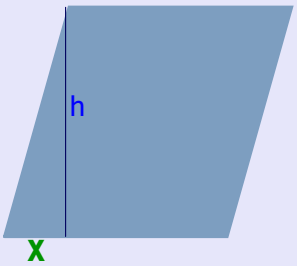
use their knowledge of rectangles, parallelograms and triangles to deduce formulae for the area of a parallelogram, and a triangle, from the formula for the area of a rectangle
solve problems involving surface areas and volumes of prisms, pyramids, cylinders, cones and spheres
solve problems involving more complex shapes and solids, including segments of circles and frustums of cones
calculate perimeters and areas of shapes made from triangles and rectangles
find the surface area of simple shapes using the formulae for the areas of triangles and rectangles
areas of parallelograms and trapeziums, half-circles and quarter circles find volumes of cuboids, recalling the formula and understanding the connection to counting cubes and how it extends this approach

calculate volumes of right prisms and of shapes made from cubes and cuboids
convert between area measures, including square centimetres and square metres, and volume measures, including cubic centimetres and cubic metres
find circumferences of circles and areas enclosed by circles, recalling relevant formulae
calculate the lengths of arcs and the areas of sectors of circles

Area and Volume

Prove that the area of a parallelogram is base x height

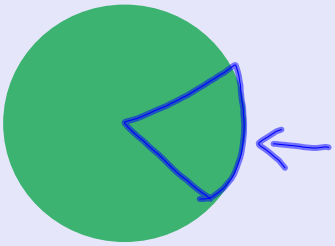


page 91 and 92: Page 93: do all questions
a, c, and (if poss) d
Ext: do e

page 94: c1,2,4

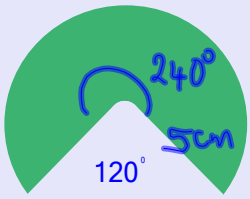
Circles

Area of a circle = πr^2



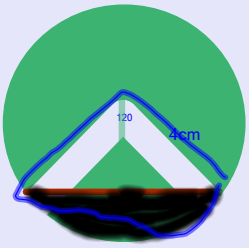
Area of a sector of the circle= $\frac{240}{360} \times \pi r^2$

$= 52.4 cm^2$



Area of a Segment

1. Find the area of sector
2. Find area of $\triangle$
3. Subtract (2) from (1)



Area of sector $= \frac{120}{360} \times \pi \times 4^2$

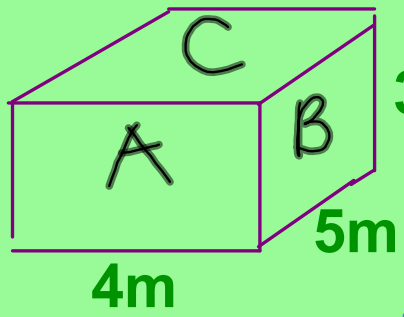
$= 16.8$

Area of triangle $= \frac{1}{2} \times 4 \times 4 \times \sin 120$

Area of segment $= 9.82 cm^2$

Surface Area

The surface area of a shape is the total area of all surfaces.



