

Shape and Space Designers

Use polygon properties, area and perimeter to explain a design.

GRADE 4 • 4.GSR.8

4.GSR.8 "Identify and draw geometric objects, classify polygons based on properties, and solve problems involving area and perimeter of rectangular figures."

NAME _____

DATE _____

You will need: Pencil; Ruler or straightedge; A paper corner to check right angles

DESCRIBE THE BOUNDARY AND THE SPACE INSIDE

Polygons have straight sides. Rectangles have four right angles and two pairs of parallel sides; squares are rectangles with all four sides equal. Area counts square units inside a rectangle: length times width. Perimeter is the distance around it: add all four sides. Use the stated lengths; diagrams are not life size. Label units. Sketches need not be to scale.

WORKED EXAMPLE

Rectangle ABCD has $AB = 7$ cm and $BC = 2$ cm. Find its area and perimeter.

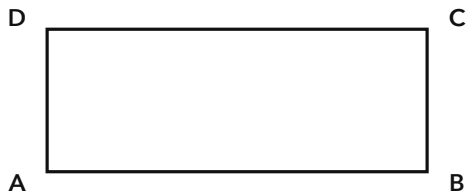


1. Area: $7 \times 2 = 14$ square centimeters.
2. Opposite sides match. Perimeter: $7 + 2 + 7 + 2 = 18$ centimeters.

Answer: Area = 14 square cm; perimeter = 18 cm.

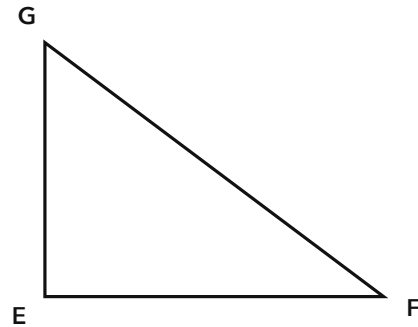
PRACTICE 4 problems

- 1** ABCD is shown. Use a paper corner to check its angles. Name the most specific quadrilateral type. Name both pairs of parallel sides.



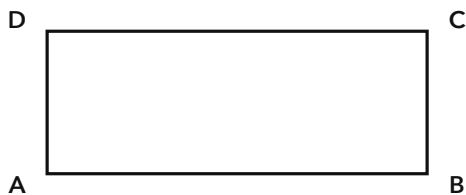
ANSWER _____

- 2** Check the corners of triangle EFG with a paper corner. Is it acute, right or obtuse? Name the corner that proves your answer.



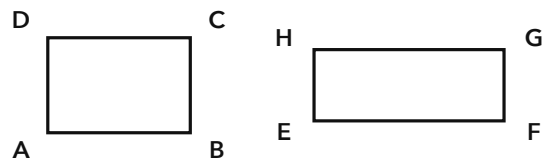
ANSWER _____

- 3** Rectangle ABCD has $AB = 8$ cm and $BC = 3$ cm. Find the area and perimeter. Write a calculation for each.



ANSWER _____

- 4** Both rectangles have area 24 square cm. ABCD is 6 cm by 4 cm; EFGH is 8 cm by 3 cm. Calculate each perimeter. Does equal area guarantee equal perimeter?



ANSWER _____

APPLY IT Show your work

- 1** A rectangular garden is 9 meters long and 5 meters wide. Sketch and label it. How much fencing surrounds all four sides? How much ground area can be planted?

ANSWER _____

- 2** Sketch a rectangle with area 18 square units and whole-number side lengths. Label all four side lengths and mark its four right angles. Calculate its perimeter.

ANSWER _____

CHALLENGE One step up

Sketch two different rectangles, each with perimeter 20 units and whole-number side lengths. Label their lengths and calculate their areas. Does equal perimeter guarantee equal area? Explain.



PRACTICE 1

Rectangle; four right angles. AB is parallel to CD, and BC is parallel to AD.

PRACTICE 2

Right triangle; angle E is a right angle.

PRACTICE 3

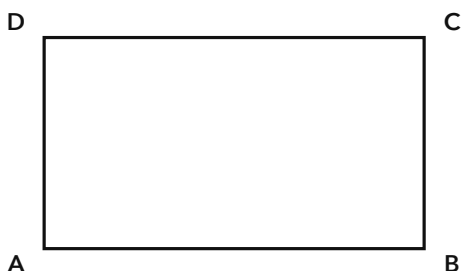
Area: $8 \times 3 = 24$ square cm. Perimeter: $8 + 3 + 8 + 3 = 22$ cm.

PRACTICE 4

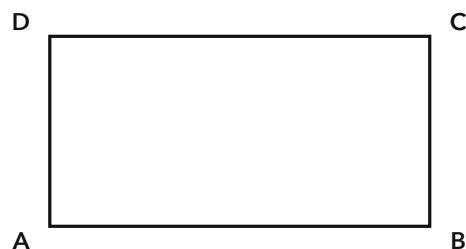
ABCD: $6 + 4 + 6 + 4 = 20$ cm. EFGH: $8 + 3 + 8 + 3 = 22$ cm. No; their areas match but their perimeters differ.

APPLY IT 1

28 meters of fencing; 45 square meters of planting area. Perimeter: $9 + 5 + 9 + 5 = 28$ m.
Area: $9 \times 5 = 45$ square m.

**APPLY IT 2**

Examples: 6 by 3 has perimeter 18 units; 9 by 2 has perimeter 22 units; 18 by 1 has perimeter 38 units. Each adjacent pair of lengths multiplies to 18. Opposite sides match. Add all four side lengths for the perimeter. The sample diagram is 6 by 3.

**CHALLENGE**

No. Example: 1 by 9 has perimeter 20 units and area 9 square units; 4 by 6 also has perimeter 20 units but area 24 square units. Other valid pairs are accepted.

Check right angles, two pairs of parallel sides and opposite sides equal in rectangle sketches. Allow sketches that are not to scale. Check linear versus square units.

Student designs may differ from the example diagrams; use their stated dimensions to verify area and perimeter.

