VOLUME and SURFACE AREA

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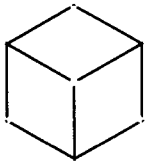
3	Volume of prisms
4	Volume, surface area and nets of prisms
5	Volume and surface area of prisms
6	Volume and surface area of prisms
7	Volume and surface area of spheres and hemispheres
8	Volume and surface area of cones and other pyramids
9	Volume of a frustrum
10	Mixed volume and surface area
11	Mixed volume and surface area
12	Key formulas and ideas for volume and surface area
13	Recap on volume and surface area

Find the volume of each of these shapes

1



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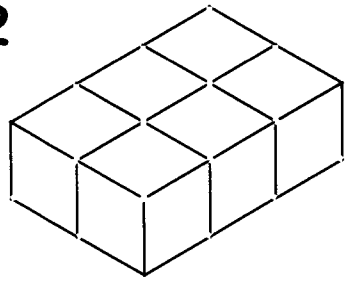

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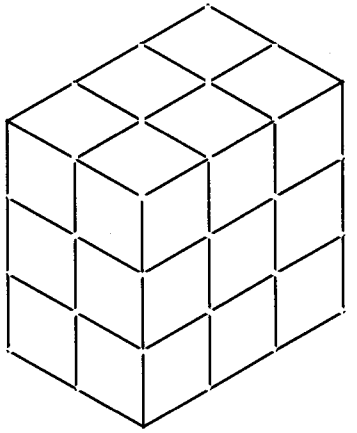

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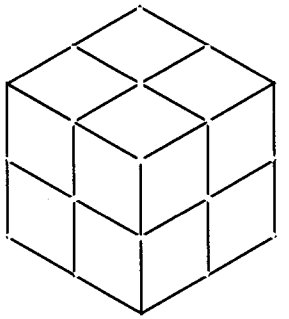

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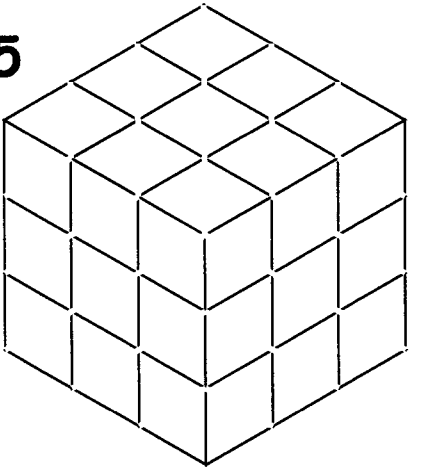

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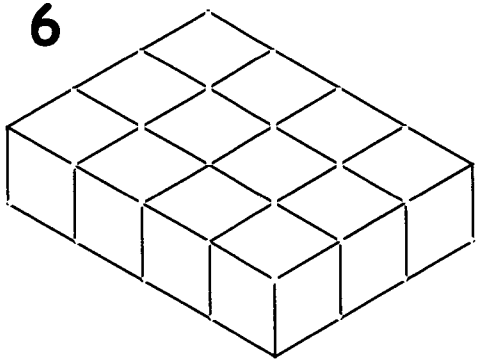

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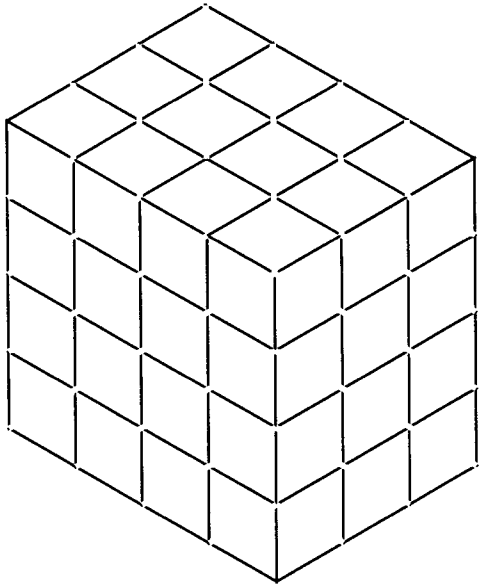

