Classifying Triangles and Quadrilaterals

Classifying Triangles and Quadrilaterals: Find, Fix, and Work Backward

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QUICK REVIEW

One figure can belong to several groups. Rectangles have 4 right angles; rhombuses have 4 equal sides. A square meets both definitions. For triangles, classify sides and angles separately. Isosceles means at least 2 equal sides.

Worked example

A triangle has sides $4, 4, 5$ and all angles less than $90°$. Classify it by sides and angles.

1. The two sides of length 4 are equal, while $5 \neq 4$. It is isosceles, not equilateral.

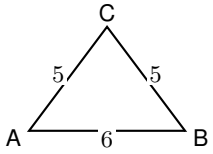
2. All 3 angles are below $90°$. That meets the definition of an acute triangle.

Answer: Isosceles and acute.

Practice Problems

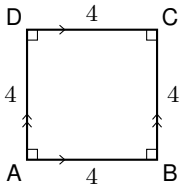
Show your thinking.

1. A student says every isosceles triangle is equilateral. Check the claim using a triangle with sides $5, 5, 6$ units.



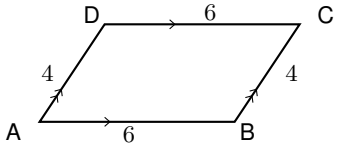
2. A maker changes a rhombus $ABCD$ so angle A becomes a right angle. All four sides stay equal, and opposite sides stay parallel. Does it become a square? Explain what happens to the other corners.

3. A label says a square cannot be a rectangle because it has equal sides. Correct the label using the rectangle definition.



4. A student thinks any triangle with two equal sides must be acute. A triangle has two equal legs and angles $45°, 45°, 90°$. Does it support or disprove the claim?

5. A student puts every parallelogram in the rectangle group. Use $ABCD$ to check the claim. All right angles in the drawing would be marked.



6. A tag describes one quadrilateral as both a rectangle and a rhombus but says it is not a square. Which part of the tag is impossible?

Answer Key

1. False. It is isosceles, but not equilateral.
2. Yes. All four corners are right, and all four sides are equal.
3. A square is a special rectangle.
4. It disproves the claim. It is isosceles right, not acute.
5. The claim is false. $ABCD$ is a parallelogram but not a rectangle.
6. The not-a-square claim is impossible.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The 2 sides of length 5 make it isosceles.

2. $6 \neq 5$, so not all 3 sides are equal. The example disproves the claim.

Problem 2

1. AB meets AD at $90°$. Since $AB \parallel CD$ and $AD \parallel BC$, the opposite sides follow those same two directions.

2. Each corner joins one side in each direction, so all 4 corners are right. The 4 equal sides now make it a square.

Problem 3

1. A rectangle needs 4 sides and 4 right angles. It does not require different side lengths.

2. A square meets both requirements. Its extra property of 4 equal sides does not rule it out.

Problem 4

1. The 2 equal legs make it isosceles.

2. The $90°$ angle makes it right. The other 2 angles are acute, but an acute triangle needs all 3 angles acute.

Problem 5

1. There are 2 parallel pairs: $AB \parallel CD$ and $BC \parallel AD$. That makes it a parallelogram.

2. There are 0 right-angle marks, but a rectangle requires 4. This figure does not belong in that group.

Problem 6

1. Rectangle membership supplies 4 right angles.

2. Rhombus membership supplies 4 equal sides. A quadrilateral with both properties must be a square.

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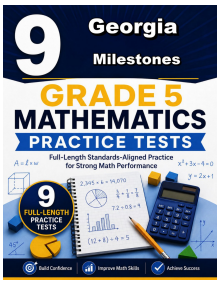

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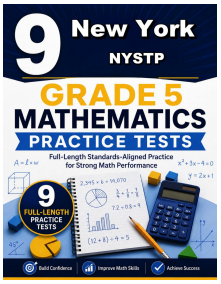

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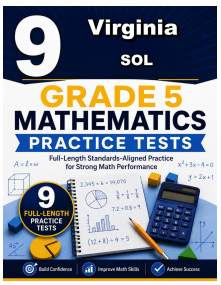

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