

19. [Perimeter / Area / Volume]

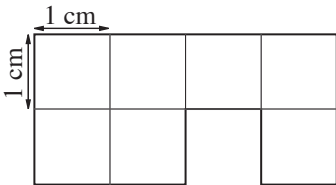
Skill 19.1 Calculating the perimeter of a shape using a grid.

MMYellow 1 1 2 2 3 3 4 4
MMRed 1 1 2 2 3 3 4 4

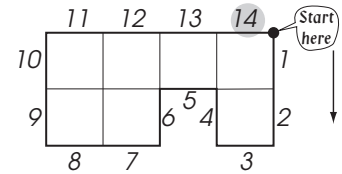
- To find the perimeter of a shape using a grid, mark a starting point and count the number of grid units around the outside of the shape.

Hint: The perimeter is the distance around the outside of a shape.

Q. Find the perimeter of this shape.



A. 14 cm



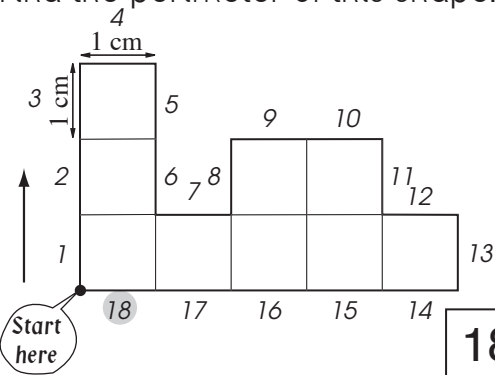
Each grid unit measures 1 cm.

Mark a starting point.

Count the number of grid units around the outside of the shape.

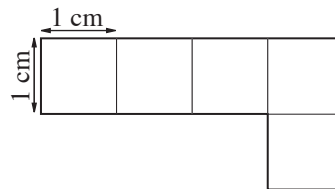
The perimeter is 14 units or cm.

a) Find the perimeter of this shape.



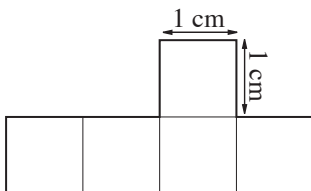
18 cm

b) Find the perimeter of this shape.



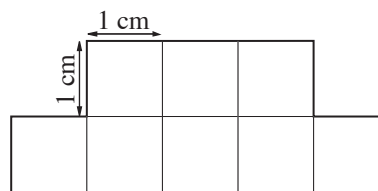
cm

c) Find the perimeter of this shape.



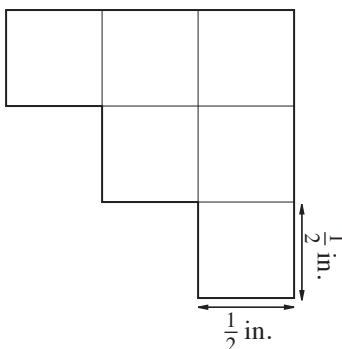
cm

d) Find the perimeter of this shape.



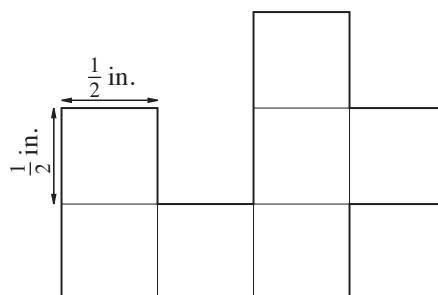
cm

e) Find the perimeter of this shape.



in.

f) Find the perimeter of this shape.

