Western Cape Government
Education

**GET DIRECTORATE**

Accountability
We take responsibility.

# MATHEMATICS LESSON

## GRADE 7

**DATE: ……………………..**

## TOPIC: AREA AND PERIMETER OF 2-D SHAPES:

**CONCEPTS & SKILLS TO BE ACHIEVED:**
**By the end of the lesson learners should know and be able to:**

- calculate the perimeter of regular and irregular polygons
- use appropriate formulae to calculate the perimeter and area of squares, rectangles and triangles
- solve problems involving perimeter and area of polygons, calculate to at least one decimal place
- use and convert between appropriate SI- units

| | |
|---|---|
| **RESOURCES:** | DBE Workbook 1, Sasol-Inzalo book, Textbooks |
| | |

## DAY 1

**INTRODUCTION**

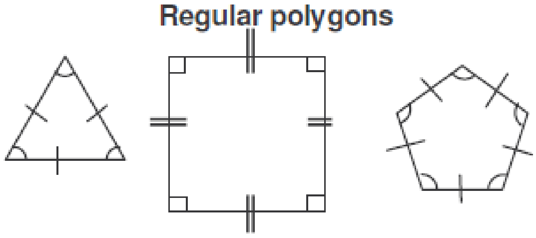
**REVISION ACTIVITY**:

***Ensure that you know the correct terminology ie.***
***Perimeter, polygons, regular irregular,***

**DEFINITIONS:**

- Definitions:
  - **Perimeter of a polygon**: The sum of lengths of its sides or the distance around a 2D shape.
  - **Regular polygon**: A polygon with all angles equal (equiangular) and all sides equal (equilateral).

Regular polygons



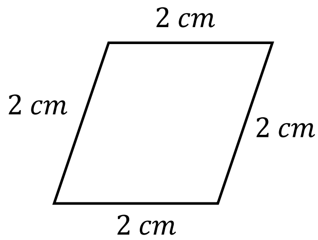
  - **Irregular polygon**: A polygon that have sides of different lengths and the interior angles do not all have the same size (measure).

## LESSON DEVELOPMENT

**Work through the following examples, and note how the perimeters of different shapes are determined:**

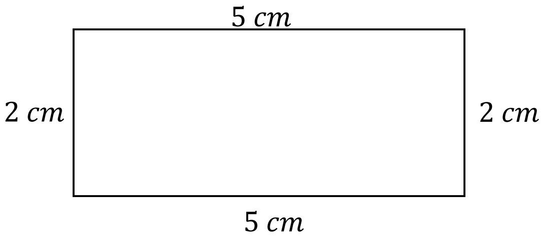
Example 1: Calculate the perimeter of polygons:

a)




Perimeter $= 2\ cm + 2\ cm + 2\ cm + 2cm = 8\ cm$

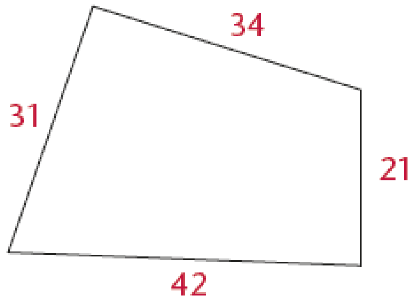
b)




Perimeter $= 2\ cm + 5\ cm + 2\ cm + 5\ cm$
$= 14\ cm$

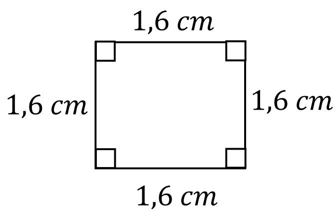
Example 2: Determine the perimeter of the figure below:

a)




Perimeter $= 31 + 42 + 21 + 34 = 128\ mm$

b)

