ST. JEAN DE BREBEUF MATHEMATICS

CHAPTER 1.1

AREA and PERIMETER

CHAPTER 1.1 AREA and PERIMETER

You need to remember, from previous math classes, the following formulas:

Perimeter

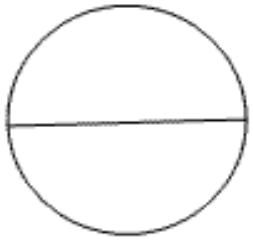
The length or distance around the outside of an object, measured in base units

i.e. m, cm, km.

Circumference (perimeter of a circle)

$C = \pi d$ (d = diameter)

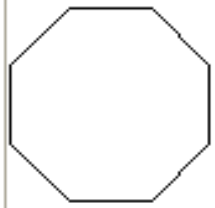
Or $C = 2\pi r$ (r = radius)



For rectangles, triangles, polygons, and many composite shapes simply add the length of each side. In the regular octagon below,

$P = s+s+s+s+s+s+s+s$

$= 8s$



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CHAPTER 1.1 AREA and PERIMETER

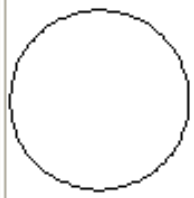
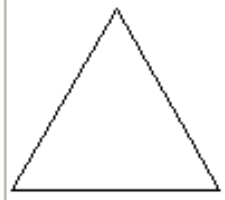
You need to remember, from previous math classes, the following formulas:

Area

The surface included within a closed figure, measured by the number of square units needed to cover the surface.

i.e. cm^2, m^2.

"Square units" always have the exponent **2**

Area= πr^2 	Area= $l \times w$	Area= $\frac{b \times h}{2}$ 

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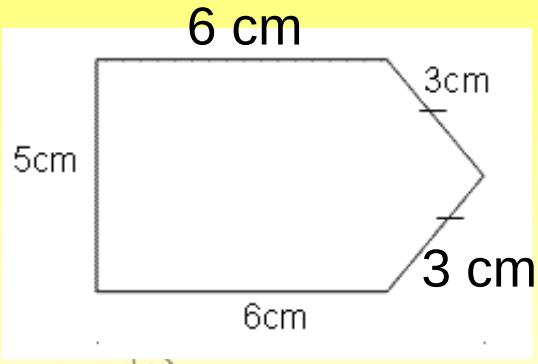
CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

Often, in real life, shapes are not just circles, rectangles, or triangles. Shapes that are formed by combining two or more simple figures are called composite shapes.

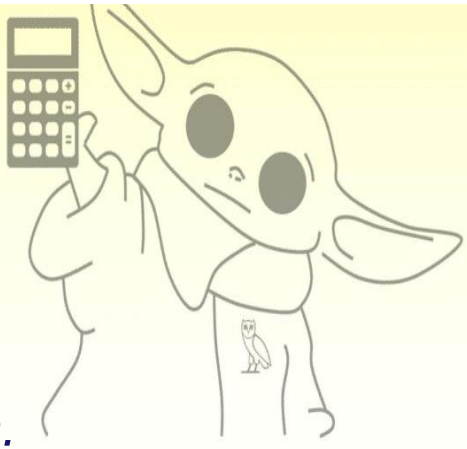


Example 1

Find the **perimeter** and **area** for the shape given:

For the **Perimeter**...

P = Sum of all sides
= 5 + 6 + 3 + 3 + 6
= **23cm**



*Therefore, the perimeter is **23 cm**.*

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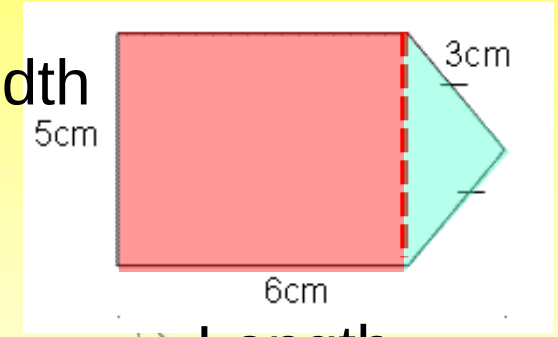