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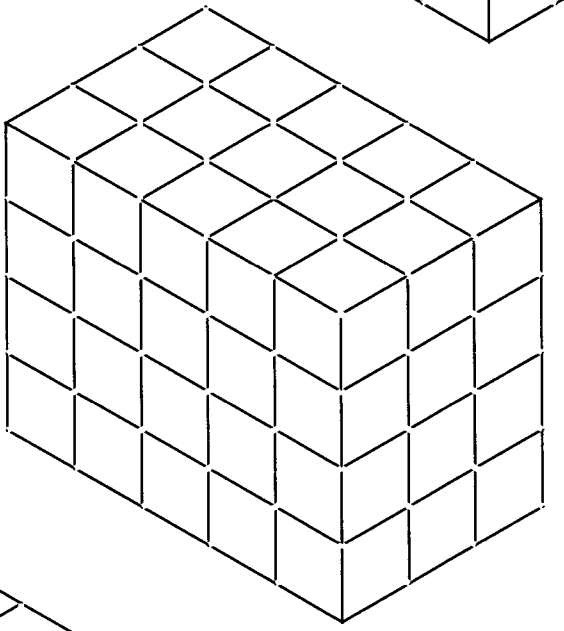

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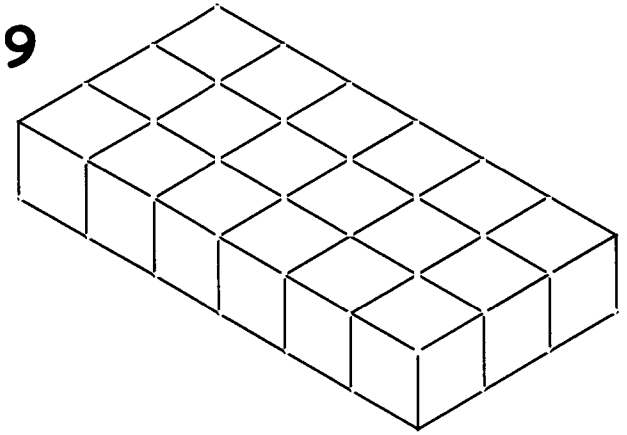

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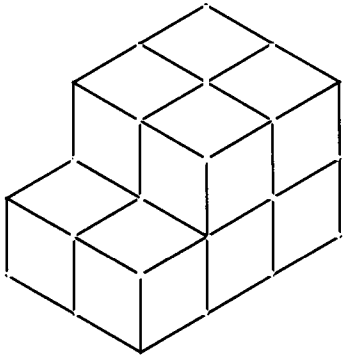
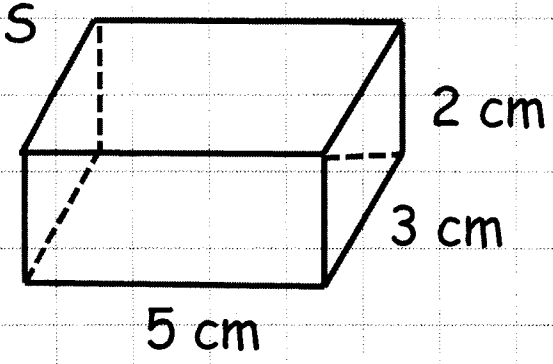


