

# Shape Quest

*Build composite figures one piece at a time.*

**GRADE 8 • 8.MG.5.c**

**8.MG.5.c** "Apply perimeter, circumference, and area formulas to solve contextual problems involving composite plane figures."

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## COMBINE THE PIECES

For a composite figure, split the shape into familiar pieces. Add areas that are included, and subtract areas of cutouts. For perimeter, trace only the outside edge. For a semicircle,  $\pi d/2$  gives the curved arc only, so also include the diameter if it is on the outside edge.

## WORKED EXAMPLE

A rectangle is 10 cm long and 6 cm wide. A semicircle with diameter 6 cm is attached to a short side. Find the total area.

1. Rectangle area =  $10 \times 6 = 60 \text{ cm}^2$ .
2. Semicircle radius =  $6/2 = 3 \text{ cm}$ .
3. Semicircle area =  $1/2 \times \pi \times 3^2 = 9\pi/2 \text{ cm}^2$ .
4. Total area =  $60 + 9\pi/2 \text{ cm}^2$ .

**Answer:  $60 + 9\pi/2 \text{ cm}^2$**

## PRACTICE 6 problems

- 1** An L-shaped floor is made from a 15 m by 11 m rectangle with a 4 m by 5 m corner removed. Find its area.

**ANSWER** \_\_\_\_\_

- 2** A 13 cm by 8 cm rectangle has a semicircle attached to one 8 cm side. Find the outside perimeter of the figure.

**ANSWER** \_\_\_\_\_

- 3** A 17 cm by 12 cm rectangle has a semicircle with diameter 17 cm attached to one long side. Find the total area.

**ANSWER** \_\_\_\_\_

- 4** A rectangular patio measures 19 m by 12 m. A 7 m by 5 m rectangular pond is cut out of the patio. Find the area of the remaining patio.

**ANSWER** \_\_\_\_\_

- 5** An L-shape is made by removing a 4 cm by 5 cm corner from a 20 cm by 14 cm rectangle. Find the perimeter of the L-shape.

**ANSWER** \_\_\_\_\_

- 6** A stadium-shaped logo has a central rectangle that is 11 cm by 8 cm. A semicircle is attached to each 8 cm side. Find the area and perimeter.

**ANSWER** \_\_\_\_\_

## APPLY IT Show your work

- 1** The school streaming club is making a fabric backdrop. It has a 22 ft by 14 ft rectangle with a semicircle of diameter 22 ft attached along the top. How much fabric is needed to cover the backdrop?

WORK SPACE

ANSWER \_\_\_\_\_

- 2** A skate club marks an L-shaped practice zone with tape. The zone starts as a 25 m by 18 m rectangle, and a 7 m by 5 m corner is removed for equipment. How much tape is needed around the outside edge?

WORK SPACE

ANSWER \_\_\_\_\_

## CHALLENGE One step up

### CHALLENGE

A 24 cm by 16 cm rectangle has a semicircle with diameter 24 cm attached to its top. A semicircular notch with diameter 16 cm is cut inward from the entire right side. Find the area and the outside perimeter of the new figure.

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## PART 1 • PRACTICE

| # | PROBLEM                                                                                                                                       | ANSWER                                                        |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|
| 1 | An L-shaped floor is made from a 15 m by 11 m rectangle with a 4 m by 5 m corner removed. Find its area.                                      | <b>145 m<sup>2</sup></b>                                      |
| 2 | A 13 cm by 8 cm rectangle has a semicircle attached to one 8 cm side. Find the outside perimeter of the figure.                               | <b>34 + 4n cm</b>                                             |
| 3 | A 17 cm by 12 cm rectangle has a semicircle with diameter 17 cm attached to one long side. Find the total area.                               | <b>204 + 289n/8 cm<sup>2</sup></b>                            |
| 4 | A rectangular patio measures 19 m by 12 m. A 7 m by 5 m rectangular pond is cut out of the patio. Find the area of the remaining patio.       | <b>193 m<sup>2</sup></b>                                      |
| 5 | An L-shape is made by removing a 4 cm by 5 cm corner from a 20 cm by 14 cm rectangle. Find the perimeter of the L-shape.                      | <b>68 cm</b>                                                  |
| 6 | A stadium-shaped logo has a central rectangle that is 11 cm by 8 cm. A semicircle is attached to each 8 cm side. Find the area and perimeter. | <b>Area = 88 + 16n cm<sup>2</sup>; Perimeter = 22 + 8n cm</b> |

## PART 2 • APPLY IT

- 308 + 121n/2 ft<sup>2</sup>** Find the rectangle area,  $22 \times 14 = 308$ . Add the area of the semicircle,  $1/2 \times \pi \times 11^2 = 121\pi/2$ .
- 86 m** Removing a corner takes away two outside lengths but adds equal lengths along the new inside edges. The perimeter stays  $2(25 + 18) = 86$  m.

## CHALLENGE

**Area = 384 + 40n cm<sup>2</sup>; Perimeter = 40 + 20n cm**

Accept exact answers with  $\pi$  left in the answer. For perimeter, accept equivalent reordered sums, such as  $4n + 34$  cm.