Example 1

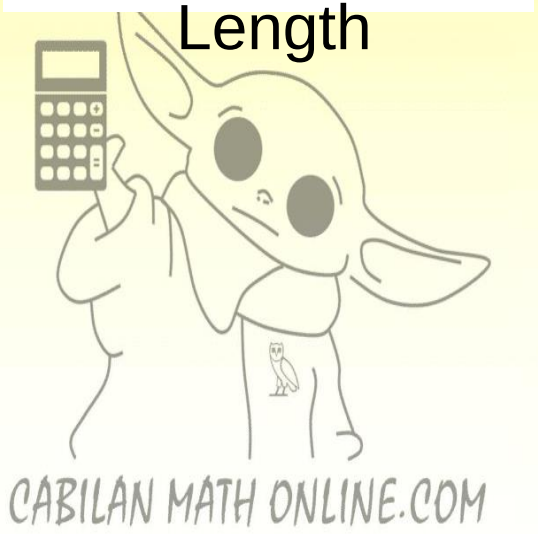
Find the **perimeter** and **area** for the shape given:

For the **Area**...

Total Area = Area of *Rectangle* + Area of *Triangle*

For Area of the *Rectangle*
= length x width
= 6 cm x 5 cm
= **30 cm²**

For Area of the *Triangle*



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Area of Composite Shapes

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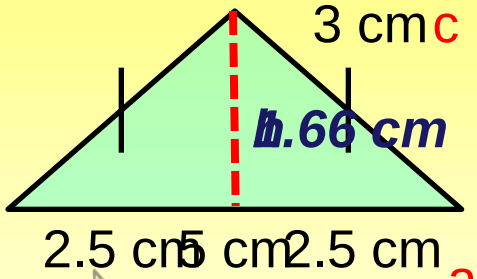

For the **Area**...

Total Area = Area of *Rectangle* + Area of *Triangle*

For Area of the *Rectangle*

= length x width

= 6 cm x 5 cm

= **30 cm²**

For Area of the *Triangle*

$$AREA = \frac{base \times height}{2}$$

Base can be cut in half
*Use **Pythagorean Theorem** to solve for height*

$$c^2 = a^2 + h^2$$

$$(3)^2 = (2.5)^2 + h^2$$

$$9 = 6.25 + h^2 \qquad \sqrt{2.75} = \sqrt{h^2}$$

$$9 - 6.25 = h^2 \qquad 1.66\,cm = h$$

$$2.75 = h^2$$

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CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

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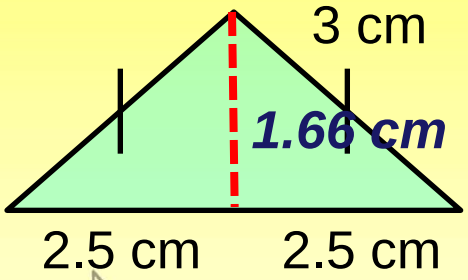


Base can be cut in half
*Use **Pythagorean Theorem** to solve for height (h)*

For the **Area**...

Total Area = Area of *Rectangle* + Area of *Triangle*

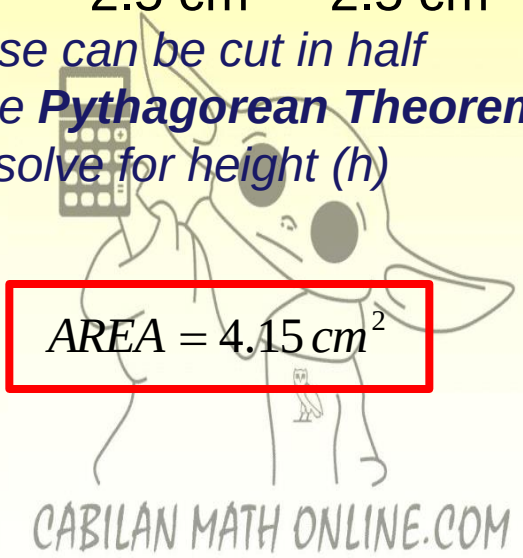
For Area of the *Rectangle*
= length x width
= 6 cm x 5 cm
= **30 cm²**