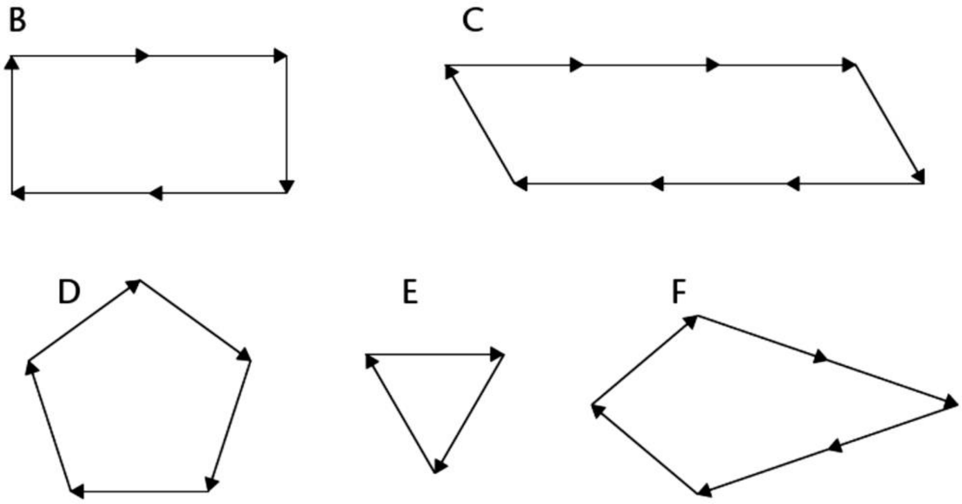



Perimeter $= 1{,}6\ cm + 1{,}6\ cm + 1{,}6\ cm + 1{,}6\ cm = 6{,}4\ cm$

## CLASSWORK: ACTIVITY:

**WE ARE NOW GOING TO CALCULATE THE PERIMETER OF THE FIGURES BELOW BY ADDING THE ARROWS**

The following shapes consist of arrows that are equal in length. If each arrow is 30 mm long, what is the perimeter of each shape in millimetres

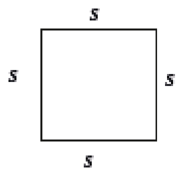



(a) What is the perimeter of each shape in number of arrows?

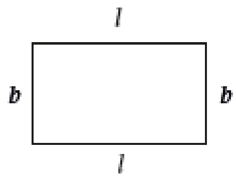
| | | |
|---|---|---|
| B: | C: | D: |
| E: | F: | |

MATHEMATICIANS DO NOT LIKE TO WRITE UNNECESSARILY, THEREFORE WE WILL INVESTIGATE IF THERE ARE SHORTER WAYS TO CALCULATE PERIMETER:

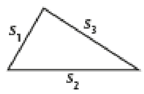
If the sides of a square are all $s$ units long:
**Perimeter of square** = $s + s + s + s$
= $4 \times s$
or $P = 4s$



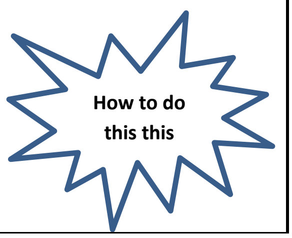

the length of a rectangle is $l$ units and the breadth (width) is $b$ units:
**Perimeter of rectangle** = $l + l + b + b$
= $(2 \times l) + (2 \times b)$
= $2l + 2b$
or $P = 2(l + b)$




A triangle has three sides, so:
**Perimeter of triangle** = $s_1 + s_2 + s_3$ or $P = s_1 + s_2 + s_3$




If we need to apply the formula, calculating the perimeter of a square with side length of 5mm we will write:
**P = 4s**
= 4 x 5mm (here we substitute the letter with the value of the side)
= 20mm



If we need to apply the formula, calculating the perimeter of a rectangle with length of 5 mm and breadth of 3 mm we will write:

or $P = 2(l + b)$

$= 2\ (5 \text{ mm} + 3 \text{ mm})$ (here we substitute the letters with the value of the sides)

$= 2 \times 8 \text{ mm}$

$= 16 \text{ mm}$

How to do this this sum

If we need to apply the formula, calculating the perimeter of a triangle with side lengths 5 mm, 4 mm, 3 mm, we will write:

$P = s_1 + s_2 + s_3$

$= 5 \text{ mm} + 4 \text{ mm} + 3 \text{ mm}$ (here we substitute the letters with the value of the sides)

$= 12 \text{ mm}$

How to do this this sum

**CONSOLIDATION**

**YOU SHOULD REMEMBER FROM TODAY'S WORK THAT:**

- Perimeter of a polygon is the sum of lengths of its sides or the distance around a 2-D shape.
- Regular polygons are polygons with all angles equal (equiangular) and all sides equal (equilateral)
- Irregular polygons are polygons that have sides of different lengths and the interior angles do not all have the same size (measure).
- **Perimeter of square: $P = 4s$**
- **Perimeter of a rectangle: $P = 2(l + b)$**
- **Perimeter of a triangle: $P = s_1 + s_2 + s_3$**

**HOMEWORK:** Do the exercise in your book using the correct formulae:

1. Calculate the perimeter of a square if the length of one of its sides is 17,5 cm.

2. A rectangle is 40 cm long and 25 cm wide. Calculate its perimeter.

3. Two sides of a triangle are 2,5 cm each. Calculate the length of the third side if the triangle's perimeter is 6,4 cm.