2 Area of A = 2 × 4 × 3 = 24

2 Area B = 2 × 5 × 3 = 30

2 Area C = 2 × 4 × 5 = 40

Total area = 94 m^2

Converting Units

convert $1m^2$ to cm^2

100

1  100

$10000cm^2$

2.8

100

100

$1m^3$

2.8m

$2.8m^3$

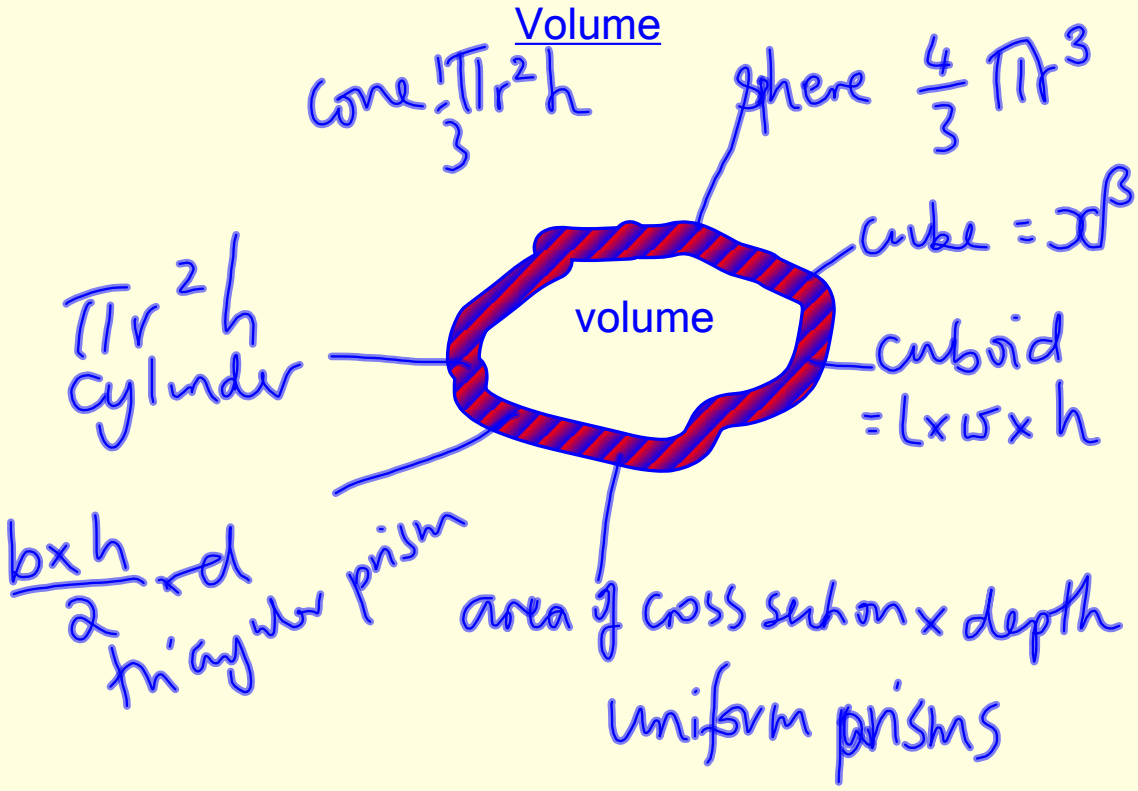
$\rightarrow cm^3$

$280 \times 100 \times 100$

$= 2800000$

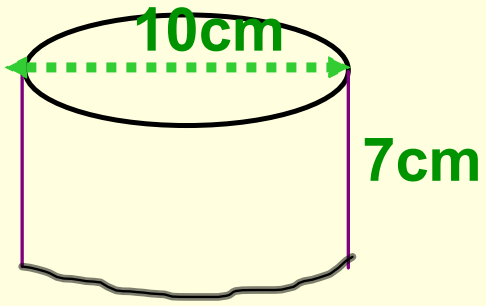
$1ml = 1cm^3$

$1000cm^3 = 1$ Litre


Volume
cone $\frac{1}{3}\pi r^2 h$
sphere $\frac{4}{3}\pi r^3$
cube $= x^3$
$\pi r^2 h$
cylinder
volume
cuboid
$= l \times w \times h$
$\frac{b \times h}{2} \times d$
triangular prism
area of cross section x depth
uniform prisms

page 96

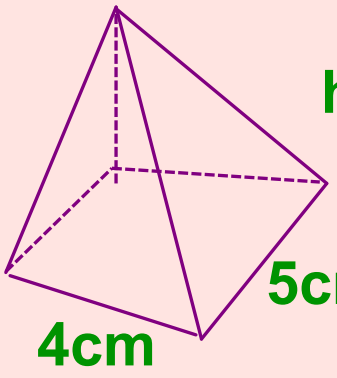
Volume and surface Area of Cylinders



$$\text{Vol} = \pi r^2 h$$
$$= \pi \times 5^2 \times 7$$
$$= \pi \times 25 \times 7$$
$$= 175\pi \text{ cm}^3$$