For Area of the *Triangle*

$$AREA = \frac{base \times height}{2}$$

$$AREA = \frac{(5.0\,cm)(1.66\,cm)}{2}$$

$$AREA = 4.15\,cm^2$$



CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

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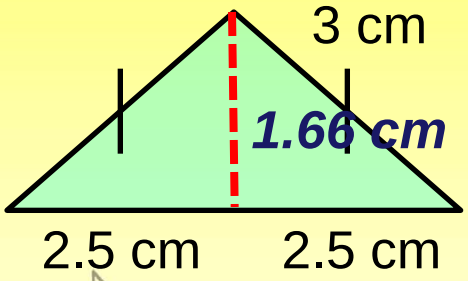


Base can be cut in half
*Use **Pythagorean Theorem** to solve for height (h)*

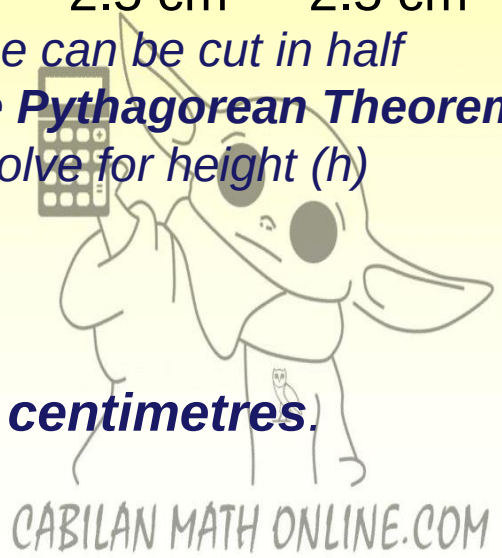
For the **Area**...

Total Area = Area of *Rectangle* + Area of *Triangle*

$= 30\ cm^2 + 4.15\ cm^2$

$= \mathbf{34.15\ cm^2}$

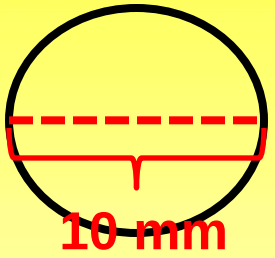
*The total area of the shape is **34.15 square centimetres**.*



CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

PRACTICE



1. Find the **Area** and **Circumference** (perimeter of a *circle)* with a **diameter of 10 mm**

For **Area**

$$A = \pi r^2$$

$$A = \pi (5)^2$$

$$A = 78.5\, mm^2$$

For radius
= diameter / 2
= 10 / 2
= **5**

For **Circumference**

$$C = \pi d$$

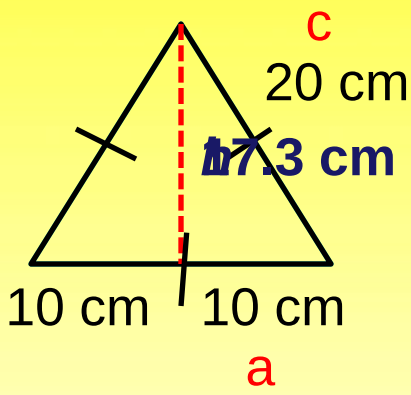
$$C = \pi (10)$$

$$C = 31.4\, mm$$

CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

PRACTICE



2. Find the **Area** and **Perimeter** of an equilateral triangle with side length **20 cm**.

An *equilateral* triangle has sides that are all the same

For **Area**
- We can split the base in half
- Find the height (h) using *Pythagorean Theorem*

