

Area and Volume

$$\text{Area of triangle} = \frac{bh}{2}$$

$$\text{square } l^2$$

$$\text{Trapezium} \\ \frac{(a+b)h}{2}$$

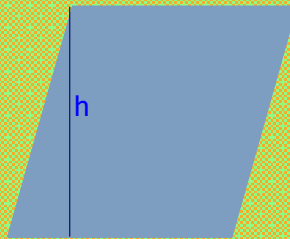


$$\text{Circle} \\ \pi r^2$$

$$\text{parallelogram} = bh$$

$$\text{rectangle} = bh$$

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

Find the area of a circle with

- a) radius 7cm
- b) diameter 10cm
- c) circumference 21cm
- d) circumference 40cm



a) $A = \pi \times 49 = 153.9 \text{ cm}^2$

b) $A = \pi \times 25 = 78.5 \text{ cm}^2$

c) $21 = 2\pi r \quad r = \frac{21}{2\pi} = 3.4$

Area of a sector of the circle =

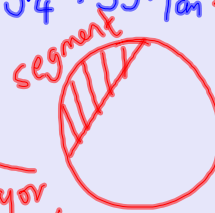
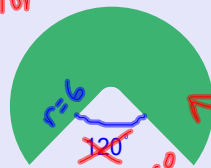
$A = \pi \times 3.4^2 = 35.1 \text{ cm}^2$

Area of minor sector of segment =

$\frac{106}{360} \pi r^2$

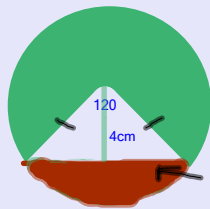
= 33.3 cm^2

minor sector

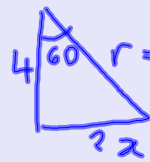


page 244 A1: a,c,e
A2-A8 even nos only

Area of a Segment



Area of segment = area of sector - area of triangle.



$r = 8 \quad \cos 60 = \frac{4}{r}$

$r = \frac{4}{\cos 60}$

$r = 8 \text{ cm}$

Area of sector = $\frac{120}{360} \times \pi \times 8^2$

= 67 cm^2

Base length: $8^2 = 4^2 + x^2$

$64 = 16 + x^2$

$48 = x^2 \quad x = 6.9 \text{ cm}$

ie 246

$$\text{Base} = 2 \times 6.9 = 13.9 \text{ cm}$$

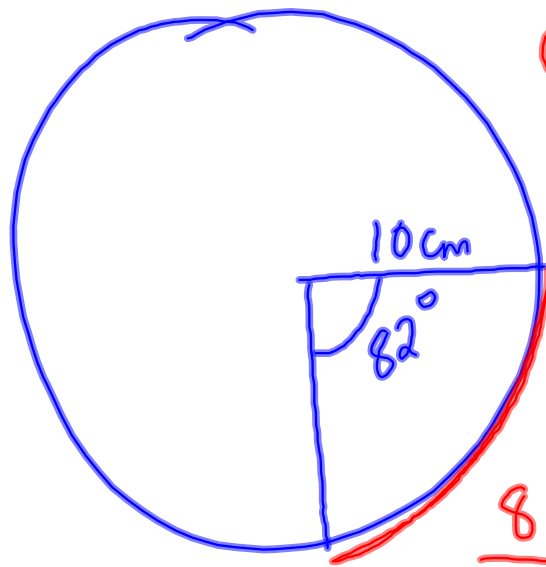
$$\begin{aligned} \text{Area of triangle} &= \frac{13.9 \times 4}{2} \quad \frac{bh}{2} \\ &= 27.7 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of segment} \\ &= \text{area of sector} - \text{area of triangle} \end{aligned}$$