**MEMORANDUM DAY 1:**

HOMEWORK:

1. 70 cm
2. 130 cm
3. 3,9 cm

# DAY 2

**INTRODUCTION: CALCULATING AREA AND SQUARE UNITS:**

## WHAT IS AREA?

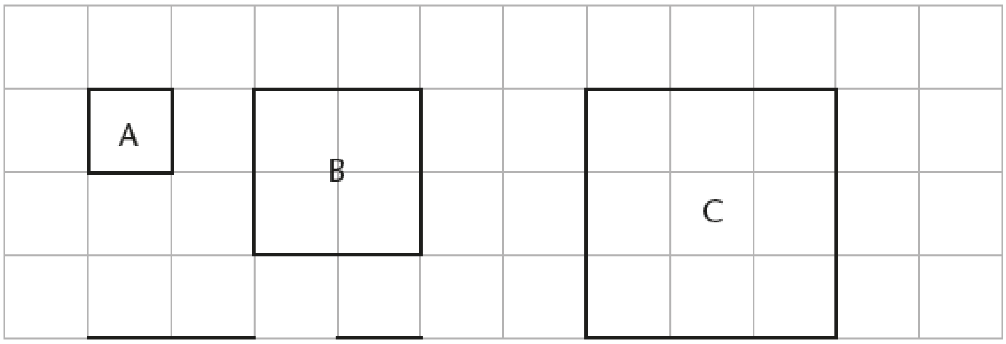
The **area** of a shape is the size of the flat surface surrounded by the border (perimeter) of the shape.

Usually, area (A) is measured in square units, such as square millimetres ($mm^2$), square centimetres ($cm^2$) and square metres ($m^2$)

**Work through the example based on the diagram below**:

Each small square on the grid below measures $1\ cm \times 1\ cm\ (or\ 1\ cm^2)$.

**Note that** [cm x cm = $cm^2$] cm is squared which indicates that we are working with Area. The unit could also have been $mm^2$ or $m^2$.




a) What can you say about the lengths of the sides in each polygon? **All sides are equal in each polygon.**

b) Name the polygons shown on the grid. **They are squares**

c) How many square units make up the area polygons A, B and C above? **Area of square A** $= 1\ cm^2$**, Area of square B** $= 4\ cm^2$ **and Area of square C** $= 9\ cm^2$

d) Is there another way of calculating the area of each shape without counting the number of squares in each polygon? **Yes, the area of each polygon or any square could be calculated using the formulae below:**

Area (A) of a square $=$ Length of side $\times$ Length of side $= l \times l = l^2$ Or $A = s^2$; where $l$ or s is the length.

Similarly, the perimeter (P) of a square $= side + side + side + side$

$= 4s$

**Learners' activities**

**Activity 1: Work through the 3 examples below about the perimeter and area of squares in your classwork exercise book.** The solutions are at the end of the day's lesson.

Example 1: If a square has a length of $8\ cm$, calculate:

a) the perimeter and

b) the area of the square.

Example 2: If the perimeter of a square is $36\ cm$:

a) Determine the length of each side.

b) Calculate the area of the square.

Example 3: A square bathroom has a length of $2{,}5\ m$.

a) Calculate the area of the bathroom.

b) Calculate the perimeter of the bathroom.

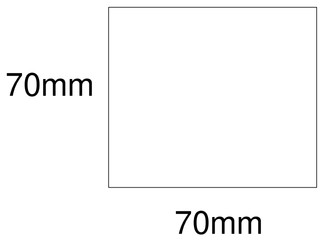
## CONSOLIDATION & HOMEWORK

You must remember that the formula for the

- Perimeter of a square $= 4s$ or P = 4s and
- the formula for Area of a square = $s^s$ or A = $s^2$ where capital P is Perimeter and capital A is Area.

**Homework:** Complete the problem below in your classwork book.

***Problem: Calculate the perimeter (P) and area (A) of the following.***




## MEMORANDUM DAY 2

**Activity 1:**

Example 1:

a) $P = 4s$ , we write down the formula for perimeter of a square

$= 4 \times 8\ cm$, substitute s with 8 cm and multiply 4 sides by 8 cm

$= 32\ cm$

b) $A = s^2$, which is the formula for calculating the area

$= (8\ cm)^2$, again, substitute s with 8 cm and calculate (8 cm x 8 cm).