$$c^2 = a^2 + h^2$$

$$(20)^2 = (10)^2 + h^2$$

$$400 = 100 + h^2$$

$$400 - 100 = h^2$$

$$300 = h^2$$

$$\sqrt{300} = \sqrt{h^2}$$

$$17.3 = h$$

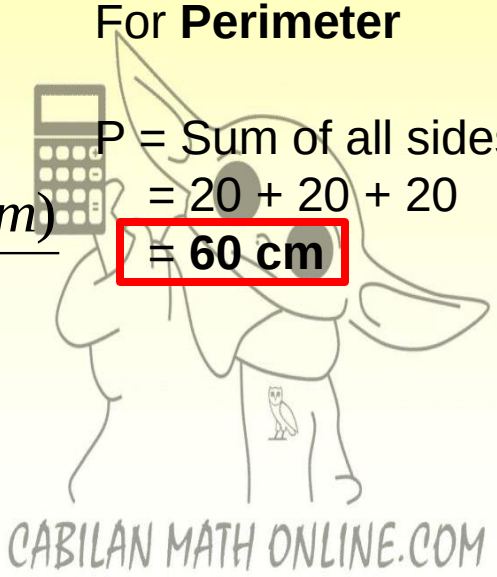
$$A = \frac{bh}{2}$$

$$A = \frac{(20cm)(17.3cm)}{2}$$

$$A = 173\,cm^2$$

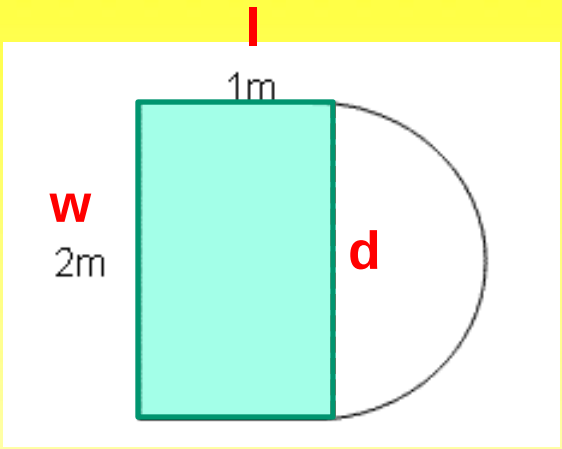
For **Perimeter**

P = Sum of all sides
= 20 + 20 + 20
= **60 cm**



CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes



PRACTICE

3. Find the **Area** and **Perimeter** of a composite figure comprised of a **1m** by **2m** rectangle and a *semi-circle* with diameter of **2m**.

For **Area**

Total area = Area of Rectangle + Area of Semi-Circle

Area of Rectangle
= lw
= (1m)(2m)
= **2 m²**

Area of Semi-circle

$$A = \frac{\pi r^2}{2}$$

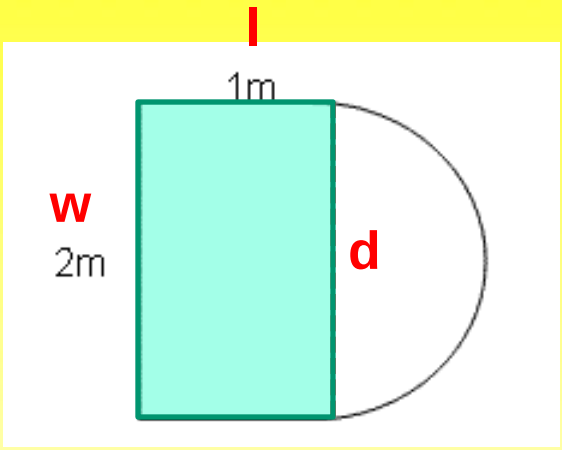
$$A = \frac{\pi (1)^2}{2}$$

$$A = 1.6\,m^2$$

For **radius**
= d / 2
= 2 / 2
= **1**

CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes



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3. Find the **Area** and **Perimeter** of a composite figure comprised of a **1m** by **2m** rectangle and a *semi-circle* with diameter of **2m**.

For **Area**

Total area = Area of Rectangle + Area of Semi-Circle

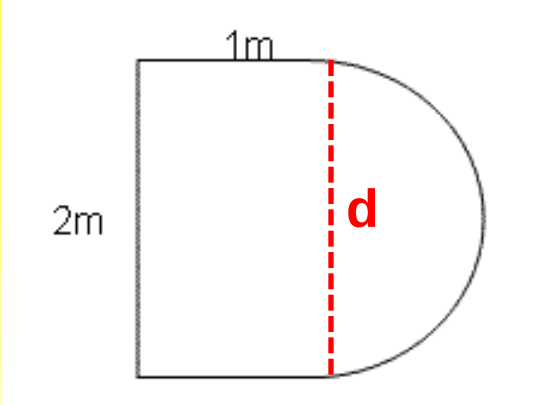
= 2 m^2 + 1.6 m^2

= **3.6 m^2**

CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

PRACTICE



3. Find the **Area** and **Perimeter** of a composite figure comprised of a **1m** by **2m** rectangle and a *semi-circle* with diameter of **2m**.