$$= 67 - 27.7$$

$$= \underline{\underline{39.3 \text{ cm}^2}}$$

Length of an arc



Circumference

$$= 2 \times \pi \times 10$$

$$= 62.8 \text{ cm}$$

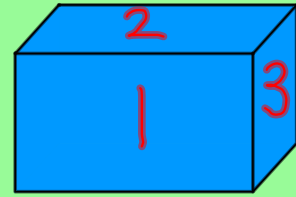
$$\frac{82}{360} \times 2\pi r$$

$$= \frac{82}{360} \times 2 \times \pi \times 10$$

$$= 14.3 \text{ cm}$$

Surface Area

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



Surface area of a cuboid

$$\begin{aligned} 2 \times \text{area of face 1} &= 2 \times 13.5 \times 10.5 = 2835 \\ 2 \times \text{area of face 2} &= 2 \times 3.5 \times 13.5 = 945 \\ 2 \times \text{area of face 3} &= 2 \times 3.5 \times 10.5 = 735 \\ \hline \text{Total SA} &= 4515 \text{ cm}^2 \end{aligned}$$

Find sa of boxes!

page 97

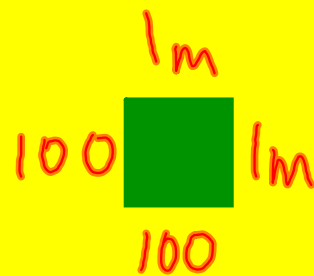
E7c and d only,
E8 evens

Converting Units

convert 1m^2 to cm^2

$$= 100 \times 100$$

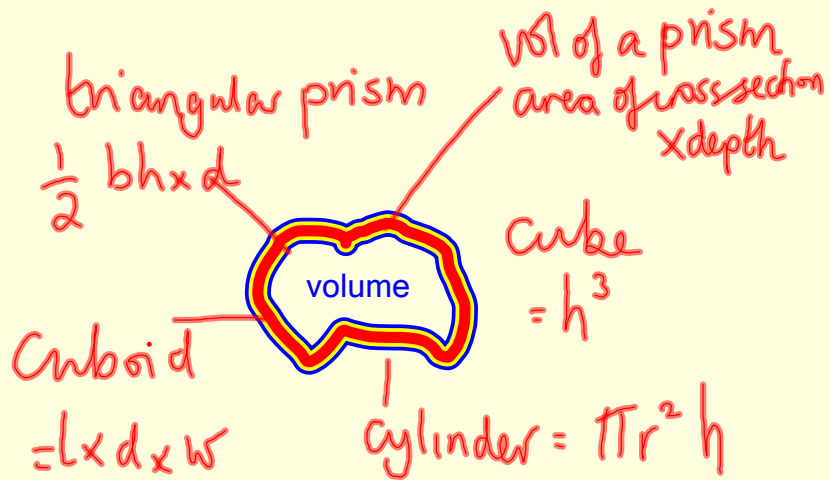
$$= 10000 \text{cm}^2$$



page 100

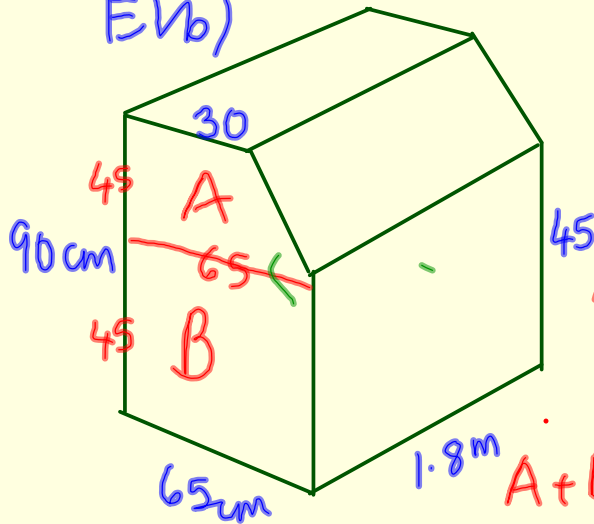
odds only 10mins.