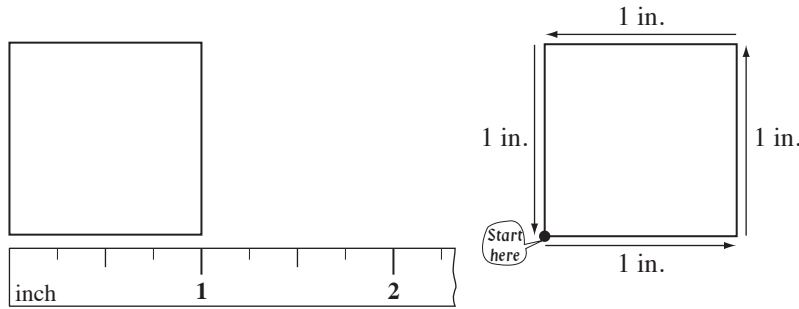


in.

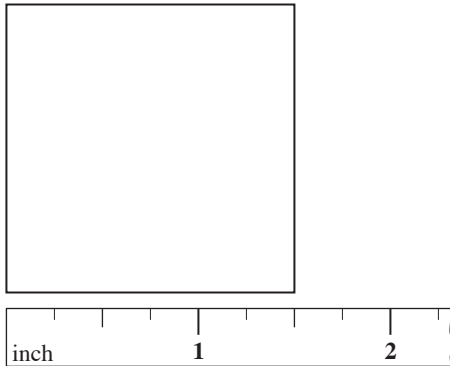
Skill 19.2 Measuring the perimeter using a ruler.

- Measure the side lengths of the shape.
- Add the lengths of all sides.

Example: Side length = 1 in., then perimeter square = 1 in. + 1 in. + 1 in. + 1 in. = 4 in.



Q. Using an inch ruler measure the length of each side of the square. What is the perimeter?

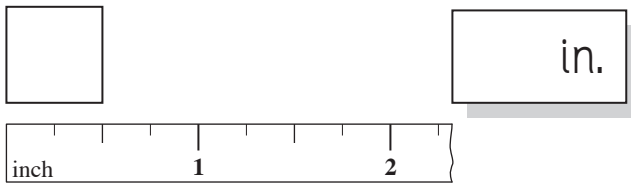


A. 1.5 in.
 1.5 in.
 1.5 in.
 $+ 1.5 \text{ in.}$

 6.0 in.

A square has 4 sides the same length. Measure the length of 1 side. (1.5 in. long.) Add all four sides. The perimeter of the square is 6 inches.

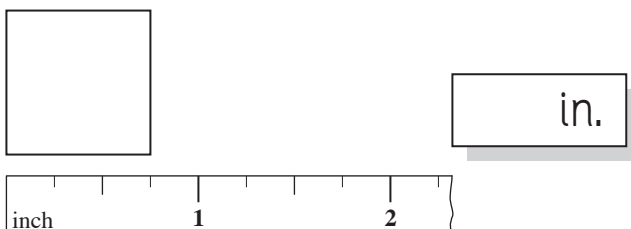
a) Use an inch ruler to measure the length of one side of the square.



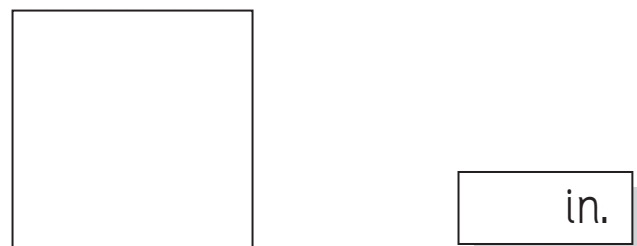
b) Use an inch ruler to measure the length of one side of the square.



c) Using an inch ruler measure the length of each side of the square. What is the perimeter?



d) Using an inch ruler measure the length of each side of the square. What is the perimeter?



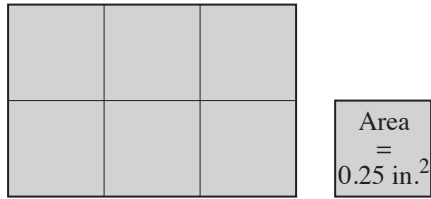
$0.75 + 0.75 + 0.75 + 0.75 = 1.5 + 1.5$

 $= 3 \text{ in.}$

Skill 19.3 Calculating the area of a shape by counting squares (1).

