

# Fold Line Detectives

Sort quadrilaterals by their lines of symmetry.

**7.MG.3.b.iii** "Sort and classify quadrilaterals as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties: lines of symmetry."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## HAS A LINE OF SYMMETRY

A symmetric quadrilateral can be folded along at least one straight line so both halves match exactly.

An equilateral triangle has lines of symmetry.

## HAS NO LINE OF SYMMETRY

An asymmetric quadrilateral has no straight fold line that makes two matching halves.

A scalene triangle has no lines of symmetry.

## 1 SORT \_\_\_\_\_ 8 items

For Part 1, circle SYMMETRIC or ASYMMETRIC for each quadrilateral; for Part 2, choose two numbered items and explain how you decided.

- |                                                                    |                                 |                                  |
|--------------------------------------------------------------------|---------------------------------|----------------------------------|
| 1. A square                                                        | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 2. A parallelogram with unequal adjacent sides and no right angles | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 3. A trapezoid with no equal sides                                 | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 4. An isosceles trapezoid                                          | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 5. A non-square rhombus                                            | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 6. A non-square rectangle                                          | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 7. A quadrilateral with no equal side lengths                      | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |
| 8. A convex kite with two pairs of equal adjacent sides            | <input type="radio"/> SYMMETRIC | <input type="radio"/> ASYMMETRIC |

## 2 PROVE IT Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # \_\_\_\_\_ HOW I KNEW \_\_\_\_\_

\_\_\_\_\_

ITEM # \_\_\_\_\_ HOW I KNEW \_\_\_\_\_

\_\_\_\_\_

## 3 MAKE YOUR OWN One of each

Write one new quadrilateral example for SYMMETRIC and one new quadrilateral example for ASYMMETRIC.

**SYMMETRIC** \_\_\_\_\_

\_\_\_\_\_

**ASYMMETRIC** \_\_\_\_\_

\_\_\_\_\_

### CHALLENGE

Name a quadrilateral with exactly two lines of symmetry, and describe where both lines are located.

\_\_\_\_\_

\_\_\_\_\_

**PART 1 • SORT**

| # | ITEM                                                            | CATEGORY          | WHY                                                                                 |
|---|-----------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------|
| 1 | A square                                                        | <b>SYMMETRIC</b>  | A square has four lines of symmetry.                                                |
| 2 | A parallelogram with unequal adjacent sides and no right angles | <b>ASYMMETRIC</b> | A general oblique parallelogram has no reflection symmetry.                         |
| 3 | A trapezoid with no equal sides                                 | <b>ASYMMETRIC</b> | Without equal legs, a trapezoid cannot fold into matching halves.                   |
| 4 | An isosceles trapezoid                                          | <b>SYMMETRIC</b>  | It has one line of symmetry through the midpoints of its bases.                     |
| 5 | A non-square rhombus                                            | <b>SYMMETRIC</b>  | Its two diagonals are lines of symmetry.                                            |
| 6 | A non-square rectangle                                          | <b>SYMMETRIC</b>  | It has two lines of symmetry through the midpoints of opposite sides.               |
| 7 | A quadrilateral with no equal side lengths                      | <b>ASYMMETRIC</b> | Reflection symmetry would require at least one pair of equal corresponding sides.   |
| 8 | A convex kite with two pairs of equal adjacent sides            | <b>SYMMETRIC</b>  | A kite has a line of symmetry through the vertices where the equal side pairs meet. |

**PART 2 • PROVE IT**

Accept any explanation that names the deciding feature from the rule box for the chosen item.

**PART 3 • MAKE YOUR OWN (SAMPLE ANSWERS)**

- **SYMMETRIC:** A rhombus that is not a square.
- **ASYMMETRIC:** An oblique parallelogram with adjacent side lengths of 4 cm and 7 cm.

**Challenge:** A non-square rectangle has exactly two lines of symmetry. Each line connects the midpoints of one pair of opposite sides.

For Part 2, students should refer to whether a straight fold would create matching halves, or state the number and location of symmetry lines. Accept accurate new examples in Part 3 that match the chosen category.