Congruence and similarity - topic test

15 questions | 33 marks | 45 minutes

Match parts, select valid tests, solve proportional lengths, and justify a geometric claim.

Equivalent correct methods earn the corresponding marks.

1. Given $\triangle ABC \cong \triangle DEF$, name the side corresponding to BC. [1 mark]

B corresponds to E and C corresponds to F.

Answer: EF.

2. Congruent triangles have corresponding sides $2x + 1$ cm and 11 cm. Find x. [2 marks]

$2x + 1 = 11$ gives $2x = 10$, so $x = 5$.

Answer: $x = 5$.

3. Two triangles each have sides 6, 8 and 10 cm. State a congruence test. [1 mark]

All three corresponding side lengths are equal.

Answer: SSS.

4. Two right triangles have equal hypotenuses and one equal corresponding shorter side. State a congruence test. [1 mark]

Right angle, hypotenuse and a shorter side match.

Answer: RHS.

5. Two triangles each have angles 40°, 60° and 80°. Must they be congruent? Explain. [2 marks]

AAA establishes similarity, not congruence.

Answer: No. Equal angles allow different sizes.

6. A similar enlargement changes a 6 cm side to 15 cm. Find its scale factor. [2 marks]

$k = \frac{15}{6} = 2.5$.

Answer: 2.5.

7. Similar rectangles have corresponding widths 4 cm and 10 cm. The smaller height is 6 cm. Find the larger height. [3 marks]

Scale factor is $\frac{10}{4} = 2.5$.

Larger height is $6(2.5) = 15$ cm.

Answer: 15 cm.

8. Triangles have sides 4, 6, 8 cm and 6, 9, 12 cm. Decide whether they are similar and give a reason. [2 marks]

$\frac{6}{4} = \frac{9}{6} = \frac{12}{8} = 1.5$.

Answer: Yes, proportional SSS, factor 1.5.

9. Triangle ABC has $A = 35°$ and $B = 70°$. Triangle DEF has $D = 35°$ and $E = 70°$. State why the triangles are similar. [2 marks]

Two corresponding angles match.

Their third angles are both 75°.

Answer: AA similarity.

10. A photo 18 cm wide and 12 cm high is reduced to width 9 cm without distortion. Find the new height. [3 marks]

The width factor is $\frac{9}{18} = \frac{1}{2}$.

Height is $12(\frac{1}{2}) = 6$ cm.

Answer: 6 cm.

11. Parallelogram diagonals AC and BD meet at O. $AO = 7$ cm and $BO = 5$ cm. Find AC and BD. [3 marks]

Each diagonal is bisected at O.

$AC = 2(7) = 14$ cm; $BD = 2(5) = 10$ cm.

Answer: $AC = 14$ cm; $BD = 10$ cm.

12. Reflect point $(-4, 3)$ in the y axis. [2 marks]

Change the sign of x and keep y the same.

Answer: $(4, 3)$.

13. A triangle is enlarged by factor 2 about the origin. Point $A(-2, 1)$ becomes A'. Find A' and state whether the image triangle is congruent to the original. [3 marks]

Multiply both coordinates by 2.

Side lengths double, so shape is preserved but size changes.

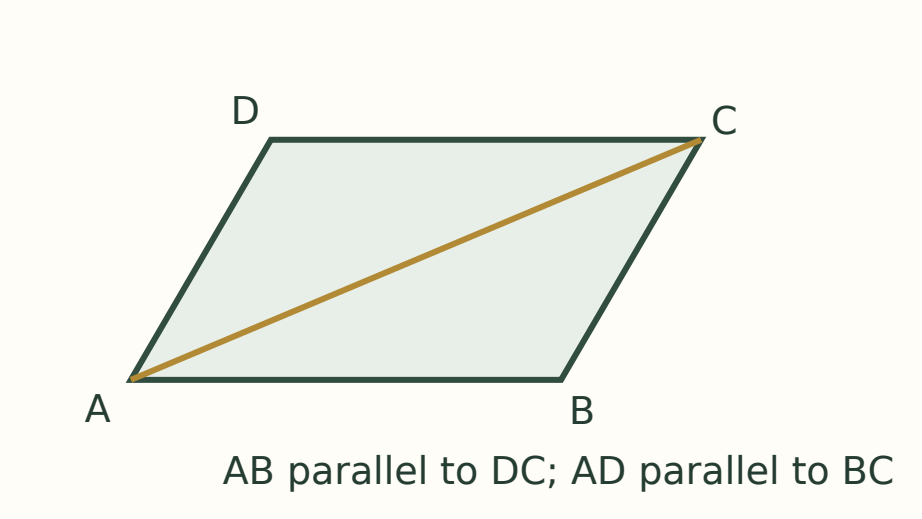
Answer: $A'(-4, 2)$; not congruent.

14. A side-ratio program obtains 3, 3 and 2.8 but reports “similar” because two factors agree. Explain and correct its decision. [2 marks]

Proportional SSS requires all three matching side ratios to be equal.

Answer: It must report not similar.

15. $ABCD$ is a parallelogram. Diagonal AC is drawn, as shown. [4 marks]



(a) Explain why triangles ABC and CDA are congruent. [3 marks]

AB parallel to CD gives $\angle BAC = \angle DCA$.

BC parallel to AD gives $\angle BCA = \angle DAC$.

AC is common, so ASA applies.

Answer: ASA congruence.

(b) Use that congruence to explain why $AB = CD$. [1 mark]

The vertex order pairs A with C and B with D, so AB corresponds to CD.

Answer: They are corresponding sides of the congruent triangles.