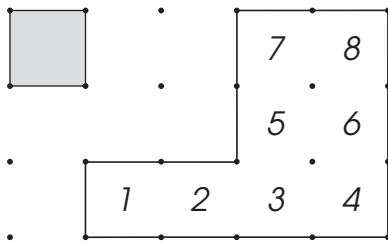
- Count the number of squares of a certain size that are needed to cover the shape.

Q. Find the area of this rectangle.



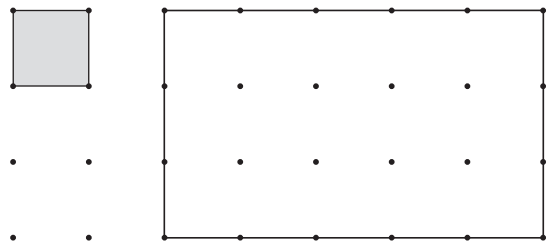
A. 1.5 in.^2 Each square is 0.5 in. on each side.
Count the squares that cover the surface inside the rectangle.
There are 6 squares, each with an area of 0.25 in.^2
 $\text{Area} = 6 \times 0.25 \text{ in.}^2$
 $= 1.5 \text{ in.}^2$

a) How many small squares are needed to cover the larger shape?

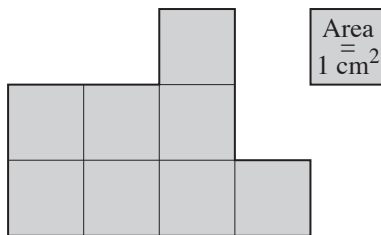


8

b) How many small squares are needed to cover the larger rectangle?

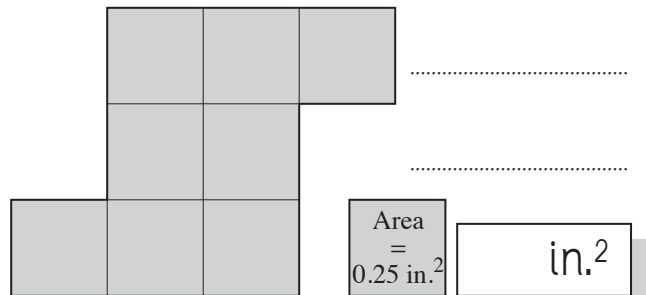


c) Find the area of this shape.



cm²

d) Find the area of this shape.



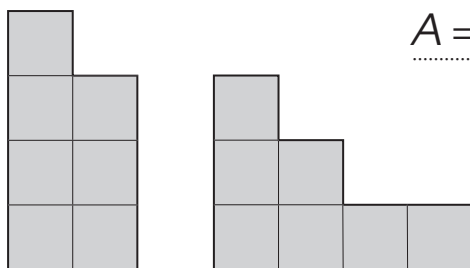
in.²

e) The shapes below have the same:

- A) perimeter and area
- B) perimeter
- C) area

$P =$

$A =$

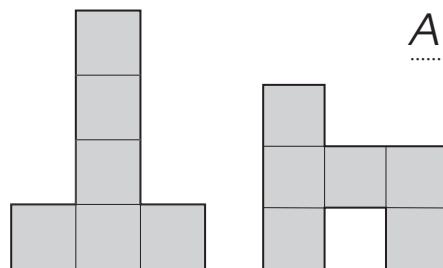


f) The shapes below have the same:

- A) perimeter and area
- B) perimeter
- C) area

$P =$

$A =$

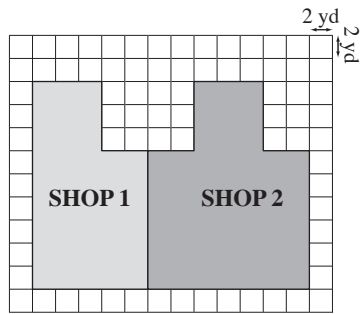


Skill 19.3 Calculating the area of a shape by counting squares (2).

