

# Fold Line Detectives

Sort polygons by fold symmetry.

**3.GSR.6** "Identify the attributes of polygons, including parallel segments, perpendicular segments, right angles, and symmetry."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## HAS A LINE OF SYMMETRY

A polygon has a line of symmetry if you can fold it along a line and both halves match exactly.

A honeycomb-cell hexagon has fold lines that make matching halves.

## NO LINE OF SYMMETRY

A polygon has no line of symmetry if no fold line can make two matching halves.

A four-sided shape with sides 2 cm, 3 cm, 5 cm, and 6 cm cannot fold into matching halves.

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

Circle YES or NO for each polygon, then choose two items and explain how you know each answer.

- |                                                            |                                                    |
|------------------------------------------------------------|----------------------------------------------------|
| 1. 1. a square                                             | <input type="radio"/> YES <input type="radio"/> NO |
| 2. 2. a right triangle with two unequal shorter sides      | <input type="radio"/> YES <input type="radio"/> NO |
| 3. 3. an equilateral triangle                              | <input type="radio"/> YES <input type="radio"/> NO |
| 4. 4. a rectangle that is not a square                     | <input type="radio"/> YES <input type="radio"/> NO |
| 5. 5. a trapezoid with unequal nonparallel sides           | <input type="radio"/> YES <input type="radio"/> NO |
| 6. 6. a pentagon with equal sides and equal angles         | <input type="radio"/> YES <input type="radio"/> NO |
| 7. 7. a parallelogram that is not a rectangle or a rhombus | <input type="radio"/> YES <input type="radio"/> NO |
| 8. 8. an octagon with equal sides and equal angles         | <input type="radio"/> YES <input type="radio"/> NO |

## 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 or draw one new polygon for YES and one new polygon for NO.

YES \_\_\_\_\_

\_\_\_\_\_

NO \_\_\_\_\_

\_\_\_\_\_

### CHALLENGE

Draw a polygon with exactly one line of symmetry, then draw its line of symmetry.

\_\_\_\_\_

\_\_\_\_\_

**PART 1 • SORT**

| # | ITEM                                                    | CATEGORY   | WHY                                                            |
|---|---------------------------------------------------------|------------|----------------------------------------------------------------|
| 1 | 1. a square                                             | <b>YES</b> | A square has 4 lines of symmetry.                              |
| 2 | 2. a right triangle with two unequal shorter sides      | <b>NO</b>  | The unequal sides cannot make matching folded halves.          |
| 3 | 3. an equilateral triangle                              | <b>YES</b> | An equilateral triangle has 3 lines of symmetry.               |
| 4 | 4. a rectangle that is not a square                     | <b>YES</b> | A rectangle has 2 lines of symmetry.                           |
| 5 | 5. a trapezoid with unequal nonparallel sides           | <b>NO</b>  | The unequal nonparallel sides cannot match across a fold line. |
| 6 | 6. a pentagon with equal sides and equal angles         | <b>YES</b> | This regular pentagon has 5 lines of symmetry.                 |
| 7 | 7. a parallelogram that is not a rectangle or a rhombus | <b>NO</b>  | A general parallelogram has no line of symmetry.               |
| 8 | 8. an octagon with equal sides and equal angles         | <b>YES</b> | This regular octagon has 8 lines of symmetry.                  |

**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)**

- **YES:** A regular heptagon.
- **NO:** A pentagon with side lengths 2 cm, 3 cm, 4 cm, 5 cm, and 6 cm.

**Challenge:** Draw an isosceles triangle with side lengths 5 cm, 5 cm, and 6 cm. Draw a line from the top vertex to the middle of the 6 cm side.

Items 1, 3, 4, 6, and 8 are YES. Items 2, 5, and 7 are NO. For Part 2, accept explanations that describe matching folded halves or explain why no fold can make matching halves.