

# Border Path Detectives

Decide which methods find the distance around a shape.

**3.MG.2.b.ii** "Solve problems, including those in context, involving perimeter: estimate and measure the distance around a polygon (with no more than six sides) to determine the perimeter and justify the measurement; and"

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## USES EVERY SIDE

This method uses the length of every outside side of the polygon once. Adding these lengths finds the perimeter.

A rhombus-shaped coaster has a ribbon around its border. The ribbon touches each edge once.

## DOES NOT USE EVERY SIDE

This method does not use every outside side once. It may leave out a side or use a length that is not on the outside.

A trapezoid window has four border pieces. A plan that counts only three border pieces is incomplete.

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

For each item, circle ALL SIDES or NOT ALL, then choose two items and explain which lengths or paths make each choice correct.

- |    |                                                                                  |                                 |                               |
|----|----------------------------------------------------------------------------------|---------------------------------|-------------------------------|
| 1. | A rectangle is 9 cm by 4 cm. Add $9 + 4 + 9 + 4$ .                               | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 2. | A triangle has side lengths 5 cm, 6 cm, and 7 cm. Add all three side lengths.    | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 3. | A square has side length 6 cm. Add $6 + 6 + 6$ .                                 | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 4. | A pentagon has side lengths 2, 3, 2, 4, and 3 units. Add all five lengths.       | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 5. | On a rectangle, measure from one corner straight across to the opposite corner.  | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 6. | A garden is 8 m by 3 m. Add $8 + 3$ .                                            | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 7. | A hexagon has side lengths 1, 2, 2, 1, 3, and 2 units. Add the six side lengths. | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |
| 8. | A square has sides 4 cm long. Add $4 + 4 + 4 + 4$ .                              | <input type="radio"/> ALL SIDES | <input type="radio"/> NOT ALL |

## 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 example that is ALL SIDES and one new example that is NOT ALL. Use a polygon with no more than six sides.

ALL SIDES \_\_\_\_\_

\_\_\_\_\_

NOT ALL \_\_\_\_\_

\_\_\_\_\_

### CHALLENGE

Choose a polygon with no more than six sides. Give its side lengths, find its perimeter, and write an equation that uses every outside side.

\_\_\_\_\_

\_\_\_\_\_

## PART 1 • SORT

| # | ITEM                                                                             | CATEGORY         | WHY                                                            |
|---|----------------------------------------------------------------------------------|------------------|----------------------------------------------------------------|
| 1 | A rectangle is 9 cm by 4 cm. Add $9 + 4 + 9 + 4$ .                               | <b>ALL SIDES</b> | All four outside sides are included once.                      |
| 2 | A triangle has side lengths 5 cm, 6 cm, and 7 cm. Add all three side lengths.    | <b>ALL SIDES</b> | All three outside sides are included once.                     |
| 3 | A square has side length 6 cm. Add $6 + 6 + 6$ .                                 | <b>NOT ALL</b>   | One of the four outside sides is missing.                      |
| 4 | A pentagon has side lengths 2, 3, 2, 4, and 3 units. Add all five lengths.       | <b>ALL SIDES</b> | All five outside sides are included once.                      |
| 5 | On a rectangle, measure from one corner straight across to the opposite corner.  | <b>NOT ALL</b>   | The path goes through the shape, not around its outside sides. |
| 6 | A garden is 8 m by 3 m. Add $8 + 3$ .                                            | <b>NOT ALL</b>   | Only two of the rectangle's four outside sides are included.   |
| 7 | A hexagon has side lengths 1, 2, 2, 1, 3, and 2 units. Add the six side lengths. | <b>ALL SIDES</b> | All six outside sides are included once.                       |
| 8 | A square has sides 4 cm long. Add $4 + 4 + 4 + 4$ .                              | <b>ALL SIDES</b> | All four outside sides are included once.                      |

## 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)

- **ALL SIDES:** A four-sided shape has side lengths 2 cm, 4 cm, 3 cm, and 5 cm. Add  $2 + 4 + 3 + 5$ .
- **NOT ALL:** A pentagon has five sides that are each 3 cm long. Add  $3 + 3 + 3 + 3$ .

**Challenge:** A pentagon has side lengths 2 cm, 3 cm, 4 cm, 2 cm, and 3 cm.  $2 + 3 + 4 + 2 + 3 = 14$  cm.

Items 1, 2, 4, 7, and 8 are ALL SIDES. Items 3, 5, and 6 are NOT ALL. In Part 2, students should name missing outside sides or identify a path through the shape when explaining NOT ALL choices.