- Count the number of squares of a certain area that are needed to cover the shape.
Hint: Divide the shape into rectangles.
Calculate the number of squares covered by each rectangle. Add all the totals together.
- Multiply the total number of squares covered by the area of a unit square.

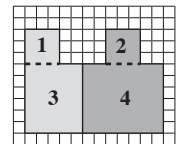
Q. Use the grid and scale to find the total floor area of the shops.

A. 360 yd^2



$\square = 4 \text{ square yards}$

Divide the shape into 4 rectangles.



Count the squares that are covered by each rectangle.

1) 9 2) 9 3) 30 4) 42

$9 + 9 + 30 + 42 = 90$ squares

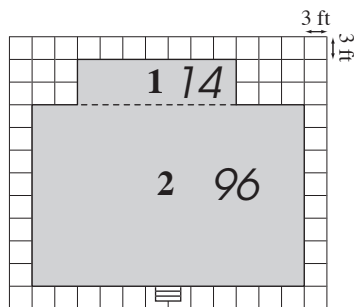
In all there are 90 squares covered.

Each square has an area of 4 yd^2

$\text{Area} = 90 \times 4 \text{ yd}^2$

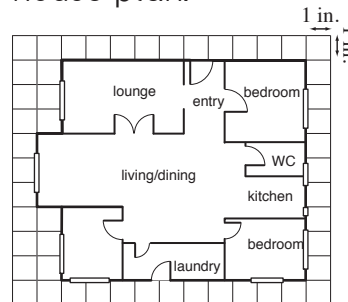
$= 360 \text{ yd}^2$

g) Use the grid and scale to find the floor area of this house.



$\square = 9 \text{ square feet}$

h) Use the grid to find the area of this house plan.



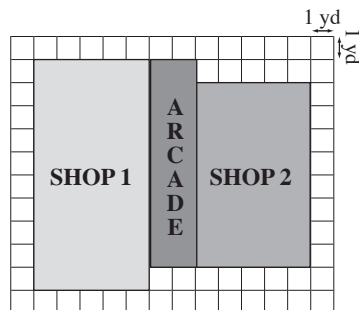
$\square = 1 \text{ square inch}$

$14 + 96 = 110$

$110 \times 9 =$ ft²

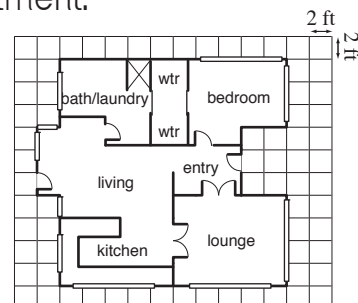
.....
.....
in.²

i) Use the grid and scale to find the total floor area of the shops and arcade.



$\square = 1 \text{ square yard}$

j) Use the grid and scale to find the area of this apartment.



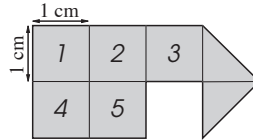
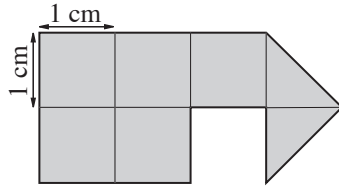
$\square = 4 \text{ square feet}$

.....
.....
yd²

.....
.....
ft²

Q. Find the area of this shape.

A. 6 cm^2



First count the number of complete squares.
There are 5 complete squares.

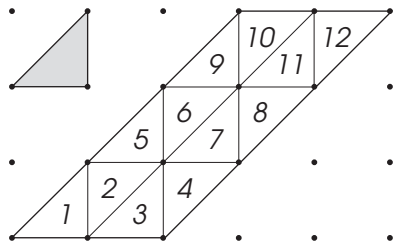
Then count the triangles.
Each triangle doubled forms 1 square.

There are 2 triangles in the shape. Together they make 1 more square.