Volume



page 96

E1b)



Area of B = 65×45
 $= 2925$

Area of A = $\frac{95}{2} \times 45$
 $= 2137.5 \text{ cm}^2$

$A + B = 5062.5 \text{ cm}^2$

Volume = 5062.5×1.8
 $= 9112.5 \text{ cm}^3$
 $= 0.0091125 \text{ m}^3$

E2a E4, E5, E6

$$\frac{172}{360} \times \pi \times 20.4^2 = 624.6$$

$$\frac{172}{360} \times \pi \times 9.4^2 = 32.6$$

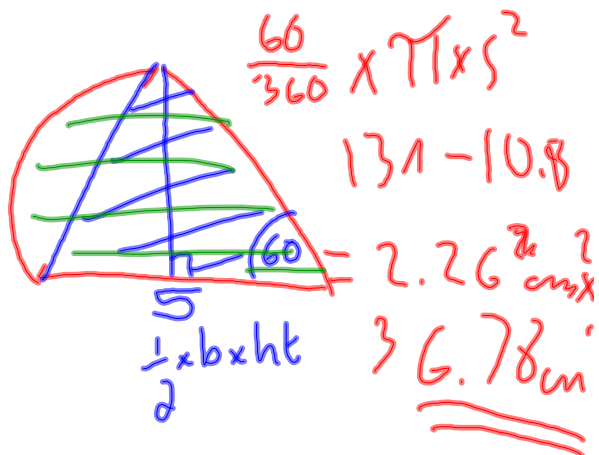
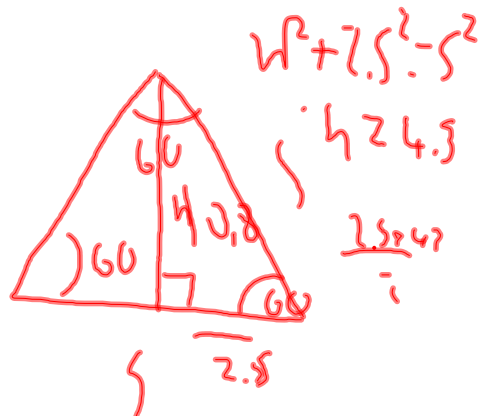
$$= \underline{\underline{492.0 \text{ cm}}}$$

$$\frac{125}{360} \times \pi r^2 = 50$$

$$125 \times \pi r^2 = 18000$$

$$\pi r^2 = 144$$

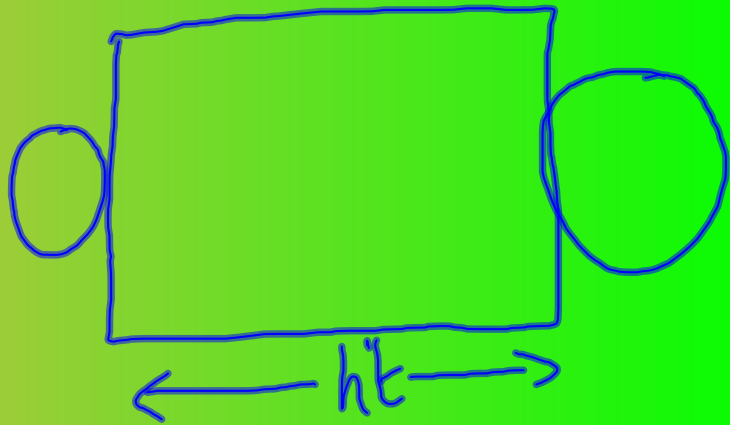
$$r^2 = 1 \quad 6.8$$



Volume and surface Area of Cylinders

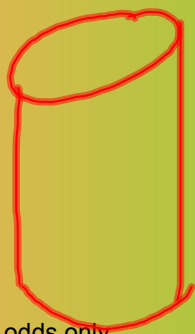
Volume of a cylinder = $\pi r^2 d$

Net of a cylinder:



Surface area of a cylinder:

$$= 2\pi r^2 + \pi d ht$$



diameter = 5.2 cm

11 cm

page 247 odds only

$$\begin{aligned} Vol &= \pi \times 2.6^2 \times 11 \\ &= 233.6 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} SA &= 2\pi r^2 + \pi d \times ht \\ &= 2\pi \times 2.6^2 + \pi \times 5.2 \times 11 \\ &= 222.2 \text{ cm}^2 \end{aligned}$$

Homework:
Make (from paper) a
cylinder of volume
 120cm^3 .
Show your working in
your exercise book.
Find its surface area
(top, bottom and curved
surface) For March 9th

Volume of a pyramid and a cone

You will need thin card, scissors and glue

page 249: draw the net accurately
and put it together.

