

Classifying Quadrilaterals

Quadrilaterals are 4-sided polygons. Different kinds have different rules: squares have everything equal, rectangles have 4 right angles, rhombuses have 4 equal sides, trapezoids have one pair of parallel sides.

| Quadrilateral | Defining property |
|---------------|---------------------------------------|
| Square | 4 equal sides AND 4 right angles |
| Rectangle | 4 right angles (sides equal in pairs) |
| Rhombus | 4 equal sides |
| Parallelogram | 2 pairs of parallel sides |
| Trapezoid | At least 1 pair of parallel sides |

Key Concepts

1. A **quadrilateral** is any 4-sided polygon.
2. A **square** has 4 equal sides *and* 4 right angles. It's the most special quadrilateral.
3. A **rectangle** has 4 right angles. A square is a special rectangle where every side happens to be equal.
4. A **rhombus** has 4 equal sides but the angles can be slanted. If a rhombus has 4 right angles, it's a square.

Worked Examples

- ① A shape has 4 sides, 4 right angles, and two sides are longer than the other two. What is it?
 Four right angles tells you "rectangle." The fact that two sides are longer (not all equal) means it's *not* a square. So: rectangle.
-  **Answer:** *Rectangle*
-
- ② A shape has 4 equal sides but no right angles. What is it?
 Four equal sides points to either square or rhombus. Since the angles aren't right, it's a rhombus.
-  **Answer:** *Rhombus*
-
- ③ Is a square also a rectangle?
 A rectangle just needs 4 right angles. A square has 4 right angles *and* 4 equal sides — so it meets the rectangle definition. Yes, every square is a rectangle.
-  **Answer:** *Yes*

Practice Problems

Name or identify each shape.

1. 4 right angles, all sides equal \Rightarrow ? _____

2. 4 sides, 1 pair parallel \Rightarrow ? _____
3. All squares are rectangles. (T/F) _____
4. All rectangles are squares. (T/F) _____
5. 4 equal sides, no right angles \Rightarrow ? _____

6. Opposite sides equal, 4 right angles \Rightarrow ? _____

7. How many vertices does any quadrilateral have? _____
8. A rhombus has ___ equal sides. _____
9. A trapezoid has ___ pair(s) of parallel sides. _____
10. Is a rhombus always a square? (T/F) _____
11. 2 pairs of parallel sides, no right angles \Rightarrow ? _____
12. Name a quadrilateral you see on a door. _____

Study Tips

-  “Square” is the most specific quadrilateral — a square is also a rectangle, a rhombus, a parallelogram, and a quadrilateral.
-  Some rectangles aren’t squares (when the sides aren’t all equal). Some rhombuses aren’t squares (when angles aren’t right).
-  Sketch the shape if you’re unsure. A picture makes the properties obvious.

Word Problems

1. Maria says her shape has 4 equal sides and 4 right angles. Is it a square, a rhombus, or both?
Answer: _____
2. Leo draws a quadrilateral with only one pair of parallel sides. What type of quadrilateral did he draw?
Answer: _____

Answer Key — with Friendly Explanations**Practice Problems**

1. Square.
 **Answer:** *Square*
2. Trapezoid.
 **Answer:** *Trapezoid*
3. True — a square has 4 right angles, which is the rectangle requirement.
 **Answer:** *True*
4. False — a rectangle doesn't need equal sides.
 **Answer:** *False*
5. Rhombus.
 **Answer:** *Rhombus*
6. Rectangle.
 **Answer:** *Rectangle*
7. 4 sides means 4 vertices.
 **Answer:** *4*
8. All 4 sides equal.
 **Answer:** *4*
9. At least 1 pair.
 **Answer:** *1 pair*
10. False — only if it also has right angles.
 **Answer:** *False*
11. Parallelogram.
 **Answer:** *Parallelogram*
12. Rectangle (or square).
 **Answer:** *Rectangle*

Word Problems

1. Square (which is both a rhombus AND a rectangle).
 **Answer:** *Both*
2. Trapezoid.
 **Answer:** *Trapezoid*

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