MEASUREMENT OF PLANE FIGURES

PERIMETER – A measure of the *"length around the boundary"* of a closed plane figure. It is simply the total of the lengths of all the sides of the figure.

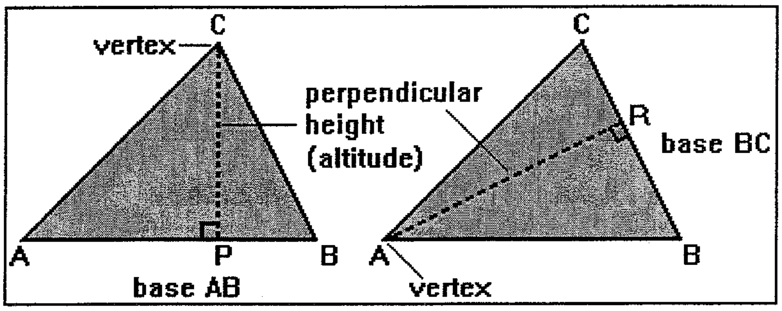
AREA – A measure of the *"size of the inside"* of any closed plane figure. Found by calculating the equivalent number of 'one unit' squares that would fill the inside

AREA of a TRIANGLE:

Area = ½ × *base* × *perpendicular height.*

- where the *perpendicular height* (or *altitude*) is the perpendicular distance from any vertex to the side opposite.

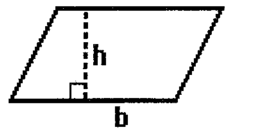
- and the *base* is the length of the side opposite the chosen vertex.



AREA of QUADRILATERALS:

For all rectangles, squares, parallelograms and rhombus's we have:

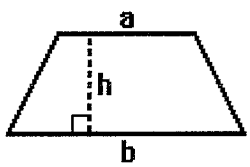
Area = base × perpendicular height. ie. $A = b \times h_\perp$



For a trapezium the area is:

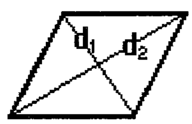
Area = Average of the 2 parallel sides × its perpendicular height.

ie. $A = \frac{1}{2} \times (a + b) \times h_\perp$



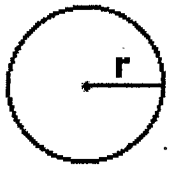
A rhombus also has the formula:

Area = ½ × *product of the diagonals* ie. $A = \frac{1}{2} \times d_1 \times d_2$



AREA of a CIRCLE

The area of a circle is found by multiplying the square of the radius r^2 by π (pi).



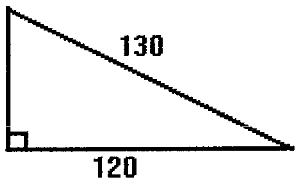
The perimeter of a circle is called its *circumference*.

The circumference is = $\pi \times d$ (d is the diameter).

EXERCISE 24 – Area and Perimeter

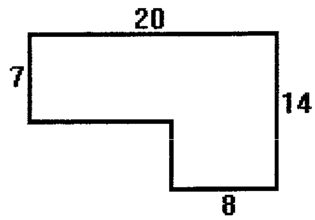
Find both the area <u>and</u> the perimeter of the plane figures below - measurements are all in centimetres (cm):

1.



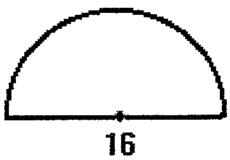
Area: __________ Per: __________

2.



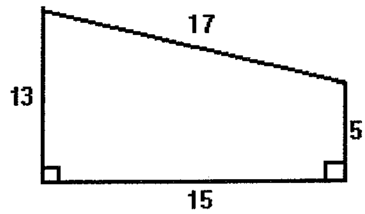
Area: __________ Per: __________

3.



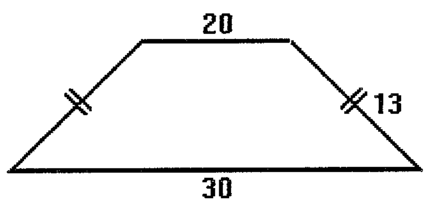
Area: __________ Per: __________

4.



