



## Perimeter and Area

Suggested time: 75 minutes

### **What's important in this lesson:**

In this lesson you will explore applications involving perimeter and area formulas.

### **Complete these steps:**

1. Read through the lesson portion of the package independently.
2. Complete any of the examples in the lesson
3. Check your lesson answers with the lesson key your teacher has.
4. Seek assistance from the teacher as needed.
5. Complete the Assessment and Evaluation and submit for evaluation. Be sure to ask for any assistance when experiencing difficulties.

### **Hand-in the following to your teacher:**

1. Assessment and Evaluation

### **Questions for the teacher:**

## Diagnostic/Introductory Activity



1. In your own words, explain the difference between perimeter and area.

2. Below are two figures. Which one best represents  $\text{cm}^2$ ? Explain.

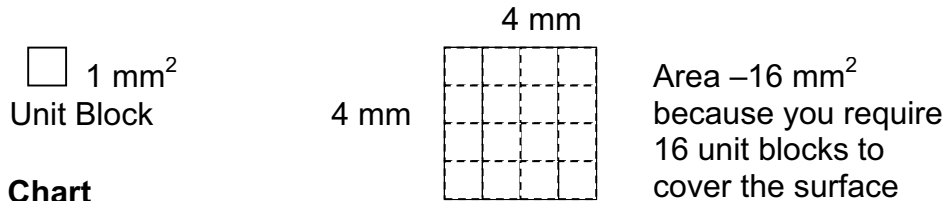


3. State the Pythagorean theorem and create an example to solve.



The **perimeter** of an object is the total distance around the outside of the figure. Perimeter is a one-dimensional measurement, which means that our units will be m, cm, km, etc. We will not have to worry about using exponents on the units. Please remember the perimeter of a circle has a special name, **circumference**.

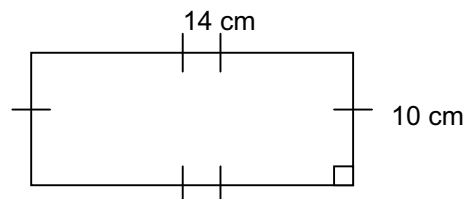
The **area** of an object is the number of square units required to cover the surface. Area is a two-dimensional measurement, which means our units will be in m<sup>2</sup>, cm<sup>2</sup>, km<sup>2</sup>, etc.



**Summary Chart**

Figure	Perimeter	Area	Example
	$P = l+l+w+w$ or $P = 2(l+w)$	$A = lw$	3m  5m $P = 5+5+3+3$ $P = 16\text{ m}$  $A = 5 \times 3$ $A = 15\text{ m}^2$
	$P = a+b+c$	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$	3      4 5  8 cm $P = 3+8+4$ $P = 15\text{ cm}$  $A = \frac{1}{2}(8)(5)$ $A = 20\text{ cm}^2$
	The perimeter of a circle is the circumference $C = 2\pi r$ or $C = 2d$	$A = \pi r^2$	$r=3\text{ m}$  $C = 2\pi(3)$ $C = 18.85\text{ m}$  $A = \pi(3)^2$ $A = 28.27\text{ m}^2$

**Example #1**





Calculate the perimeter and area of the figure at the right.

**Solution**

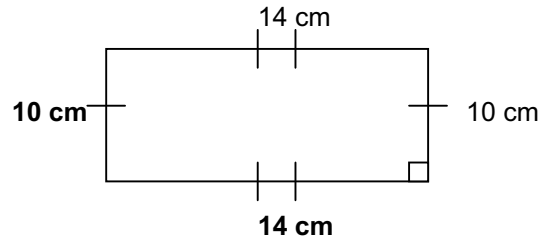
The hash marks are present on the diagram to show opposite sides are equal. This information has been added to the diagram in bold. You can now calculate the perimeter.