For **Perimeter**

Total Perimeter = length of sides + circumference of semi-circle

Length of sides
= 1 m + 2 m + 1m
= **4m**

Circumference of semi-circle

$$C = \frac{2\pi r}{2}$$

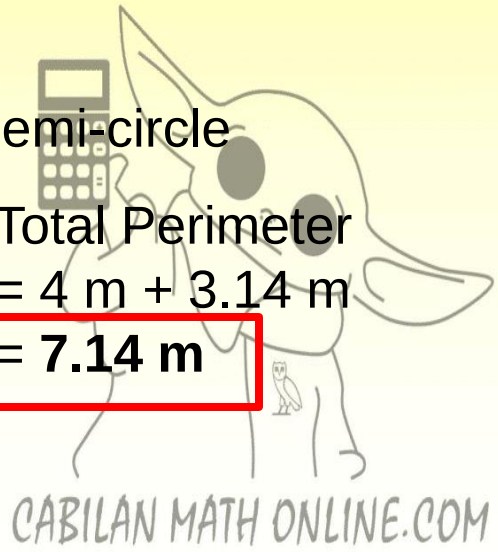
$$C = \pi r$$

$$C = \pi(1)$$

$$C = 3.14m$$

For **radius**
= d / 2
= 2 / 2
= **1**

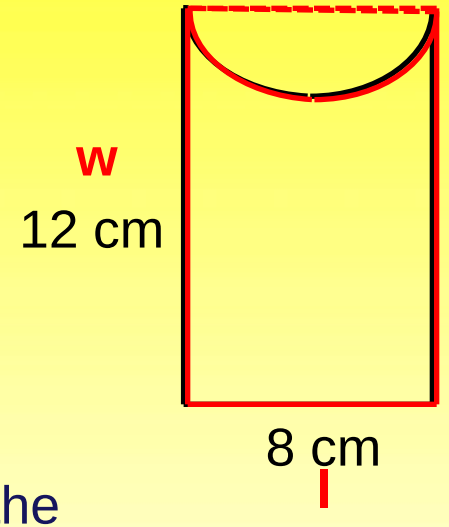
Total Perimeter
= 4 m + 3.14 m
= **7.14 m**



CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

PRACTICE



4. Find the **Area** and **Perimeter** of the composite figure shown:

For Area:

We have to find the area of the rectangle and the area of *semi-circle* and subtract them from each other

For radius
= diameter / 2
= 8 / 2
= **4cm**

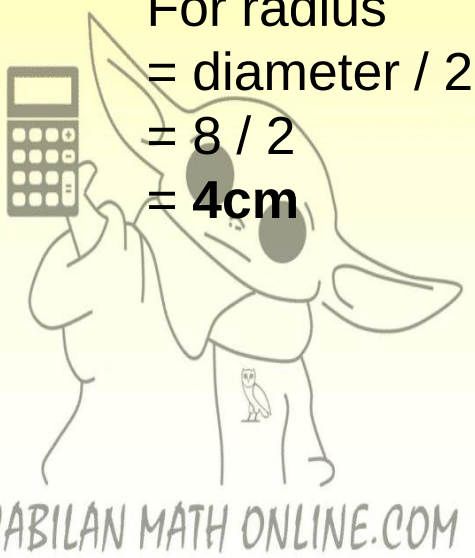
Area of *rectangle*
= lw
= (8)(12)
= **96 cm²**

Area of *semi-circle*

$$A = \frac{\pi r^2}{2}$$

$$= \frac{\pi (4)^2}{2}$$

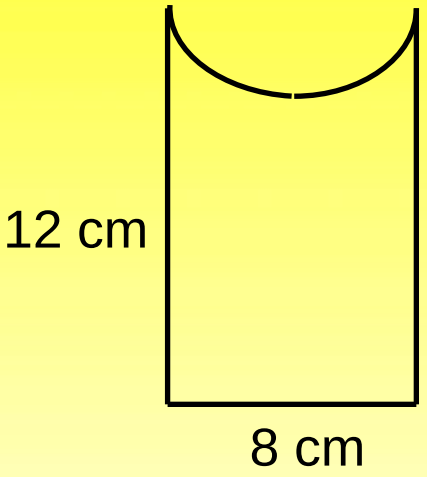
$$= 25.13 cm^2$$



CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

PRACTICE



4. Find the **Area** and **Perimeter** of the composite figure shown:

For Area:

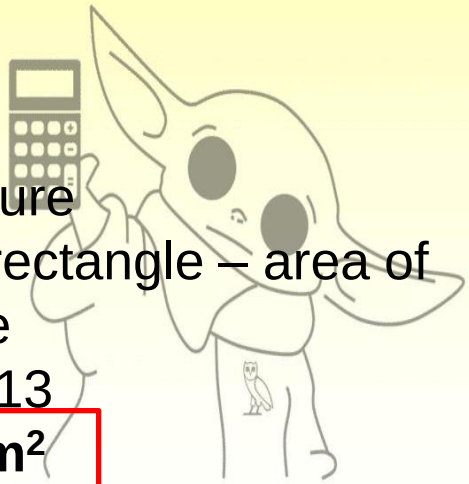
We have to find the area of the rectangle and the area of *semi-circle* and subtract them from each other

Area of *rectangle*
= lw
= (8)(12)
= **96 cm²**

Area of *semi-circle*

$= 25.13 cm^2$

Area of figure
= Area of rectangle – area of semi-circle
= 96 – 25.13
= **70.87 cm²**



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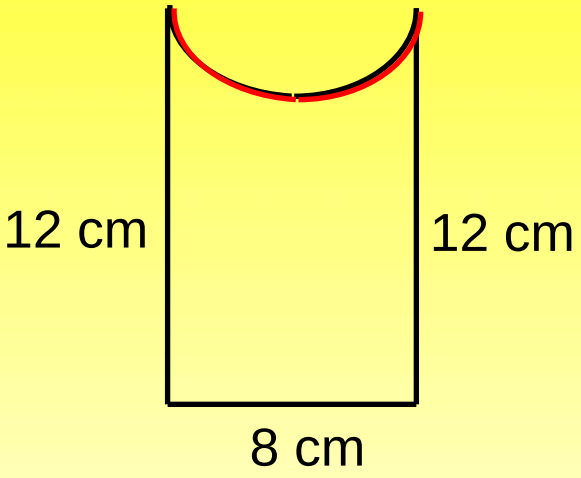
CHAPTER 1.1 AREA and PERIMETER

Area of Composite Shapes

PRACTICE



4. Find the **Area** and **Perimeter** of the composite figure shown:

For Perimeter:

We have to calculate the **circumference** of the *semi-circle* and add up the side lengths of the rectangle

For **circumference of *semi-circle***

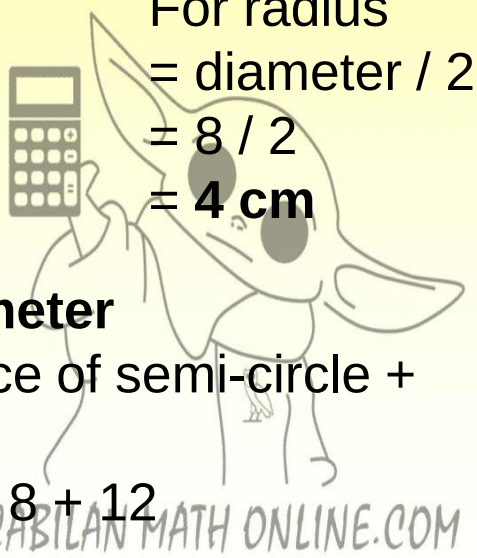
$$C = \frac{2\pi r}{2}$$

$$C = \pi r \qquad = 12.57\,cm$$

$$= \pi(4)$$

For radius
= diameter / 2
= 8 / 2
= **4 cm**

For **total perimeter**
= Circumference of semi-circle + side lengths
= 12.57 + 12 + 8 + 12
= **44.57 cm**



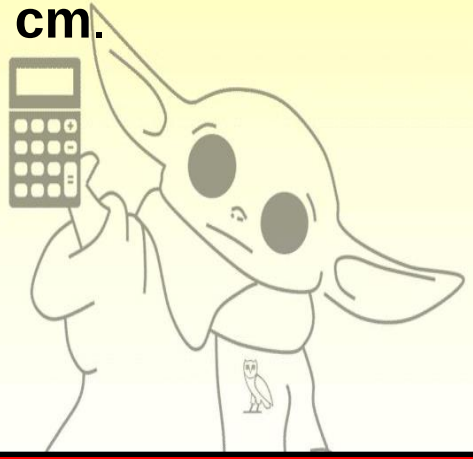
CHAPTER 1.1 AREA and PERIMETER

Did You Know

The Google search engine will perform unit conversion for you? Try it.