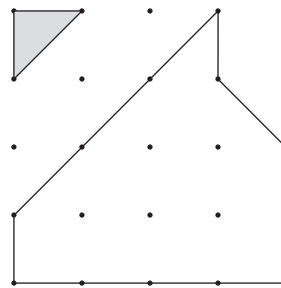


$5 + 1 = 6$ squares

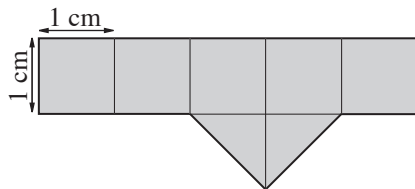
a) How many small triangles are needed to cover the parallelogram?



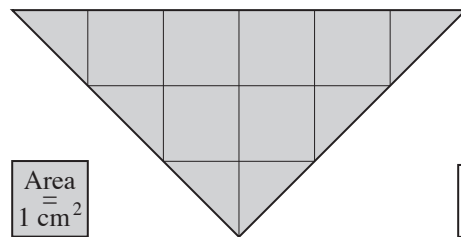
b) How many small triangles are needed to cover the shape?



c) Find the area of this shape.



d) Find the area of this triangle.

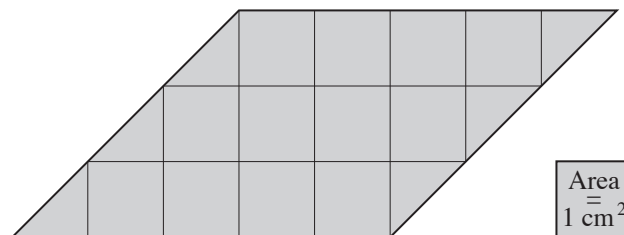


e) Find the area of this trapezoid.



Area = 1 cm²

f) Find the area of this parallelogram.



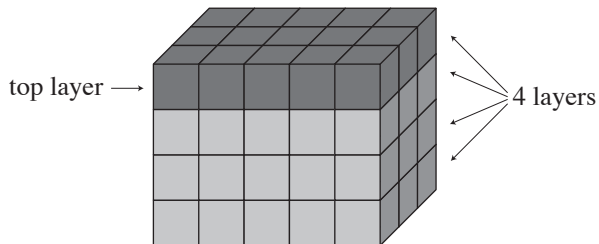
Area = 1 cm²

Skill 19.5 Calculating the volume of a rectangular prism by counting cubes.

- Count the number of cubes needed to fill the top layer.
- Multiply this amount by the number of layers.



Q. How many cubes were used to make this prism?

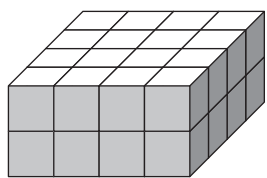


A. $3 \times 5 = 15$
 $15 \times 4 = 60$

First count the cubes in the top layer.
There are 3 rows of 5 cubes.

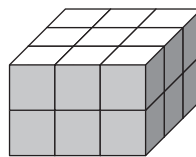
Then count the number of layers.
There are 4 layers of cubes.

a) How many cubes were used to make this prism?



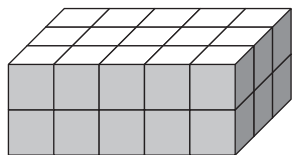
$4 \times 4 = 16$
 $16 \times 2 =$ 32

b) How many cubes were used to make this prism?



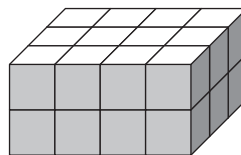
.....
.....

c) How many cubes were used to make this prism?



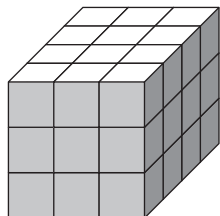
.....
.....

d) How many cubes were used to make this prism?



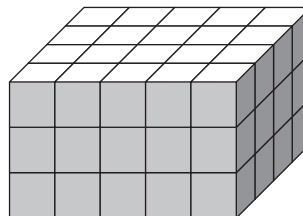
.....
.....

e) How many cubes were used to make this prism?