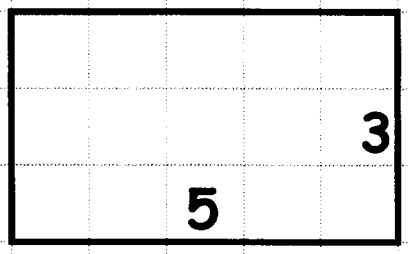
CUBOIDS



VOLUME =

How many
Faces =
Edges =
Corners =

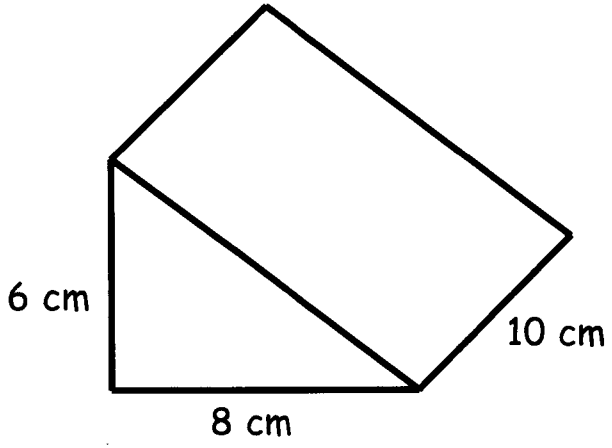
Complete the NET of the cuboid

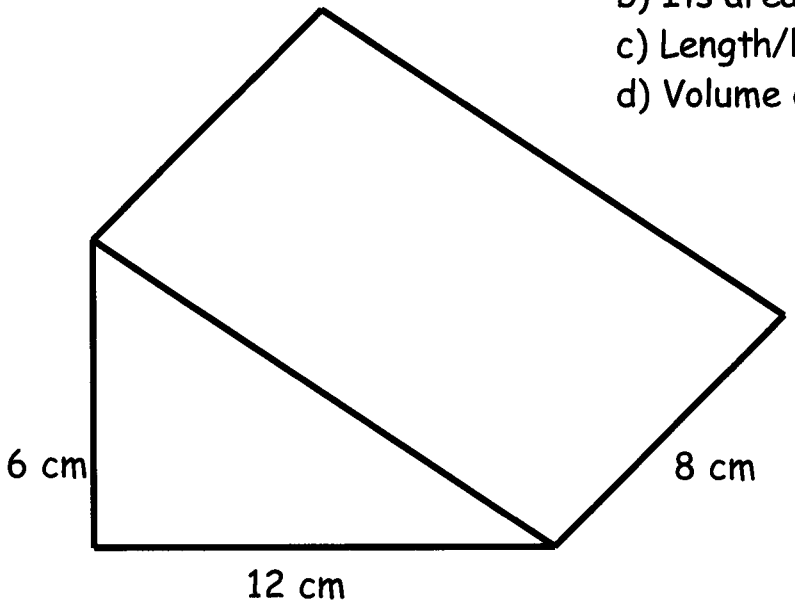


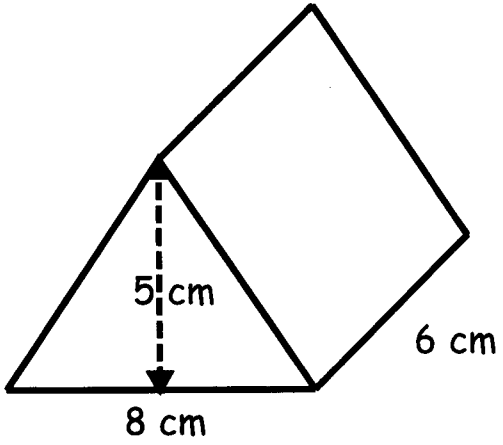
What is the SURFACE AREA of the cuboid?

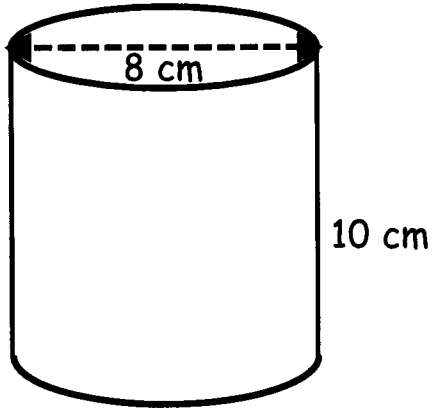
A prism has the same shape (cross section) running all the way through it
The volume of a prism = Area of cross section × length (or height)

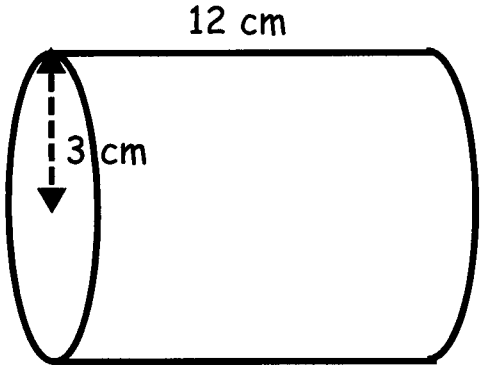
Find the volume of these prisms. For each shape write
a) Name of cross section shape
b) Its area
c) Length/height of prism
d) Volume of prism