Go the Google start page and enter **7 miles** in **km**, then press **Search**.

It also works for square measurements. Try entering **35 sq. in.** In **square cm**.



END OF DAY 1

CHAPTER 1.1 AREA and PERIMETER

Practice

Let us look at some practice questions together. The questions demonstrate how you would find area and perimeter if the dimensions given are in different units.

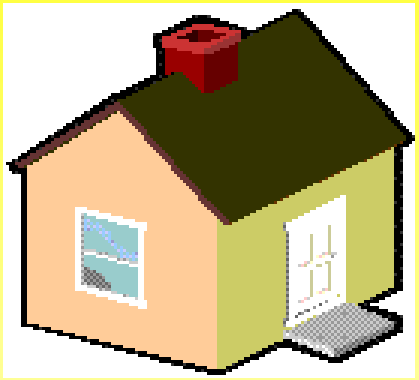
Remember, all dimensions must be expressed in the same units of measurement before you begin to solve a problem.

CHAPTER 1.1 AREA and PERIMETER

Question

A room in a new house is **10'** by **12'** and needs to be carpeted. New and True Carpets sells carpet for $40 a **square yard**. How much will it cost to carpet the room?

*These are in **feet***



SOLUTION

Step 1

Before calculating the area, we need to convert measurements from **feet** to **yards**

→From the Intro, we know that we need to divide by 3 (refer to the table)

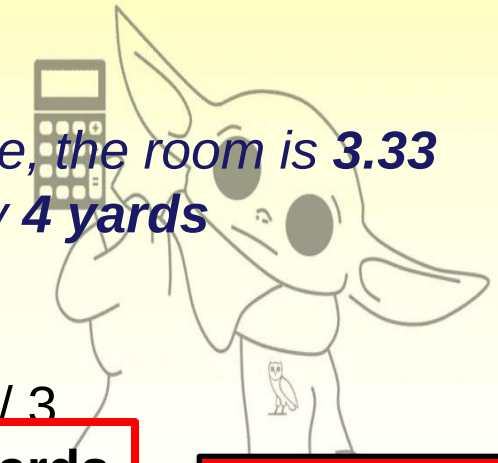
Measurement 1 = 10 / 3

= **3.33 yards**

Measurement 2 = 12 / 3

= **4 yards**

*Therefore, the room is **3.33 yards** by **4 yards***



CONV.

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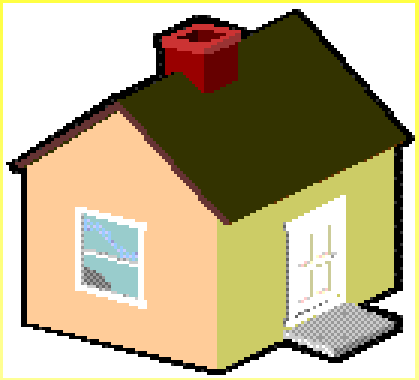