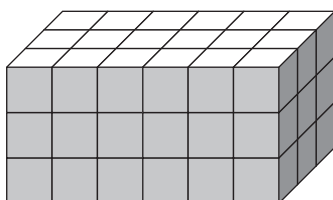
.....
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f) How many cubes were used to make this prism?



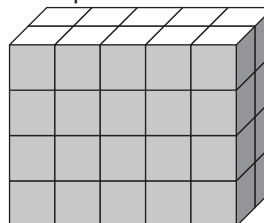
.....
.....

g) How many cubes were used to make this prism?



.....
.....

h) How many cubes were used to make this prism?

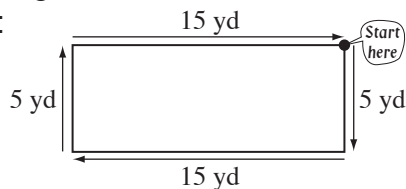


.....
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Skill 19.6 Calculating the perimeter of a shape.

- Add the lengths of all sides.

Example:

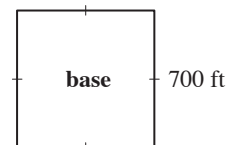


$$\begin{aligned} \text{Perimeter} &= 5 \text{ yd} + 15 \text{ yd} + 5 \text{ yd} + 15 \text{ yd} \\ &= 40 \text{ yd} \end{aligned}$$

- Q.** The third largest pyramid in the world is the Pyramid of the Sun, in Teotihuacan, Mexico. The pyramid has a square base of side length 700 ft. Find the perimeter of its base.



$$\begin{array}{r} \text{A. } 700 \text{ ft} \\ 700 \text{ ft} \\ 700 \text{ ft} \\ + 700 \text{ ft} \\ \hline \mathbf{2800 \text{ ft}} \end{array}$$



All four sides are the same length.
Each side is 700 ft long.
Add all four sides.
The perimeter of the square is 2800 ft.

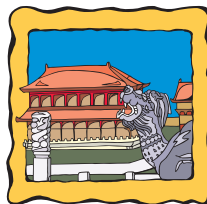
- a)** Italian artist Leonardo da Vinci's painting Mona Lisa is a rectangle 53 cm wide and 77 cm high. Find the painting's perimeter.



$$P = l + l + l + l$$

$$= 53 + 77 + 53 + 77 = \boxed{} \text{ cm}$$

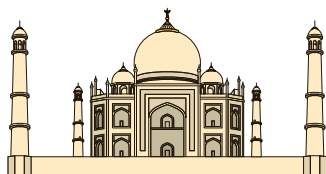
- b)** Tiananmen Square in Beijing, China, is a square with a side length of approximately 1.5 km. Find the perimeter of the square.



$$P = l + l + l + l$$

$$= \boxed{} \text{ km}$$

- c)** Taj Mahal in Agra, India, is a white marble tomb. It sits on a square platform of side length 313 ft. Find the perimeter of the platform.



$$P = l + l + l + l$$

$$= \boxed{} \text{ ft}$$

- d)** *USA Today* is printed on rectangular sheets of paper 290 cm wide and 405 cm long. Find the perimeter of a newspaper page.



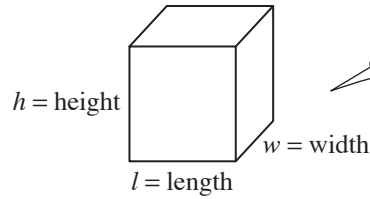
$$\boxed{} \text{ cm}$$

Skill 19.7 Calculating the volume of a rectangular prism.

MMYellow 11 22 33 44
MMRed 11 22 33 44

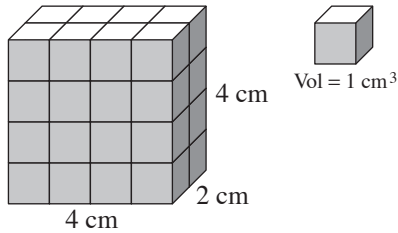
- Multiply length by width by height.

$$\text{Volume} = l \times w \times h$$



$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$

- Q.** Find the volume of this prism.
(Volume = length \times width \times height)



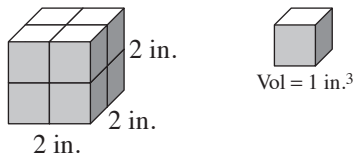
A. $\text{Volume} = l \times w \times h$

$$= 4 \times 2 \times 4$$

$$= \mathbf{32 \text{ cm}^3}$$

Length (l) is 4 cm.
Width (w) is 2 cm.
Height (h) is 4 cm.
Multiply length by width by height.
Volume is 32 cm³.