Perimeter

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

$$P = 10 + 10 + 14 + 14$$

$$P = 48 \text{ cm}$$



Area

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

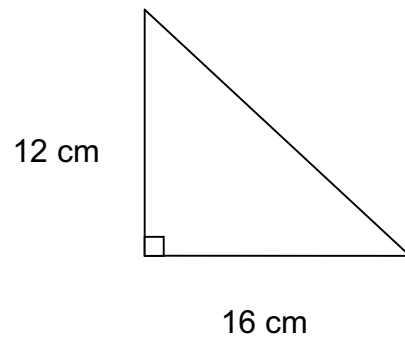
$$= 10 \times 14$$

$$= 140 \text{ cm}^2$$

← units are squared because of area.

**Example #2**

Calculate the perimeter and area of the given triangle. Round all answers to one decimal place.



**Solution**

Perimeter

First you must make use of the Pythagorean Theorem to calculate the hypotenuse.

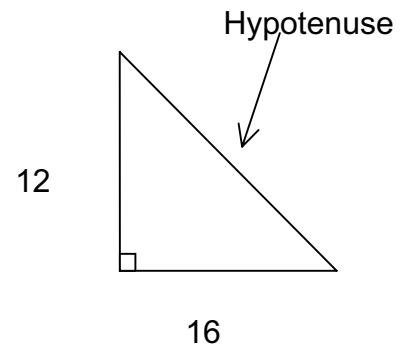
$$c^2 = a^2 + b^2$$

$$c^2 = 12^2 + 16^2$$

$$c^2 = 144 + 256$$

$$c^2 = 400$$

$$c = \sqrt{400}$$





$$c = 17.7$$

$$\begin{aligned} \text{Perimeter} &= 12 + 16 + 17.7 \\ &= 45.7 \end{aligned}$$

Therefore, the perimeter is 45.7 cm.

### Area

$$A = \frac{bxh}{2}$$

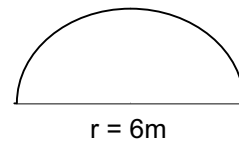
$$A = \frac{12 \times 16}{2}$$

$$A = 96 \text{ cm}^2$$

Therefore, the area is 96 cm<sup>2</sup>.

### **Example # 3**

Calculate the perimeter and area of the given figure.  
Round your answers to one decimal place.



### **Solution**

First we must recognize we are dealing with a semicircle. Due to this fact we must remember to divide all our results by 2.

### Perimeter

We will have to break this figure into two parts in order to calculate the perimeter.

The formula for circumference of a circle will only give us the round part of the circle and not include the diameter.

$$\begin{aligned} C &= \pi d \text{ (note diameter} = 2 \times \text{radius)} \\ &= \pi (2 \times 6) \\ &= 12\pi \\ &= 37.7 \end{aligned}$$



You now divide this answer by two because we only require half the circumference.



$$\begin{aligned} C &= 37.7 \div 2 \\ &= 18.9 \end{aligned}$$

You now need to add the diameter for the final perimeter.

$$\begin{aligned} P &= 18.9 + (2 \times 6) \\ &= 30.9 \end{aligned} \quad \text{diameter}$$

Therefore the perimeter of the shape is 30.9 m.

### Area

The area of the figure is much easier to calculate. The only note is that you must remember the figure is a semicircle.

$$\begin{aligned} A &= \pi r^2 \\ &= \pi (6)^2 \\ &= 113.1 \end{aligned}$$

**Note:** To ensure accuracy you must use your  $\pi$  button on our calculators!

Therefore the area of the semicircle is 113.1 m<sup>2</sup>

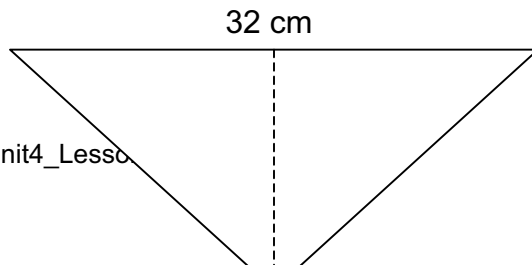
### **Exercises.**

1. Calculate the perimeter and area of each figure. Show your work.

(a)