$= 64\ cm^2$

Example 2:

a) We write down the perimeter of a square, either P = 4s or 4s = P, use this one because we want to find s:

$4s = P$

$4s = 36\ cm$ [4, because of 4 sides]

$s = 9\ cm$ [each side is 9 $cm$]

b) We write down the formula for the Area of a square:

$A = s^2$

$= (9\ cm)^2$

$= 81\ cm^2$ substitute 9 cm for s and then calculate

Example 3:

a) Write down the formula for the area of a square:

$A = s^2$

$= (2{,}5\ m)^2$ now substitute s with 2,5 cm and calculate (2,5 cm x 2,5 cm)

$= 6{,}25\ m^2$

b) We write down the formula for the Perimeter of a square:

$P = 4s$

$= 4\ x\ 2{,}5\ m$ [substitute 2,5 cm for s and multiply with 4]

$= 10\ m$

**HOMEWORK PROBLEM ANSWER**

Perimeter = 280 mm

Area (A) = 4 900 $mm^2$

# DAY 3

**INTRODUCTION: Calculating the perimeter and area of rectangles, by using formulae.**

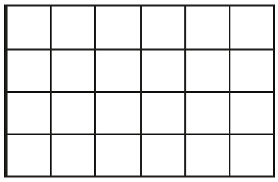
**QUICK REVISION ON PROPERTIES OF RECTANGLES**:

- Opposite sides parallel and equal
- All four angles are $90^0$, called right angles
- The diagonals bisect each other

## Work through the example based on the diagram below:

the rectangle below which is made up of small squares. Each small square below measures $1\ cm\ \times 1\ cm\ (or\ 1\ cm^2)$.

**Remember that** [cm x cm = cm$^2$] cm is squared which indicates that we are working with Area. The unit could also have been mm$^2$ or m$^2$.



a) How many square units make up the area of the rectangle? **24**

**b)** What are the dimensions of the length and breadth of the rectangle? **Length**$(\boldsymbol{l}) = \mathbf{6}\ \boldsymbol{cm}$ **and height**$(\boldsymbol{h}) = \mathbf{4}\ \boldsymbol{cm}$

**c)** What is the product of the length and the breadth**?** $\mathbf{6}\ \boldsymbol{cm} \times \mathbf{4}\ \boldsymbol{cm} = \mathbf{24}\ \boldsymbol{cm}^{\mathbf{2}}$

d) Looking at the answer in a) and c), what can you say about the product of the length and breadth/width and area of a rectangle?

**Area of a rectangle** $=$ **length of rectangle** $\times$ **breadth of rectangle**

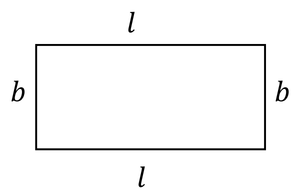
**A** $= \boldsymbol{l} \times \boldsymbol{b}$ **[$\boldsymbol{l}$ = length and $\boldsymbol{b}$ = breadth] [written in symbols]**

Let us work towards a formula for determining the perimeter of a rectangle. The rectangle alongside has a length of $l$ units a breath of $b$ units

Perimeter$(P)$ of the rectangle $= l + l + b + b$

$= 2l + 2b$

$= 2(l + b)$




In other words, the perimeter of a rectangle is = $\mathbf{2}(\boldsymbol{l} + \boldsymbol{b})$

**P =** $\mathbf{2}(\boldsymbol{l} + \boldsymbol{b})$ [written in symbols]

**Learners' activities**

**Activity 1: Work through the 3 examples below about the perimeter and area of squares in your classwork exercise book.** The solutions are at the end of the day's lesson.

**Example 1:** A rectangle has a length of $8\ cm$ and breadth of $4\ cm$.

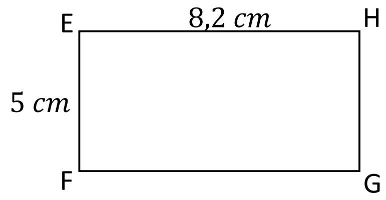
a) Calculate the perimeter of the rectangle.
b) Calculate the area of the rectangle.

**Example 2**: The area of a rectangle is $60\ cm^2$ and its length is $12\ cm$.

a) Calculate the breadth of the rectangle.
b) Calculate the perimeter of the rectangle.

**Example 3**: Consider the following rectangle:

a) Calculate the perimeter.
b) Calculate the area.




## CONSOLIDATION & HOMEWORK

**REMEMBER !!**

- Area of a rectangle, A = $l \times b$, and the unit written in squared mm, cm, m ($mm^2$ ; $cm^2$ ; $m^2$ ) and the
- Perimeter of a rectangle, $P = 2l + 2b$
  $= 2(l + b)$ and the unit is not squared.