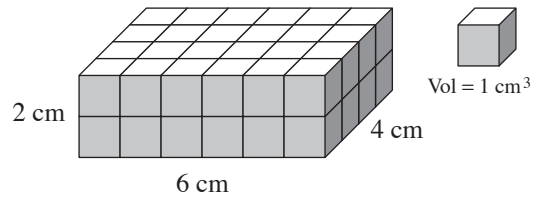
- a)** Find the volume of this cube.
(Volume = length \times length \times length)



$$\text{Volume} = l \times l \times l$$

$$= 2 \times 2 \times 2 = \boxed{\text{in.}^3}$$

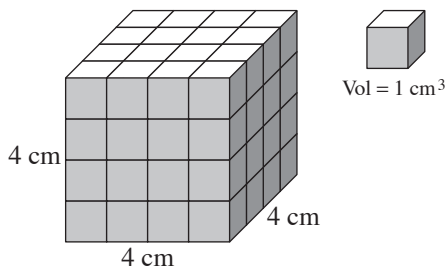
- b)** Find the volume of this prism.
(Volume = length \times width \times height)



$$\text{Volume} = l \times w \times h$$

$$= \quad = \boxed{\text{cm}^3}$$

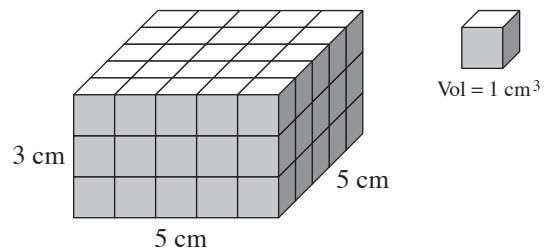
- c)** Find the volume of this cube.



$$\text{Volume} =$$

$$= \quad = \boxed{\text{cm}^3}$$

- d)** Find the volume of this prism.



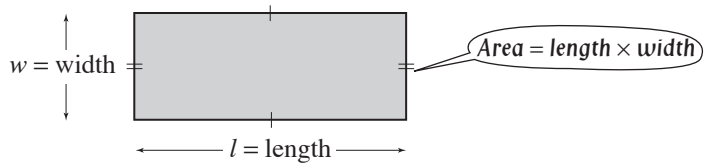
$$\text{Volume} =$$

$$= \quad = \boxed{\text{cm}^3}$$

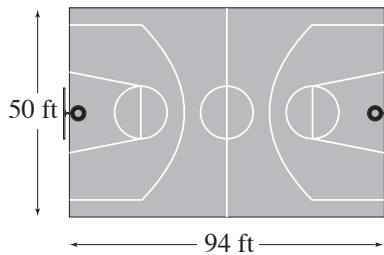
Skill 19.8 Calculating the area of a rectangle.

- Multiply length by width.

$$\text{Area} = l \times w$$



- Q.** Find the area of this rectangular basketball court.



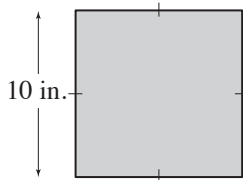
A. $\text{Area} = l \times w$

$$= 94 \times 50$$

$$= \mathbf{4700 \text{ ft}^2}$$

Length (l) is 94 ft.
Width (w) is 50 ft.
Multiply length by width.
Area is 4700 ft^2 .