Volume of a pyramid/cone

$$\text{Vol} = \frac{1}{3} \text{ base area} \times \text{height}$$

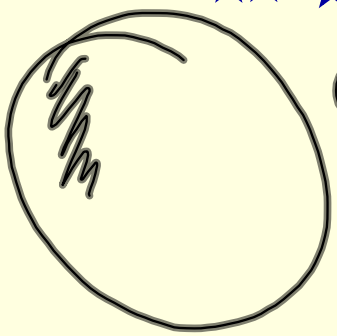


$$\text{Vol} = \frac{1}{3} \times 20 \times 7$$

$$= \frac{140}{3} = 46\frac{2}{3} \text{ cm}^3$$

Sphere

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



$d = 10\text{cm}$

$$V = \frac{4}{3} \times \pi \times 5^3$$

$$= \frac{4 \times \pi \times 125}{3}$$

$$= \frac{500\pi}{3}$$

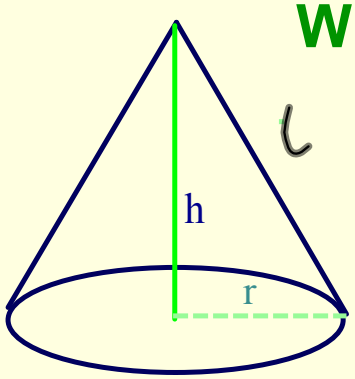
$166\frac{2}{3}\pi$

$$\approx 166.6\pi \text{cm}^3$$

Surface area of a cone

SA = π r l

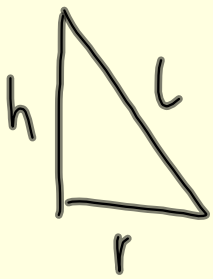
Where l is the slant height



Cone $h = 6$ cm

$r = 8$ cm

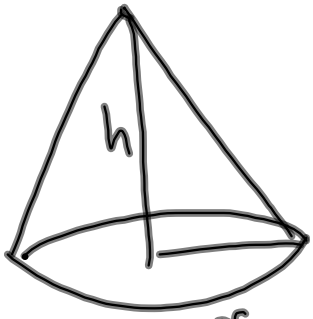
Find the s.a.

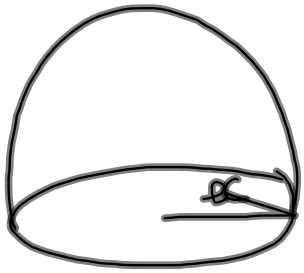


$l = 10$cm

$SA = \pi \times 8 \times 10 = 80\pi$ cm^2

see ppt





$SA = \pi r l + \pi r^2$

$= \pi x l + \pi x^2$

$+\pi r^2$

$SA = 4\pi r^2 \div 2$

$= \frac{4\pi x^2}{2}$

$= 2\pi x^2 + \pi x^2$

$2\pi x^2 + \pi x^2 = \pi x l + \pi x^2$

$2\pi x^2 = \pi x l$

$l^2 = h^2 + x^2$

$l = \sqrt{h^2 + x^2}$

$2x = l$

$2x = \sqrt{h^2 + x^2}$

$4x^2 = h^2 + x^2$

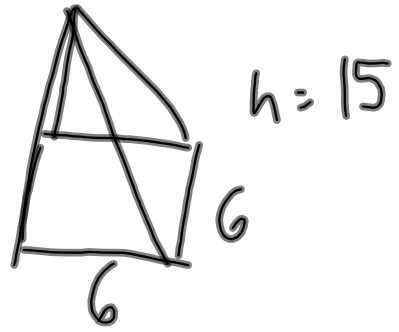
$3x^2 = h^2$

$\sqrt{3x^2} = h$

$h = \sqrt{3}\, x$

$h = x\sqrt{3}$

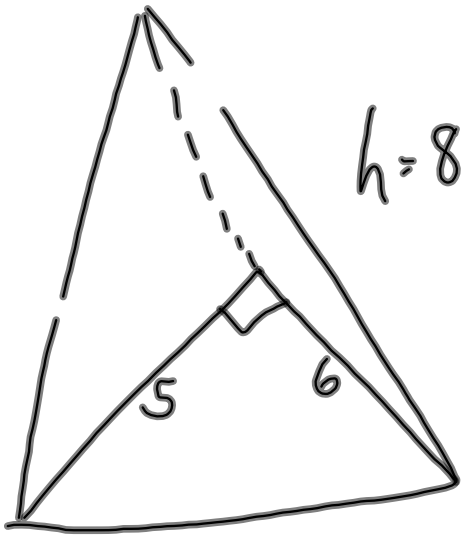
Find Vol of



$V = \frac{1}{3} \times 6 \times 6 \times 15$

$= \frac{1}{3} \times 36 \times 15$

$= 180 cm^3$



$V = \frac{1}{3} \times \frac{5 \times 6}{2} \times 8$

$= \frac{1}{3} \times 15 \times 8$

$= 5 \times 8 = 40 cm^3$

Surface Area of a sphere

SA (sphere) = $4\pi r^2$

Attachments

VOLUME of a cylinder.ppt

Surface area of a cylinder.ppt