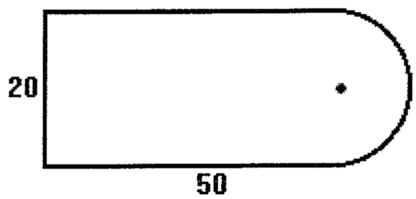
Area: __________ Per: __________

5.



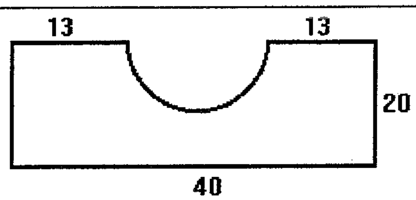
Area: __________ Per: __________

6.



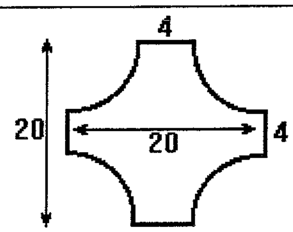
Area: __________ Per: __________

7.



Area: __________ Per: __________

8.



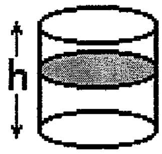
Area: __________ Per: __________

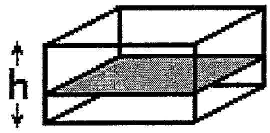
SOLIDS

PRISMS:

These are solids with a uniform *cross-section*.

Their *volume* is calculated by multiplying this cross-sectional area × their height (length).





$V = Area \times height$

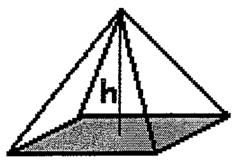
They are named according to the shape of the uniform cross-section.
eg. If the cross-section is a triangle – it is a "triangular prism"
If the cross-section is a rectangle – it is a "rectangular prism" (see diagram)
*If the cross-section is a circle – it is a "cylinder" (see diagram)

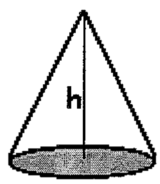
The total *Surface area* of a prism is calculated by multiplying the perimeter of the cross-sectional area by the height and adding to it 2 × this cross-sectional area.

$SA = (2 \times Area\ of\ cross\text{-}section) + (perimeter\ of\ cross\text{-}section \times height)$

RIGHT PYRAMIDS:

These are solids with a base and a vertex (sometimes called the "apex")





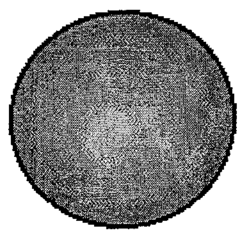
The volume of all pyramids is given by:

$V = ⅓ \times Area \times height$

Finding the surface area of any pyramid involves calculating the total of the areas of each of the faces of the chosen solid.

THE SPHERE:

This solid has a volume given by the formula:



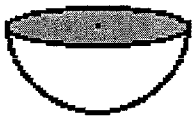
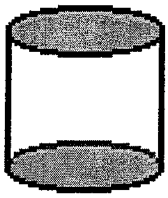
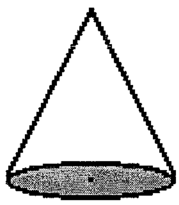
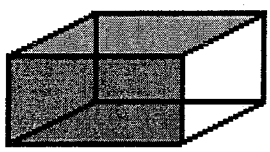
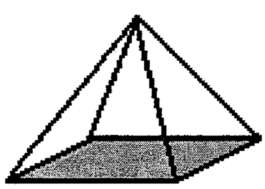
$V = \frac{4}{3}\pi r^3$

It has a surface area given by the formula:

$SA = 4\pi r^2$

EXERCISE 25 – Properties of Solids

Complete the table below:

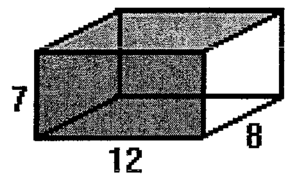
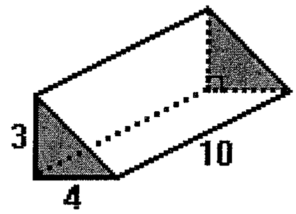
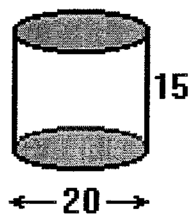
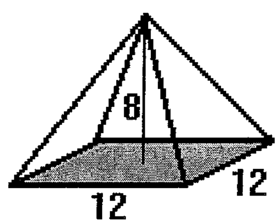
Solid	Name	Number of Surfaces, **S**	Number of Edges, **E**	Number of Vertices, **V**
				
				
				
				
				

Find the value of: $E - (S + V) + 2 = ?$ for the last 2 figures!

Test this result for a (i) triangular prism and (ii) a triangular pyramid?

EXERCISE 26 – Area and Volume of Solids

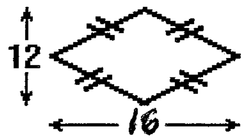
Find both the volume and surface area of the solids below:

1. Volume = _________ Surface Area = _________	
2. Volume = _________ Surface Area = _________	
3. Volume = _________ Surface Area = _________	
4. Volume = _________ Surface Area = _________	

HOMEWORK SHEET (10)

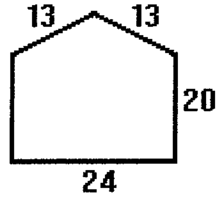
All measurements in cm.

1.



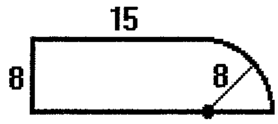
Area = ______ Perimeter = _____

2.



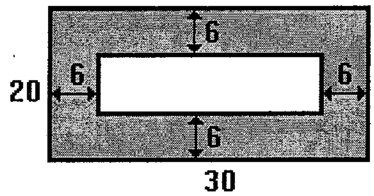
Area = ______ Perimeter = _____

3.



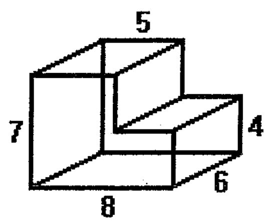
Area = ______ Perimeter = _____

4.



Area = ______ Perimeter = _____

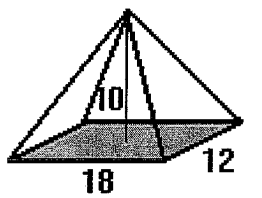
5.



Volume = _______________

Surface area = ____________

6.



Volume = _______________

Surface area = ____________

ANSWERS

Exercise 24

1. $A = 3000\ cm^2$ $P = 300\ cm$
2. $A = 196\ cm^2$ $P = 68\ cm$
3. $A = 32\pi\ cm^2$ $P = (8\pi+16)\ cm$
4. $A = 135\ cm^2$ $P = 50\ cm$
5. $A = 300\ cm^2$ $P = 76\ cm$
6. $A = (50\pi+1000)\ cm^2$ $P = (10\pi+120)\ cm$
7. $A = (800-49\pi/2)\ cm^2$ $P = (7\pi+106)\ cm$
8. $A = (400-64\pi)\ cm^2$ $P = (16\pi+16) cm$

Exercise 25

hemisphere	2	1	0
cylinder	3	2	0
cone	2	1	1
rectangular prism	6	12	8
right square pyramid	5	8	5

Exercise 26

1. $V = 672\ units^3$ $S.A. = 472\ units^2$
2. $V = 60\ units^3$ $S.A. = 132\ units^2$
3. $V = 1500\pi\ units^3$ $S.A. = 500\pi\ units^2$
4. $V = 384\ units^3$ $S.A. = 384\ units^2$

HW - Sheet (10)

1. $A = 96\ cm^2$ $P = 40 cm$
2. $A = 540\ cm^2$ $P = 90 cm$
3. $A \approx 170.3\ cm^2$ $P \approx 58.6\ cm$
4. $A = 456\ cm^2$ $P = 152\ cm$
5. $V = 282\ cm^3$ $SA = 274\ cm^2$
6. $V \approx 720\ cm^3$ $SA \approx 587.3\ cm^2$