**Homework:** Complete the following in your classwork exercise book.

If the area of a rectangle is 12 $cm^2$, what could the perimeter be?

## MEMORANDUM DAY 3:

**Activity 1:**

**Example 1:**

a) We write down the formula for calculating the perimeter of a rectangle:

$P = 2(l + b)$

$= 2(8\ cm + 4\ cm)$ [substitute the numerical values for $l$ and b]

$= 2(12\ cm)$ which is also (2 x 12 cm)

$= 24\ cm$

b) We write down the formula for calculating the area of a rectangle:

$A = l \times b$

$= 8\ cm \times 4\ cm$

$= 32cm^2$ [note the squared unit indicating area]

**Example 2:**

a) We know we have to find the breadth (b) of the rectangle, therefore we write the formula for the Area of a rectangle "back to front", viz. $l \times b = A$

$12\ cm \times b = 60\ cm^2$ [we substitute the letters with the numerical values given to us]

$b = 5\ cm$ [60 $cm^2$ ÷ 12 cm]

b). Now that we know the value or length of the breadth (5 cm) and we know the length is 12 cm, we can calculate the Perimeter of the rectangle, using the formula

$P = 2(l + b)$.

$= 2(12\ cm + 5\ cm)$ [substituting the values]

$= 2(17\ cm)$ [add 12 cm and 5 cm = 17 cm]

$= 34\ cm$ [17 cm x 2]

**Example 3:**

a) First, we write down the formula for calculating the Perimeter of a rectangle, which you know by now is

$P = 2(l + b)$

$= 2(5\ cm + 8{,}2\ cm)$ [substituting the numerical values that is given to us]

$= 2 \times 13{,}2\ cm$ [add 5,0 cm and 8,2 cm = 13,2 cm]

$= 26{,}4\ cm$ 5 is the same as 5,0 in decimal numbers; so add in decimal places under each other, e.g. 5,0

b) Now write down the formula for calculating the Area (A) of a rectangle, which is $A = l \times b$

Then substitute the numerical values for l and b = $8{,}2\ cm \times 5\ cm$ and calculate the answer which is $41\ cm^2$, don't forget the squared cm ($cm^2$), indicating Area. OR

A = l x b

= 8,2 cm x 5 cm [ 8,2 cm x 5 cm = 41, 0 $cm^2$]

= 41 $cm^2$

**Homework answer**: A = 1 cm x 12 cm = 12 $cm^2$ or A = 2 cm x 6 cm = 12 $cm^2$ or A = 3 cm x 4 cm = 12 $cm^2$;

So, Perimeter (P) could be = 26 cm or 14 cm or 16 cm

# DAY 4

**INTRODUCTION:**

**REVISION:**

**Properties of rectangles**:

*Opposite sides parallel and equal*

*All four angles are $90^0$, called right angles*

*The diagonals bisect each other*

**Describing different types of triangles**:

*A triangle with two equal sides is called an isosceles triangle.*

*A triangle with three equal sides is called an equilateral triangle.*

*A triangle with a right angle is called a right-angled triangle.*

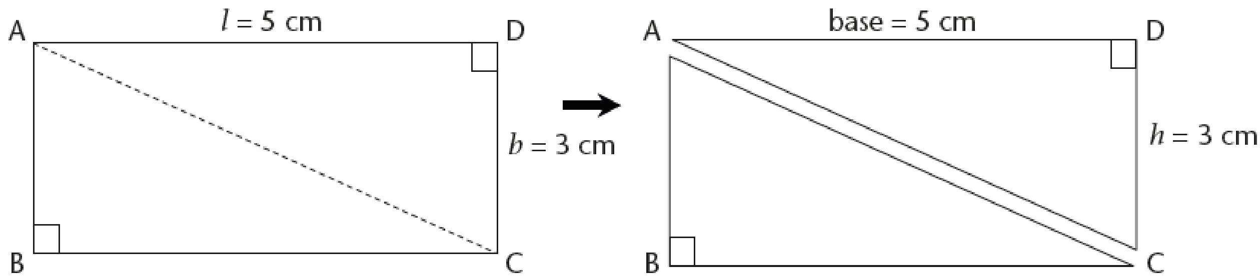
*A triangle with three sides with different lengths and no right angle is called a scalene triangle.*

**IF WE WANT TO DERIVE THE FORMULA FOR DETERMINING THE AREA OF A TRIANGLE, WE MUST USE THE FORMULA FOR DETERMINING THE AREA OF A RECTANGLE.**

Let's do the following:

STEP 1: Draw rectangle ABCD with length = 5 $cm$ and breadth = 3 $cm$.
STEP 2: Draw diagonal AC.
STEP 3: Let us name the polygons which are formed, which is $\Delta ABC$ and $\Delta ADC$.
Remember, Δ represents the word triangle.
STEP 4: Determine the area of the rectangle ABCD.
STEP 5: Determine the area of the two polygons formed, namely
$\Delta\, ABC \text{ and } \Delta\, ADC$.