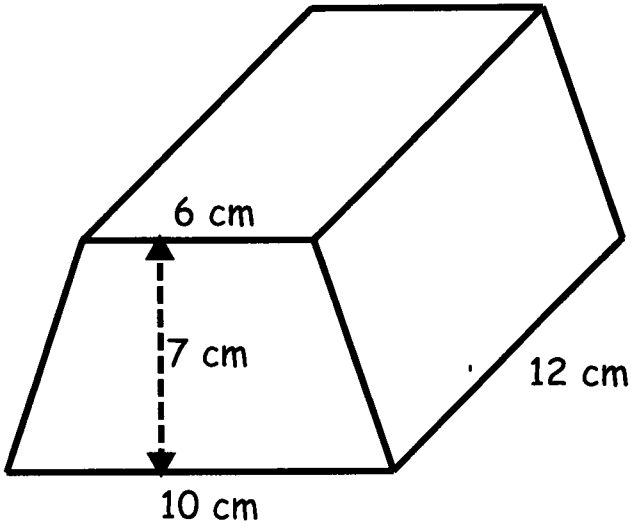




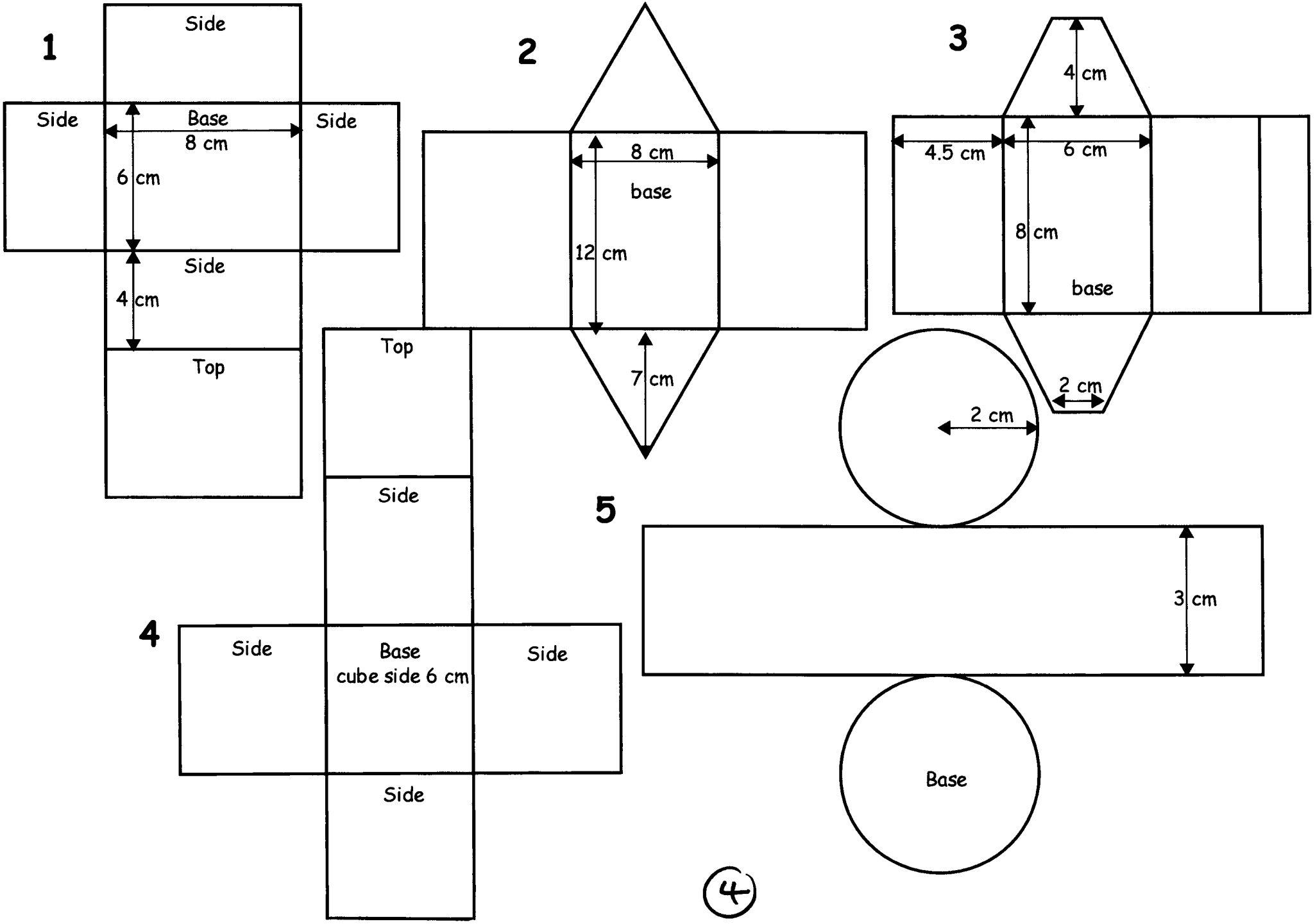






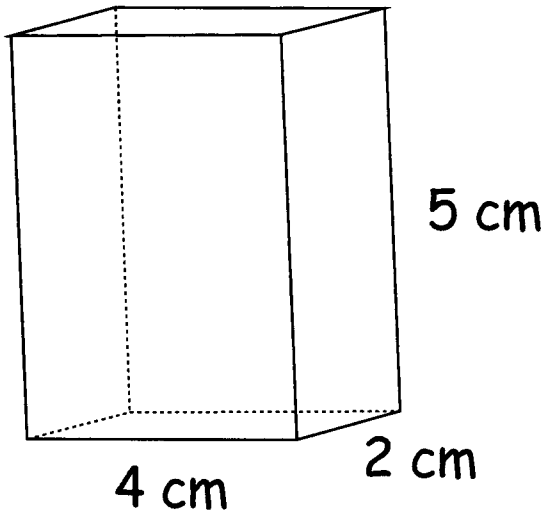


Here are the nets of five prisms. Sketch the prism and then calculate its volume and surface area



Find the volume and surface area of these shapes. Show all working out.

1



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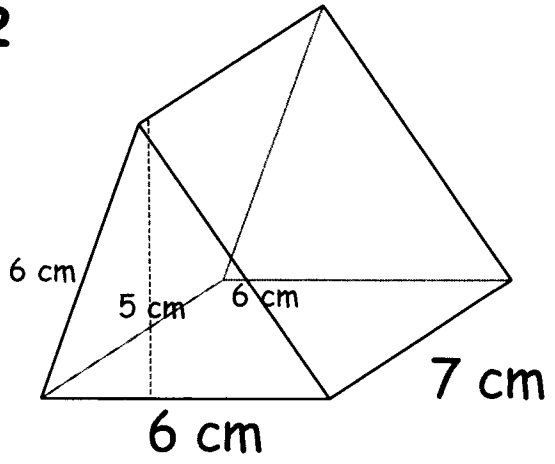