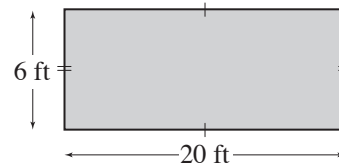
- a)** Find the area of this square.
(Area = length \times length)



$$\text{Area} = l \times l$$

$$= 10 \times 10 = \mathbf{100 \text{ in.}^2}$$

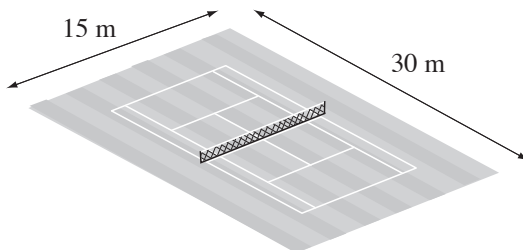
- b)** Find the area of this rectangle.
(Area = length \times width)



$$\text{Area} = l \times w$$

$$= \quad = \quad \mathbf{\text{ft}^2}$$

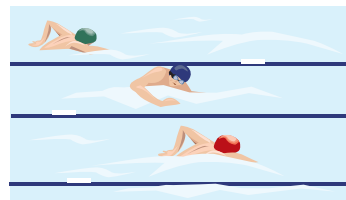
- c)** Find the area of this tennis court.



$$\text{Area} =$$

$$= \quad = \quad \mathbf{\text{m}^2}$$

- d)** Find the area of a rectangular swimming pool 20 meters long and 8 meters wide.



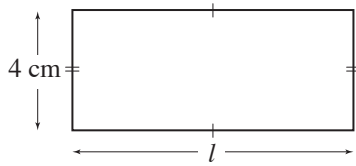
$$\text{Area} =$$

$$= \quad = \quad \mathbf{\text{m}^2}$$

Skill 19.9 Finding the side length of a shape when the perimeter is given.

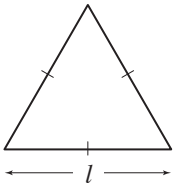
MMYellow 11 22 33 44
MMRed 11 22 33 44

- Q.** The perimeter of a rectangle is 30 cm.
If the width is 4 cm, find its length.



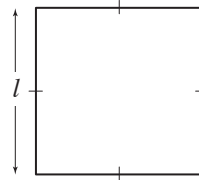
- A.** $4 \times 2 = 8$
 $30 - 8 = 22$
 $22 \div 2 = 11$
 $l = 11 \text{ cm}$
- Perimeter of a rectangle is the sum of twice the length and twice the width. Subtract twice the width from the perimeter. The result is twice the length. Divide by 2.

- a)** The perimeter of an equilateral triangle is 30 in. Find the side length.



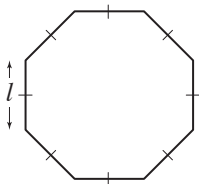
$Length = 30 \div 3 =$ in.

- b)** The perimeter of a square is 36 ft. Find the side length.



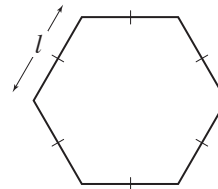
$Length =$ = ft

- c)** The perimeter of a regular octagon is 64 in. Find the side length.



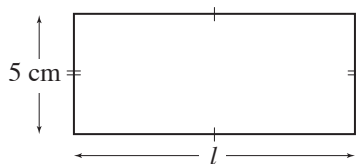
$Length =$ = in.

- d)** The perimeter of a regular hexagon is 72 mm. Find the side length.



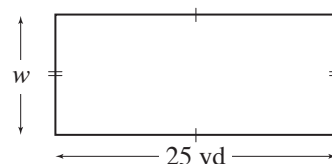
$Length =$ = mm

- e)** The perimeter of a rectangle is 24 cm. If the width is 5 cm, find its length.



$5 \times 2 = 10$
 $24 - 10 = 14$
 $14 \div 2 =$ cm

- f)** The perimeter of a rectangle is 70 yd. If the length is 25 yd, find its width.



$25 \times 2 = 50$
 $70 - 50 = 20$
 $20 \div 2 =$ yd