Connect the Ideas

Here is a composite figure from Section 1.3.
The perimeter of this figure is the sum of
3 sides of a rectangle and
one-half the circumference of a circle.

Determine the curved length

The diameter of the circle is 9.2 cm.
The circumference of a circle is: $C = \pi d$
So, the circumference is: $C = \pi \times 9.2$
One-half the circumference is: $\frac{1}{2} \times \pi \times 9.2 \doteq 14.45$
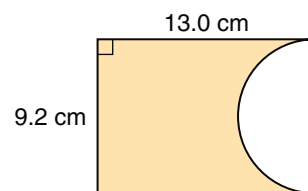
Determine the perimeter

The approximate perimeter of the composite figure is:
$13.0 + 9.2 + 13.0 + 14.45 = 49.65$
The perimeter is about 49.7 cm.

Check the result

From the diagram, the length of the semicircle
is greater than the width of the rectangle.
So, the perimeter of the figure should be greater than
the perimeter of the rectangle, which is approximately
$2(9) + 2(13) = 18 + 26 = 44$; the result is reasonable.

13.0 cm

9.2 cm

Practice

1. a) Determine the perimeter of each composite figure.

i)
6.0 cm
4.0 cm

ii)
6.0 cm
4.0 cm
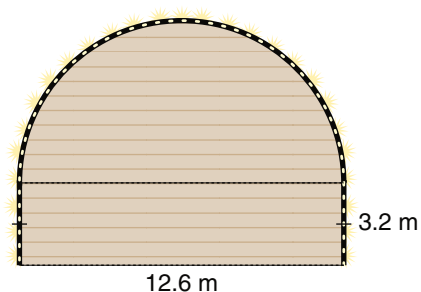
iii)
6.0 cm
4.0 cm

iv)
6.0 cm
4.0 cm
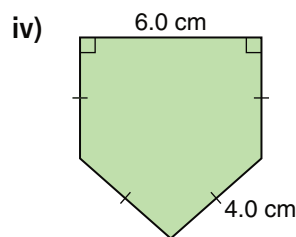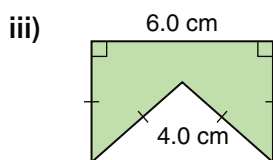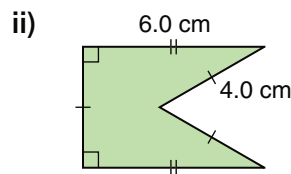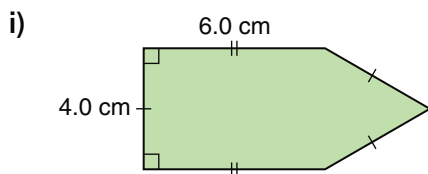
b) What do you notice about the perimeters in part a?
Do you think the same relationships are true
for the areas? How could you find out?

2. Sarah is lighting the theatre stage arch for the new play.
The arch is a semicircle on top of a rectangle.
How long is the string of lights? Justify your answer.

3.2 m

12.6 m

3. This design is 4 one-quarter circles
on the sides of a square.
   a) What is the perimeter of the design?
   The broken lines are not part of the perimeter.
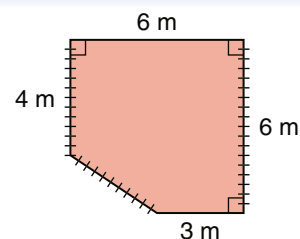   **b)** Is your result reasonable? Explain.

11.4 cm
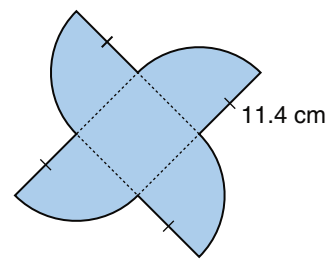
Sometimes you may need to use the Pythagorean Theorem
to calculate a length before you can determine the perimeter.

Example

Here is a plan of a driveway from
Section 1.3.

