Properties of Two-Dimensional Figures

Properties of Two-Dimensional Figures: Find, Fix, and Work Backward

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

QUICK REVIEW

Matching arrow marks show parallel side pairs. If extended, parallel sides never meet. Perpendicular sides meet at $90°$. Every right angle in a pictured polygon is marked with a small square.

Worked example

Two horizontal bars are 2 cm apart. A vertical bar joins them. How are the two horizontal bars related? How does the connector meet them?

1. The horizontal bars stay 2 cm apart along their entire length and would not meet if extended.

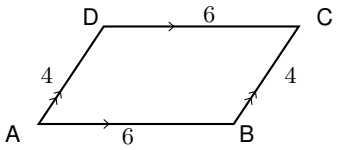
2. Where a vertical bar meets a horizontal one it forms $90°$, so the connector is perpendicular to both.

Answer: The horizontal bars are parallel. The connector meets each at a right angle.

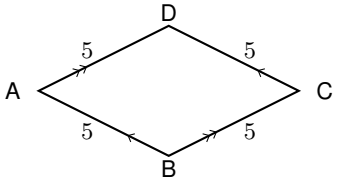
Practice Problems

Show your thinking.

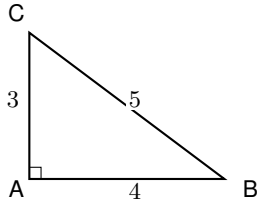
1. Jules pairs AB with BC because both touch B. Use the arrow marks to correct the pair, then give the other parallel pair.



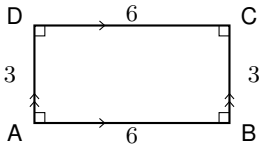
2. A student says that a quadrilateral with two parallel pairs cannot have four equal sides. Use the pictured side labels and arrow marks to test the claim.



3. Liz says AB and BC form the marked right angle. Which sides actually form it? Explain how the vertex label tells you.



4. Can a quadrilateral have four right angles without having all four sides equal? Give evidence from the labeled figure.



5. A sign has 3 straight sides of the same length. Max says this guarantees a pair of parallel sides. Is he right? Explain from the boundary.

6. A straight cut removes one corner of a square by joining interior points on its two adjacent sides. How many sides and vertices are on the larger piece?

Answer Key

1. $AB \parallel CD$ and $BC \parallel AD$.
2. False: $AB \parallel CD$ and $BC \parallel AD$, and all four sides measure 5 units.
3. AB and AC are perpendicular at A.
4. Yes. It has 4 right angles, but the lengths alternate $6, 3, 6, 3$.
5. No. No two sides of the triangle are parallel.
6. 5 sides and 5 vertices.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The 1 arrow on AB matches the 1 on CD, not the double arrow on BC.

2. The 2 arrows on BC match the 2 on AD. Touching at B does not make sides parallel.

Problem 2

1. The single arrows pair AB with CD. The double arrows pair BC with AD: 2 pairs.

2. AB, BC, CD, DA are all labeled 5. This one shape has both properties.

Problem 3

1. The 90° mark is at A, not at B.

2. The 2 sides that meet at A are AB and AC. BC does not touch A.

Problem 4

1. A square-corner mark appears at each of A, B, C, D: 4 right angles.

2. AB and CD are 6 units, while BC and DA are 3. Because $6 \neq 3$, the four sides are not all equal.

Problem 5

1. The 3 sides form a triangle, with each pair meeting at a vertex.

2. Parallel sides do not meet. All 3 pairs in a triangle meet, so 0 pairs are parallel, even when lengths match.

Problem 6

1. Keep $4 - 1 = 3$ original vertices and add 2 endpoints of the cut, for $3 + 2 = 5$ vertices.

2. Two old sides are shortened but still count. The cut adds a new side to the 4 old sides, for $4 + 1 = 5$.

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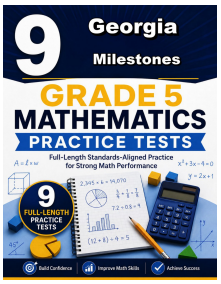

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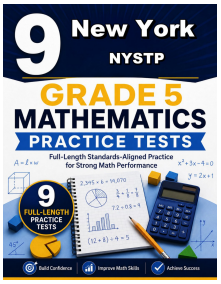

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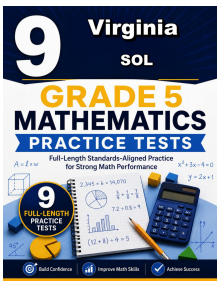

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