

# Properties of Two-Dimensional Figures

Grade 5 Math • Section 10.3

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 12

## Quick Review and Helpful Hints

### Key properties:

- **Parallel sides:** sides that never meet and stay the same distance apart.
- **Perpendicular sides:** sides that meet at a right angle ( $90^\circ$ ).
- **Congruent sides:** sides that have the same length.

💡 Properties of a category apply to all its subcategories. All rectangles are parallelograms, so all rectangle properties include parallelogram properties.

### Example:

 Name all properties shared by all rectangles.

👉 All rectangles have: 4 sides, 4 right angles ( $90^\circ$ ), 2 pairs of parallel sides, and opposite sides that are equal in length. Since every rectangle is also a parallelogram, it inherits all parallelogram properties too.

💡 **Answer:** 4 right angles, 2 pairs of parallel sides, opposite sides equal

## Practice Problems

Identify the properties of each figure.

- A square has \_\_\_\_\_ pairs of parallel sides, \_\_\_\_\_ right angles, and all sides are \_\_\_\_\_.
- A trapezoid has exactly \_\_\_\_\_ pair(s) of parallel sides.
- True or false: All squares are rectangles. \_\_\_\_\_
- True or false: All rectangles are squares. \_\_\_\_\_
- A rhombus has 4 equal sides. Does it always have 4 right angles? \_\_\_\_\_
- Name a quadrilateral with exactly one pair of parallel sides. \_\_\_\_\_
- True or false: All parallelograms have opposite sides that are equal. \_\_\_\_\_
- How many right angles does a regular rectangle have? \_\_\_\_\_
- A regular hexagon has \_\_\_\_\_ sides of equal length. \_\_\_\_\_
- True or false: A square is a special type of rhombus. \_\_\_\_\_

## Word Problems

- Mia says, "Since all squares are rectangles, all rectangles must be squares." Is Mia correct? Explain why or why not using properties. \_\_\_\_\_
- A stop sign is a regular octagon. How many sides does it have? Are all sides equal in length? How many lines of symmetry does it have? \_\_\_\_\_



## Answer Keys

- |                |               |
|----------------|---------------|
| 1. 2, 4, equal | 7. True       |
| 2. 1           | 8. 4          |
| 3. True        | 9. 6          |
| 4. False       | 10. True      |
| 5. No          | 11. No        |
| 6. trapezoid   | 12. 8; yes; 8 |

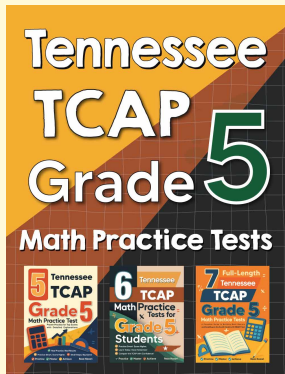
### Step-by-Step Explanations

- Start with the main idea. For 2-D figures, a square has two pairs of parallel sides, four right angles, and equal side lengths. Use the properties one at a time: sides, angles, and parallel sides.
- Keep the work tidy. For 2-D figures, a trapezoid has exactly one pair of parallel sides. A shape can belong to more than one category when it satisfies more than one definition.
- Look at what the numbers mean. For 2-D figures, a square has four right angles, so it is a rectangle. Counterexamples are useful: one shape that breaks a claim shows the claim is not always true.
- Use the setup first. For 2-D figures, a rectangle does not need all four sides equal. Use the properties one at a time: sides, angles, and parallel sides.
- Check the size of the answer. For 2-D figures, a rhombus has equal sides, but its angles do not have to be right angles. A shape can belong to more than one category when it satisfies more than one definition.
- Match the operation to the words. For 2-D figures, a trapezoid has exactly one pair of parallel sides. Counterexamples are useful: one shape that breaks a claim shows the claim is not always true.
- Write the important values first. For 2-D figures, opposite sides of a parallelogram are parallel and equal. Use the properties one at a time: sides, angles, and parallel sides.
- Follow the pattern carefully. For 2-D figures, every rectangle has four right angles. A shape can belong to more than one category when it satisfies more than one definition.
- Start with the main idea. For 2-D figures, a hexagon has six sides. Counterexamples are useful: one shape that breaks a claim shows the claim is not always true.
- Keep the work tidy. For 2-D figures, a square has four equal sides, so it is a rhombus. Use the properties one at a time: sides, angles, and parallel sides.
- Look at what the numbers mean. For 2-D figures, all squares are rectangles, but rectangles only need opposite sides equal, not all four sides equal. A shape can belong to more than one category when it satisfies more than one definition.
- Use the setup first. For 2-D figures, a regular octagon has 8 equal sides and 8 lines of symmetry. Counterexamples are useful: one shape that breaks a claim shows the claim is not always true.



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