**NOTE**: When A and C are joined, it creates two triangles that are equal in area, that is $\Delta ABC$ and $\Delta ADC$.




So, the Area of rectangle ABCD = $l \times b$ and the

Area of $\Delta ABC$ or $\Delta ADC = \frac{1}{2}\,(Area\ of\ rectangle)$

$= \frac{1}{2}\,(l \times b)$

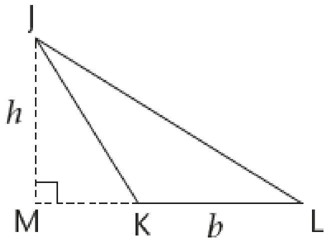
In rectangle ABCD, AD is its length and CD is its breadth.

But look at $\Delta ADC$. Can you see that AD is a height and CD is its base?

Hence, Area of $\Delta ADC$ or any other triangle $= \frac{1}{2}\,(base \times height)$

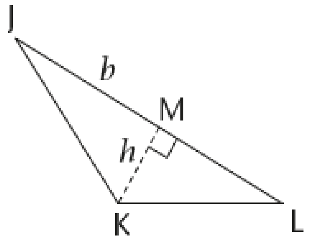
$$\mathbf{A} = \frac{1}{2}\,(\boldsymbol{b} \times \boldsymbol{h})$$

**NOTE: THE HEIGHT ($h$) OF A TRIANGLE IS A PERPENDICULAR (FORMS TWO NINETY DEGREES ANGLES) LINE SEGMENT DRAWN FROM A VERTEX TO ITS OPPOSITE SIDE. THE SKETCHES BELOW SHOW DIFFERENT POSITIONS OF THE HEIGHTS IN TRIANGLES.**



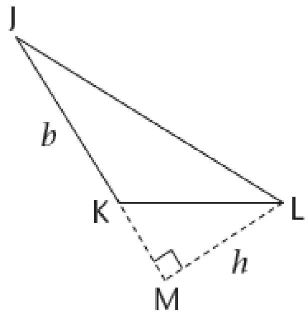

JM = height

KL = base




KM = height

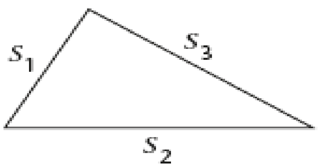
JL = base




LM = height

JK = base

We have now deduced a **formula for the area of a triangle**. Let's see if we can deduce a formula for calculating the perimeter of a triangle. We know by now that the definition of perimeter is to add all the values of the sides of a polygon. This definition will also be true for a triangle, if we test it.



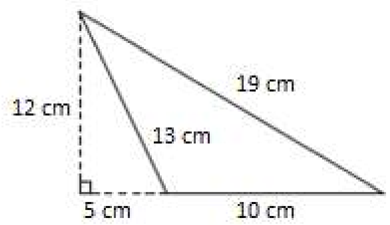

**So, the Perimeter of a triangle = Sum of all the sides**

$$\mathbf{P} = s_1 + s_2 + s_3$$

**Learners' activities**

**Activity 1: Work through the 3 examples, now that we know what the formulae for calculating the perimeter and area of triangles,** The solutions are at the end of the day's lesson.

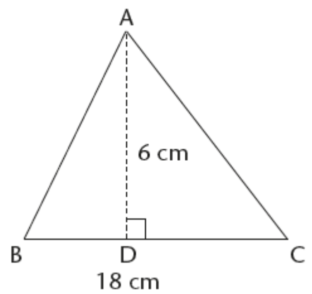
**Example 1:** Consider the following triangle:




a) Calculate the perimeter.
b) Calculate the area.

**Example 2:**
In $\Delta ABC$, the area is $48\ m^2$ and the perpendicular height is $16\ m$. Find the length of the base.