A fence is to be placed around the
driveway on the sides indicated.
How much fencing is needed?

6 m

4 m

6 m

3 m

Solution

We know the length of each part
of the fence except for AB.
Draw right △ABC.
Then AC = 6 m − 4 m = 2 m
and BC = 6 m − 3 m = 3 m
To find the length of AB, use the
Pythagorean Theorem in △ABC.

4 m

6 m

A

C   B

$a^2 + b^2 = c^2$

Substitute: $a = 3$ and $b = 2$
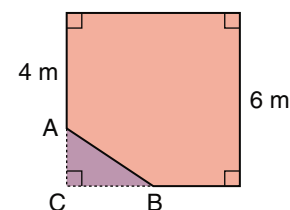$3^2 + 2^2 = c^2$
$9 + 4 = c^2$
$13 = c^2$
$c = \sqrt{13}$
$c \doteq 3.6$

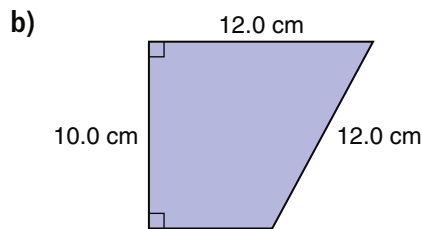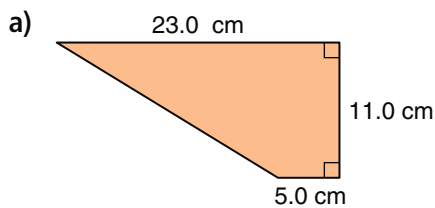The total length of fencing is:
6 m + 3.6 m + 4 m = 13.6 m
About 14 m of fencing are needed.

4. Determine the perimeter of each figure. Show your work.

a)

23.0 cm

11.0 cm

5.0 cm

b)

12.0 cm

10.0 cm

12.0 cm

Need Help?

Read the Example on page 17.

5. **Assessment Focus** A circular fish pond is set in a rectangular patio.

a) Plastic edging is placed around the pond and the patio.

   i) What length of edging is used?

   ii) The edging costs $4.79/m.

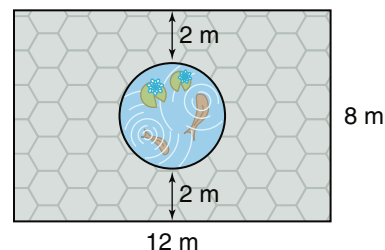   What is the total cost of the edging?

b) The patio is paved with sandstone tiles.

   i) What is the area that is paved?

   ii) The sandstone costs $45.00/m^2.

      What is the total cost of the sandstone?

c) What assumptions did you make in parts a and b?

2 m

8 m

2 m

12 m

6. Sketch two different composite figures that have the same perimeter. Calculate the perimeters, or explain how you know they are equal. Calculate each area.

7. **Take It Further** Yazan is putting up a wallpaper border in his family room. The border will run along the top of all the walls, including above any doors and windows.
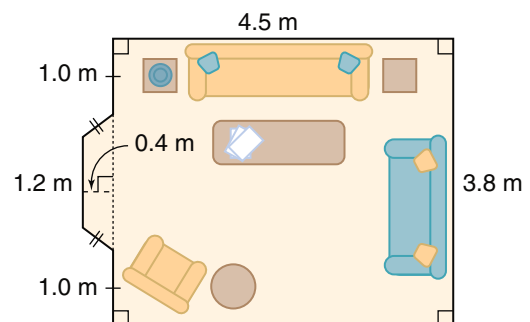
a) What length of border does Yazan need?

b) The border comes in 4.57-m rolls. How many rolls does Yazan need?

c) Each roll of border costs $14.99. How much will the border for this room cost?

4.5 m

1.0 m

0.4 m

1.2 m

3.8 m

1.0 m

In Your Own Words

Sketch a composite figure.
Explain how you calculate its perimeter.
Show your work.