SOLUTION

Step 2

Using the *yards* measurements, find the area of carpeted area

$A = lw$

$= (3.33 \text{ yd})(4 \text{ yd})$

$= \mathbf{13.32 \text{ yd}^2}$ (or **square yards)**

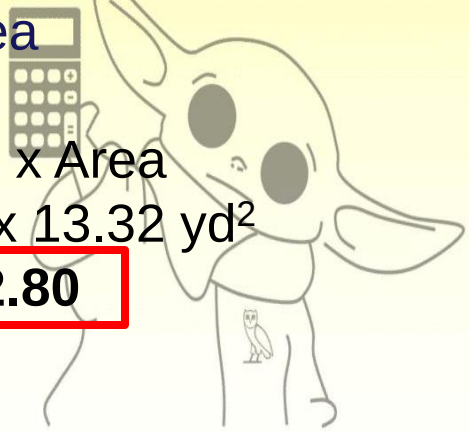
Step 3

Determine the cost for the carpeted area

Cost = Price x Area

$= \$40 \times 13.32 \text{ yd}^2$

$= \mathbf{\$532.80}$



*Therefore, it will cost approx. **$532.80** to carpet the room.*

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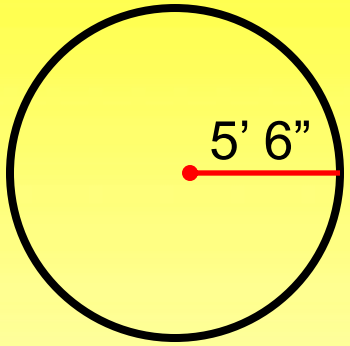
CHAPTER 1.1 AREA and PERIMETER

Question

A church wants to build a large, circular sand pit for their Sunday school children. If the sand pit has a **radius of 5' 6"**, what is the **circumference** of the sand pit?



SOLUTION

Step 1

Convert **inches** to feet and find the total inches

→Divide by **12**

6 ÷ 12

= **0.5 feet**

Total feet = 5 ft + 0.5 ft

= **5.5 ft**

This is the radius we will now use!

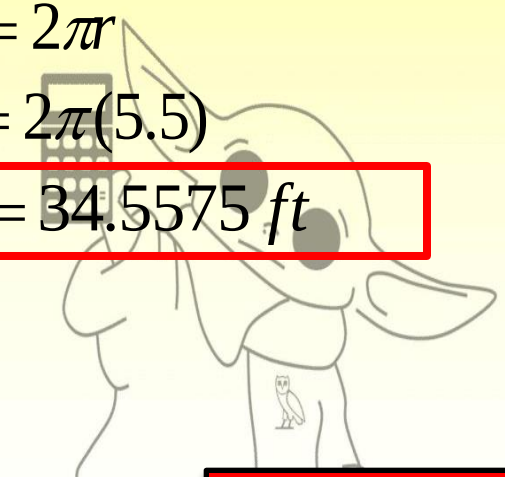
Step 2

Find the circumference

$$C = 2\pi r$$

$$C = 2\pi(5.5)$$

$$C = 34.5575\ ft$$

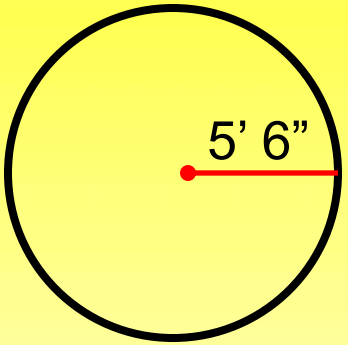


CONV.

CHAPTER 1.1 AREA and PERIMETER

Question

A church wants to build a large, circular sand pit for their Sunday school children. If the sand pit has a **radius of 5' 6"**, what is the **circumference** of the sand pit?



SOLUTION

Step 2
Find the circumference

$$C = 2\pi r$$

$$C = 2\pi(5.5)$$

$$C = 34.5575\ ft$$

Step 3
Convert the remaining measurement back to **inches**
→Multiply by **12**

34.5575 ft

0.5575 × 12
= **6.69 in.**

*The circumference of the sand pit is **34 feet 7 inches** (or **34' 7"**).*

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CHAPTER 1.1 AREA and PERIMETER

Homework

(Day 1)

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(Day 2)

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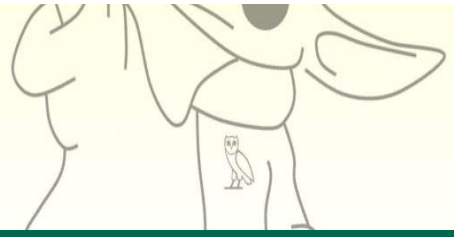
CHAPTER 1.1 AREA and PERIMETER

IMPERIAL TO IMPERIAL CONVERSION

From	*To*	*Multiply by*
Feet (ft)	Inches (in)	12
Yards (yd)	Feet (ft)	3
Miles (mi)	Yards (yd)	1760
Pounds (lbs)	Ounces (oz)	16
Tonnes (T)	Pounds (lbs)	2000
Gallons (gal)	Quarts (qt)	4
Quarts (qt)	Pints (pt)	2
Pints (pt)	Fluid ounces (fl oz)	16



PREVIOUS