**Example 3:** Use the formula to calculate the area of $\Delta ABC$.



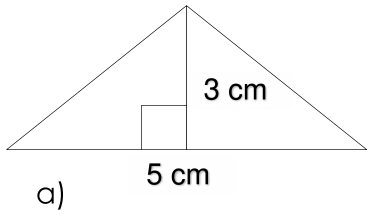

**CONSOLIDATION: REMEMBER**

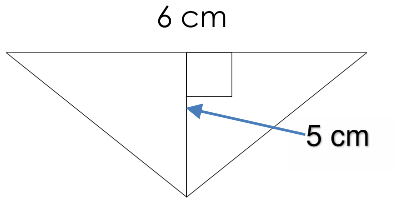
- Area (A) of a triangle $= \frac{1}{2}(b \times h)$ and the formula for the
- Perimeter of a triangle = Sum of all the sides

$$P = s_1 + s_2 + s_3.$$

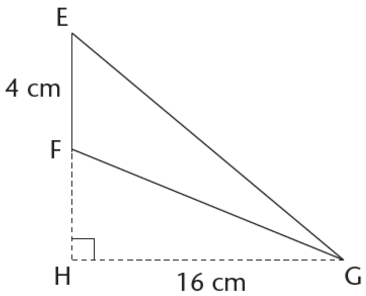
## Homework:

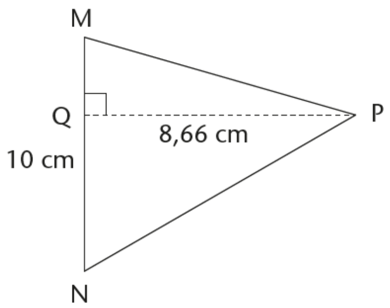
1. Calculate the areas of the following triangles. Complete in your classwork book.

a) 


b) 


2. Determine the area of:
   $a)\ \Delta EFG$ and
   $b)\ \Delta MNP$

a) 


b) 


# MEMORANDUM DAY 4:

**Activity 1:**

**Example 1:**

Firstly, always write down the formula for the Perimeter of a triangle = sum of all the sides.

a) $P = s1 + s2 + s3$ [s = side]

$= 10\ cm + 13\ cm + 19\ cm$

$= 42\ cm$

Firstly, always write down the formula for the Area (A) of a triangle:

b) $A = \frac{1}{2}(b \times h)$ [ where b = base, not breadth and h = perpendicular height on the base]

$= \frac{1}{2}(10\ cm \times 12\ cm)$ [now substitute the numerical values of b and h]

$= \frac{1}{2}(120\ cm^2)$ [multiply]

$= 60\ cm^2$ [120 $cm^2 \div 2$] ; note again the squared unit $cm^2$ indicating Area.

**Example 2:**

We write down the formula for the Area of a triangle. In this case we will change it around as we want to know what the length of the base is. So, $\frac{1}{2}(b \times h) = A$

$\frac{1}{2}(b \times 16\, m) = 48\, m^2$ [we substitute, as always, the numerical values given to us, in this case the length of the base and the area]

$b \times 8\, m = 48\, m^2$ [(b x 16 m) ÷ 2]

$b = 6\, m$ [48 $m^2$ ÷ 8 m = 6m]

**Example 2:** Again, we first write down the formula for calculating the Area of a triangle, which is

$A = \frac{1}{2}(b \times h), then$

A $= \frac{1}{2}(18\, cm \times 6\, cm)$ [we substitute the numerical values]

A $= \frac{1}{2}(108\, cm^2)$ [108 $cm^2$ ÷ 2]

$A = 54\, cm^2$ [note the squared cm, indicating the Area of the triangle ]

1a. 7,5 $cm^2$

1b. 12 $cm^2$

2a. 32 $cm^2$

2b. 43,3 $cm^2$

# DAY 5

**INTRODUCTION:** Let's revise the conversion of units which we learnt about in grade 6.

**Revision activity: Write the answers to the following question in your workbook:**

a) How many $mm$ makes $1\ cm$?
b) How many $cm$ makes $1\ mm$?
c) How many $cm$ makes $1\ m$?
d) How many $m$ makes $1\ cm$?

**NOTE AND LEARN:**

- To covert from $cm$ to $mm$, multiply by 10.
- To convert form $mm$ to $cm$, divide by 10.
- To convert from $m$ to $cm$, multiply by 100.
- To convert from $cm$ to $m$, divide by 100.