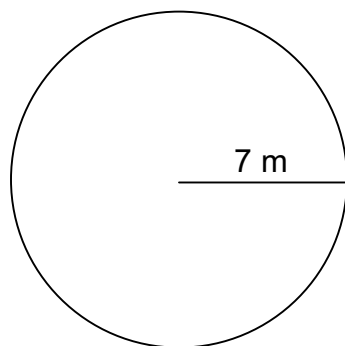
(b)





17 cm                  12cm                  19 cm

(c)



**2. CODE LINE**



Figure out each question described below. Then find your answer in the code at the bottom of the page. Each time the answer appears in the code, write the letter of that problem above it.

- (A) Perimeter of triangle with sides measuring 6.3 m, 2.9 m, and 10.5 m.
- (T) Perimeter of rectangle with sides measuring 9.6m and 3.8 m.
- (I) Perimeter of square with side measuring 4.65 m.
- (J) Perimeter of equilateral triangle with side measuring 15.8 m
- (O) Area of triangle with base 16 m and height 4.71 m.
- (U) Area of circle with radius 2.92 m. ( $\pi=3.14$ )
- (E) Perimeter of triangle with sides 11.2 m, 8.5 m, and 14.9 m.
- (D) Perimeter of isosceles triangle with base measuring 12.6 m and legs measuring 7.5 m.
- (C) Perimeter of quadrilateral with sides 9.4 m, 8.0 m, 15.0 m, and 6.8 m.
- (S) Area of rectangle with sides measuring 24.5 m and 27.7 m.
- (H) Area of a triangle with base measuring 31.2 m and height 8.72 m.
- (Y) Circumference of a circle with radius 1.64 m. ( $\pi=3.14$ )
- (N) Area of a circle with radius 2.31 m. ( $\pi=3.14$ )
- (R) Perimeter of a rectangle with sides measuring 17.4 m and 8.0 m.
- (G) Circumference of a circle with radius 8.01 m. ( $\pi=3.14$ )

TITLE: Hole of Fame

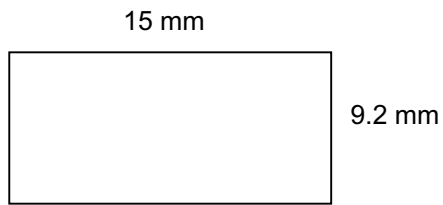
26.8m 136.03m 34.6m \* 50.3m 50.8m 19.7m 16.76m 27.6m  
 39.2m 19.7m 16.76m 10.3m 37.7m 16.7m 18.6m 67.9m  
 47.4m 26.77m 67.9m 26.8m  
 50.3m 37.7m 50.8m 50.3m 34.6m 67.9m





1. Calculate the perimeter and area of each figure.

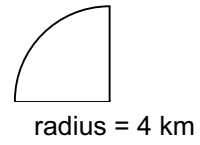
(a)



Perimeter

Area

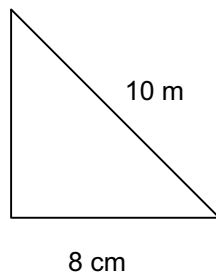
(b)



Perimeter

Area

(c)



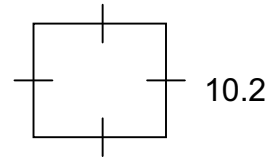
Perimeter

Area

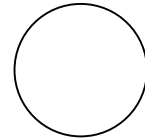


2. Calculate the area of each figure. Round your final answers to one decimal place.

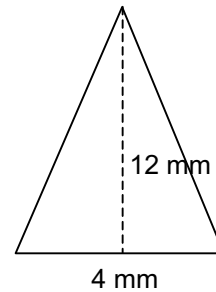
(a) A square with side length 10.2 m



(b) A circle with diameter 4.5cm.



(c) A triangle with base 4mm and height 12 mm.



3. The Rogers Centre in Toronto has a circumference of 650m. What is the diameter of the stadium?
4. Describe what calculations and measurements you would need to do in order to replace the baseboards and carpet in your room.