Working in groups of 4, each person needs to make an accurate copy of the net (page 249)

Using your pyramids, copy and complete the table.

Volume of a pyramid



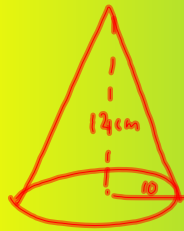
$$Vol = \frac{1}{3} \text{ base area} \times \text{height}$$

p250 D2,D3,D5,D6
:

$$\begin{aligned} Vol &= \frac{1}{3} \times ba \times ht \\ &= \frac{1}{3} \times 42 \times 50 \\ &= 14 \times 50 \\ &= 700 \text{ cm}^3 \end{aligned}$$

Volume of a Cone

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$



$$\begin{aligned} \text{Vol} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \pi \times 10^2 \times 12 \\ &= 1257 \text{ cm}^3 \end{aligned}$$

page 251 d7,d8

Surface area of a pyramid

D11 and D12

curved

Surface area of a pyramid =

$$\pi d \times \frac{l}{2}$$

Where l is the slant height

Total surface area of a cone =

$$\frac{\pi d l}{2} + \pi r^2$$

What do we call a polygon with an infinite number of sides?

page 252

Surface area of a cone

D17 - D22

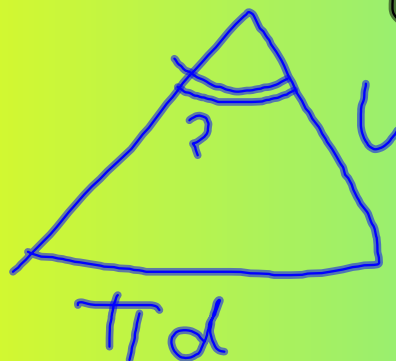
Today you are going to make a cone with volume 120cm^3 .

In your book work out what you will need to do in order to complete this.

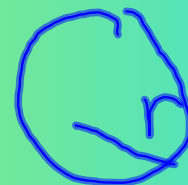


r radius
height

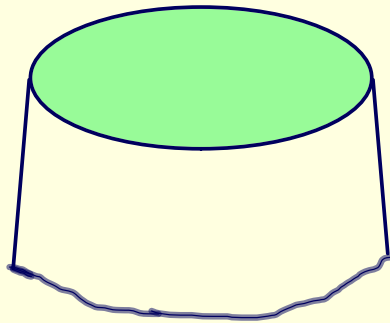
base area



Circumference



Frustrum



A frustrum is a cone
with the top taken off.

Waste paper bins are often frustrums



To find the volume of a frustrum
find the volume of the large cone and subtract
from it the volume of the small cone.

This bin has a top diameter of 30cm and a base diameter of 20cm.
its height is 40cm.
If it was a cone it would have height 70cm.



Find its volume.

Sphere

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



These chocolate footballs have a diameter of 2cm.
Find their volume.

Suppose we have a sphere with $V=420\text{cm}^3$

Find the radius.

Surface Area of a sphere

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



Find the surface area of the chocolate footballs ($r=2\text{cm}$)

Homework

1. Make a bookmark/poster/notecard with formulae on, in order to help you learn them.

You must include all of the following:

Area of

- a triangle
- a circle
- parallelogram
- trapezium

Surface area of

- a cone
- a sphere

Volume of:

- a cylinder
- a pyramid
- a cone
- a sphere

You can do this on the computer if you wish and email me a copy on cmyers@stbedes.cambs.sch.uk

Density

Which weighs more a kg of flour or a kg of feathers?

$$\text{Density} = \frac{\text{mass}}{\text{Volume}}$$

page 99

F1, F3, F5, F6,

Population Density

Population Density means how many people are there per square metre? (per sq. km)

(How dense is the population? ie how tightly packed..not how stupid?..)

What is the approximate popn density of this classroom?

How many people per sq metre

$$\text{Pop}^n \text{ den} = \frac{\text{people}}{\text{area}}$$

p 95 D1-D4

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

Attachments

VOLUME of a cylinder.ppt

Surface area of a cylinder.ppt