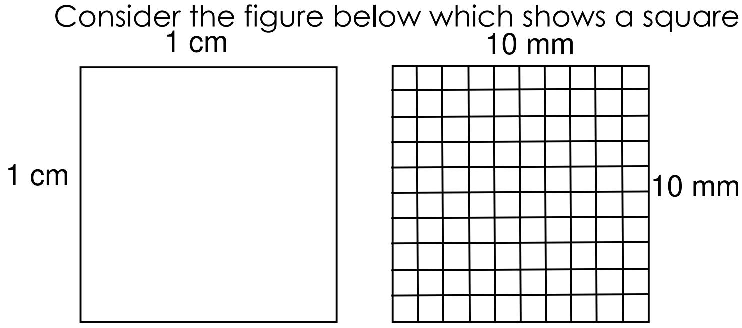
**Learners' activities**

## Study the following examples that will demonstrate and explain how we convert between units:

**Example 1: Convert $1\ cm^2$ to $mm^2$**

Solution: To convert $1\ cm^2$ to $mm^2$ is the same as finding out how many $mm^2$ would fit into $1\ cm^2$?

Consider the figure below which shows a square with sides of $1\ cm$.




and $1\ cm^2 = 1\ cm \times 1\ cm$
$= 10\ mm \times 10\ mm$
$= 100\ cm^2$

**Example 2: Convert $1\ mm^2$ to $cm^2$**

Solution: $1\ mm^2 = 1\ mm \times 1\ mm$
$= 0{,}1\ cm \times 0{,}1\ cm$
$= 0{,}01\ cm^2$

Or $1\ mm^2 = 1\ mm \times 1\ mm$
$= \frac{1}{10}\ cm \times \frac{1}{10}\ cm$
$= \frac{1}{100}\ cm^2$
$= 0{,}01\ cm^2$

**Homework: Complete in your classwork exercise books.** Use the table below to assist you. You should always convert between units as shown on the table below:

| To convert | Do this | To convert | Do this |
|---|---|---|---|
| $cm$ to $mm$ | $\times 10$ | $mm$ to $cm$ | $\div 10$ |
| $m$ to $cm$ | $\times 100$ | $cm$ to $m$ | $\div 100$ |
| $cm^2$ to $mm^2$ | $\times 100$ | $mm^2$ to $cm^2$ | $\div 100$ |
| $m^2$ to $cm^2$ | $\times 10\ 000$ | $cm^2$ to $m^2$ | $\div 10\ 000$ |

**Activity 1: Complete in your classwork exercise book.**

1. Convert:

a) $5\ cm^2$ to $mm^2$

b) $20\ mm^2$ to $cm^2$

c) $5\ m^2$ to $cm^2$

d) $20\ cm^2$ to $m^2$

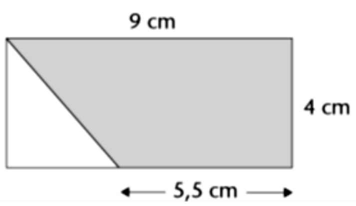
2. .(a) 25 $m^2$ = _______________ $cm^2$ (b) 240 000 $cm^2$ = _______________ $m^2$

(c) 460,5 $mm^2$ = _______________ $cm^2$ (d) 0,4 $m^2$ = _______________ $cm^2$

(e) 12 100 $cm^2$ = _______________ $m^2$ (f) 2,295 $cm^2$ = _______________ $mm^2$

3. Two sides of a triangle are 2,5 cm each. Calculate the length of the third side if the triangle's perimeter is 6,4 cm.

4 .The diagram shows a rectangle divided into a triangle and a trapezium. Calculate the shaded area. Write your answer in $mm^2$.



**MEMORANDUM DAY 5**

**Revision activity:**

a) $1\ cm = 10\ mm$
b) $1\ mm = 0{,}1\ cm$
c) $1\ m = 100\ cm$
d) $1\ cm = 0{,}01\ m$

**HOMEWORK answers:**

**Activity 1:**

**Conversions**

1. Solutions:
   a) $5\ cm^2 = 5 \times 1\ cm\ \times 1\ cm = 5 \times 10\ mm \times 10\ mm = 500\ mm^2$
   b) $20\ mm^2 = 20 \times 1\ mm\ \times 1\ mm = 20 \times 0{,}1\ cm \times 0{,}1\ cm = 0{,}2\ cm^2$
   c) $5\ m^2 = 5 \times 1\ m\ \times 1\ m = 5 \times 100\ cm \times 100\ cm = 50\ 000\ cm^2$
   d) $20\ mm^2 = 20 \times 1\ mm \times 1\ mm = 20 \times\ 0{,}01\ cm \times 0{,}01\ cm = 0{,}002\ m^2$

2. a) 250 000 $cm^2$

   b) 24 $m^2$

   (c) 4,605 $cm^2$

   (d) 4 000 $cm^2$

   (e) 1,21 $m^2$

   (f) 229,5 $mm^2$

3. Side length = 1,4 cm

4. 2 900 mm