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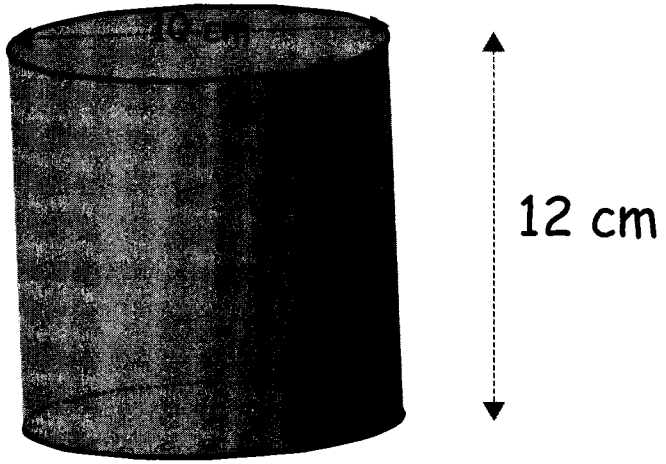
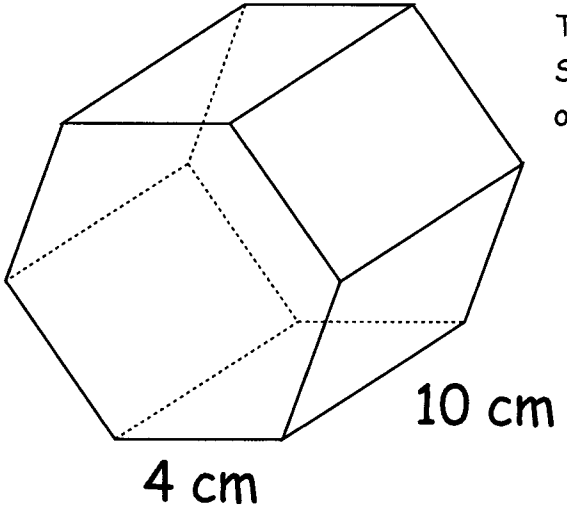
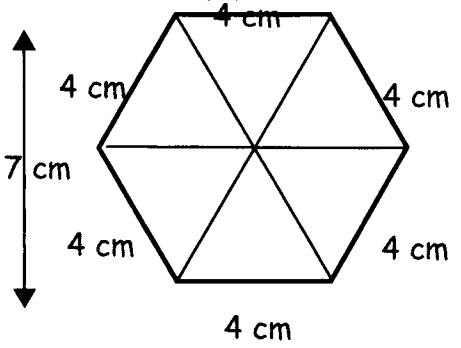


4



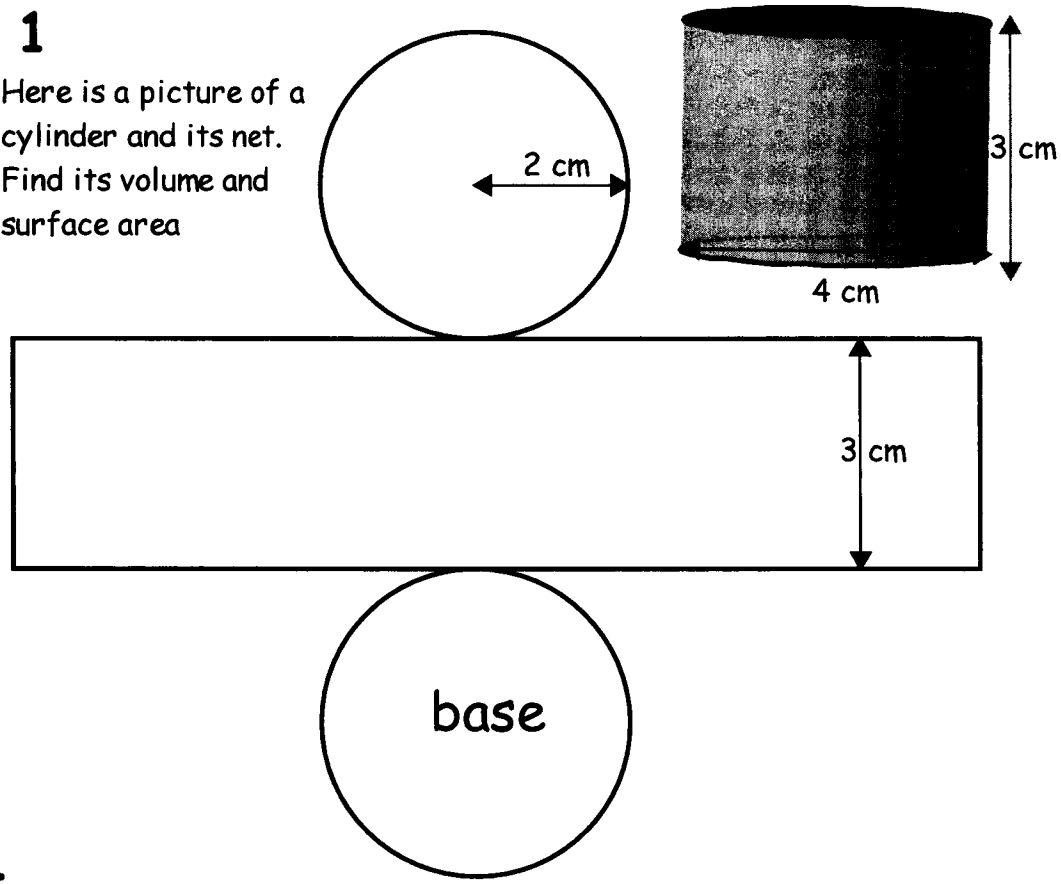
Hint

The cross section is a regular hexagon. Split it into 6 triangles, find the area of one triangle multiply the answer by 6



