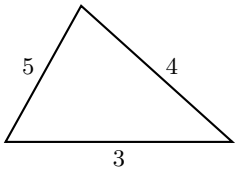
3. A triangle with sides $5, 5, 6$ cm has perimeter 16 cm. A similar copy has perimeter 32 cm. Recover the scale factor and all copy sides.



4. A student says the area factor is 3 when a 2 cm by 3 cm rectangle is enlarged by length factor 3. Find the actual area factor.



5. A small triangle with sides $3, 4, 5$ cm is a uniform-scale copy of the original triangle. Its 3 cm side corresponds to the original 6 cm side. Find the other two original side lengths.



6. Solve the similarity proportion $x/6 = 6/4$. Give the matching length x in centimeters and verify by multiplication.

7. A student uses factor $1/3$ to enlarge sides $5, 6, 8$ cm when 5 must match 15. Correct the factor, sides, and perimeter.

8. A student multiplies area by $3/2$ when a 3 by 4 rectangle has length factor $3/2$. Correct the area factor and new area.

Answer Key

1. Factor 2; matching length 8 cm.
2. Not similar; $19/6$ does not equal 3.
3. Factor 2; copy sides $10, 10, 12$ cm.
4. Area factor 9.
5. Other original sides 8 and 10 cm.
6. Matching length 9 cm.
7. Factor 3; sides $15, 18, 24$ cm; perimeter 57 cm.
8. Area factor $9/4$; new area 27 cm^2.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The copy length divided by the original length is $6/3 = 2$, so the copy doubles each side.

2. The length matching 4 cm is $4(2) = 8$ cm.

3. Check $8/4 = 6/3 = 2$. The inverse factor would shrink the side, not enlarge it.

Problem 2

1. The first corresponding ratio is $12/4 = 3$.

2. The second corresponding ratio is $15/5 = 3$.

3. The third ratio is $19/6$, not 3. Without one common factor the triangles are not similar.

Problem 3

1. Perimeters scale by the same factor as matching side lengths, so the copy factor is $32/16 = 2$.

2. Multiply each original side by 2: $5(2) = 10$, $5(2) = 10$, and $6(2) = 12$ cm.

3. Check $10 + 10 + 12 = 32$ cm.

Problem 4

1. The side lengths triple: $2(3) = 6$ and $3(3) = 9$ cm.

2. The old area is $2(3) = 6$ cm^2; the new area is $6(9) = 54$ cm^2.

3. The area factor is $54/6 = 9 = 3^2$, since both dimensions are tripled.

Problem 5

1. To go from the small triangle back to the original, multiply by $6/3 = 2$.

2. The other original sides are $4(2) = 8$ cm and $5(2) = 10$ cm.

3. Check that $8/4 = 10/5 = 6/3 = 2$.

Problem 6

1. Use the same copy-to-original ratio: $x/6 = 6/4$.

2. Multiply by 6: $x = 6(6/4) = 9$ cm.

3. Check $9(4) = 6(6) = 36$.

Problem 7

1. Corresponding length factor $15/5 = 3$.

2. The other sides are $6(3) = 18$ and $8(3) = 24$ cm. The perimeter is $15 + 18 + 24 = 57$ cm.

3. Check that the perimeter scales by the same factor: $57/(5 + 6 + 8) = 3$.

Problem 8

1. New sides $3(3/2) = 9/2$ cm and $4(3/2) = 6$ cm.

2. The new area is $(9/2)(6) = 27$ cm^2.

3. Both sides scale, so the area factor is $(3/2)^2 = 9/4$. Check $27/[3(4)] = 9/4$.

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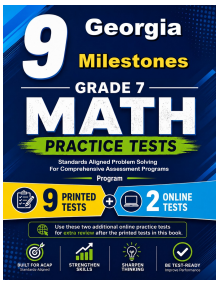

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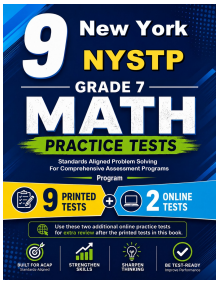

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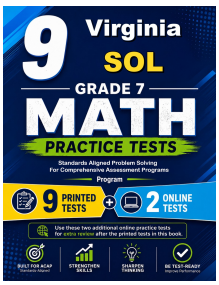

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