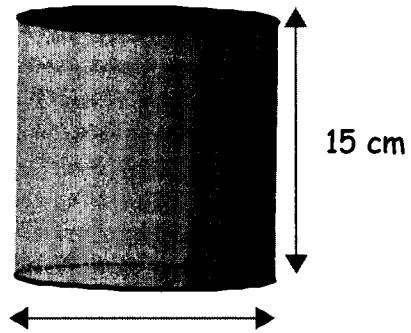
1

Here is a picture of a cylinder and its net. Find its volume and surface area

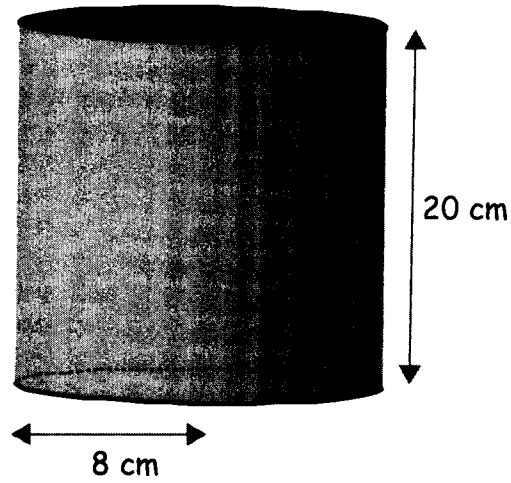


Find the volume and surface area for questions 2 and 3

2



3



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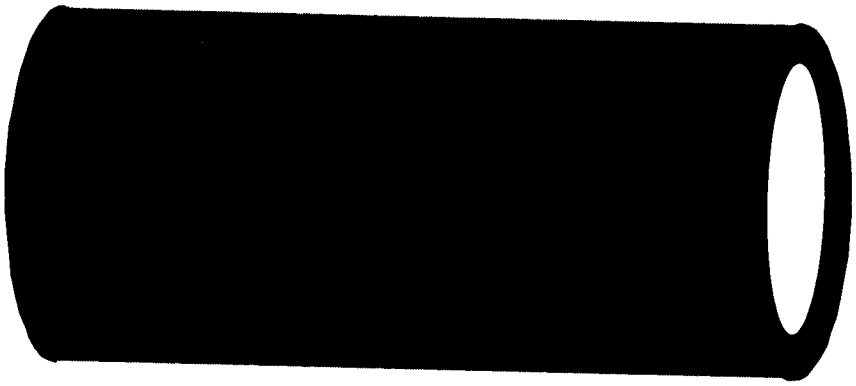
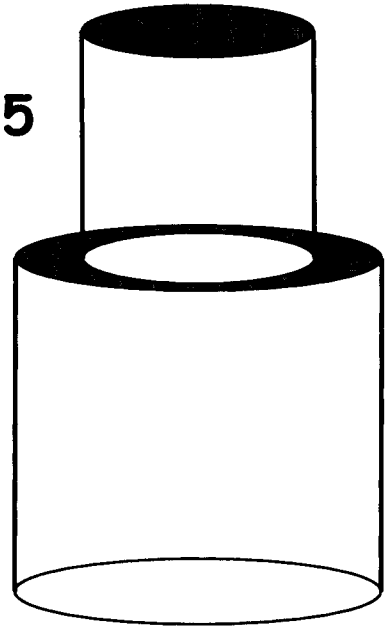


This is a length of concrete pipe. The pipe is 5 m long. The radius of the pipe is 0.4 m. The radius of the hole is 0.3 m. Calcualte the volume of the pipe.

5



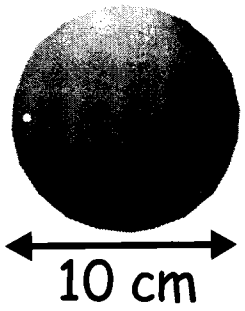
Two cylinders are placed on top of each other. The top cylinder has a radius of 5 cm and a height of 12 cm. The bottom cylinder has a diameter of 16 cm and a height of 20 cm.

Calculate the volume of this object and its surface area.

Volume of a sphere is $\frac{4}{3}\pi r^3$ this means $4 \times \pi \times r \times r \times r \div 3$

The surface area of a sphere is $4 \pi r^2$ Find the volume and surface area of these shapes to 1 d.p. Don't forget the units.

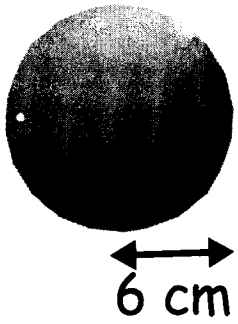
1



V=

SA =

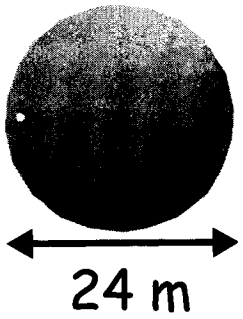
2



V=

SA =

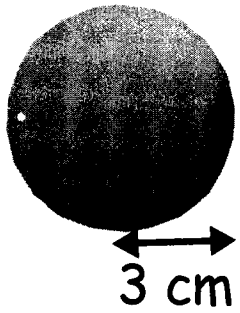
3



V=

SA =

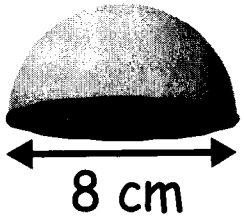
4



V=

SA =

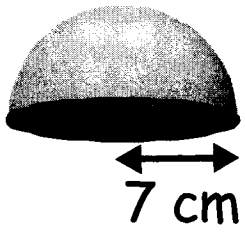
5



V=

SA =

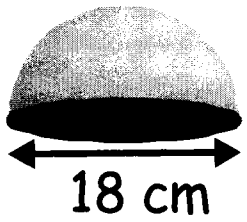
6



V=

SA =

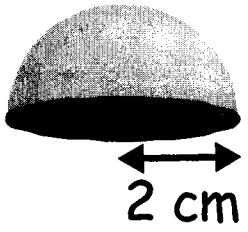
7



V=

SA =

8



V=

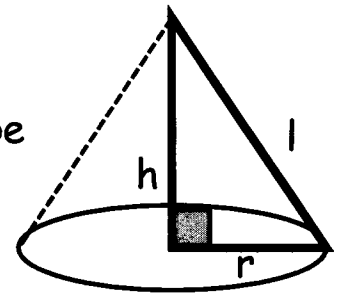
SA =

In general the Volume of a pyramid is $\frac{1}{3}$ x base area x perpendicular height

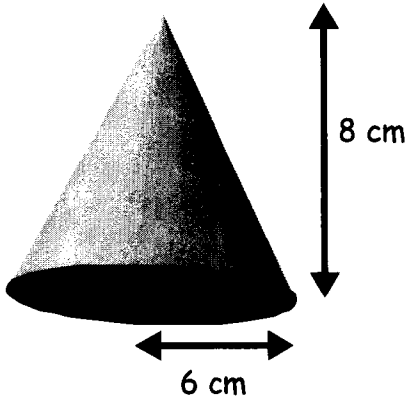
For a cone $V = \frac{1}{3}\pi r^2 h$ Surface Area = πr^2 (base) + πrl (curved surface)

l is the slant height and can be found using pythagoras.

$l^2 = r^2 + h^2$

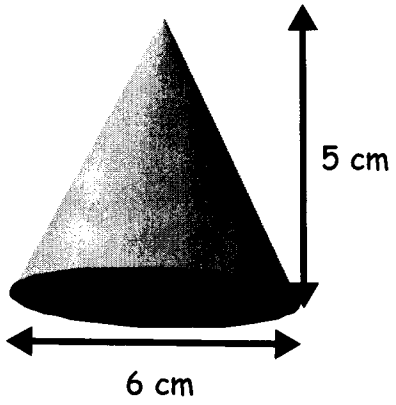


Find the volume and surface area of these pyramids



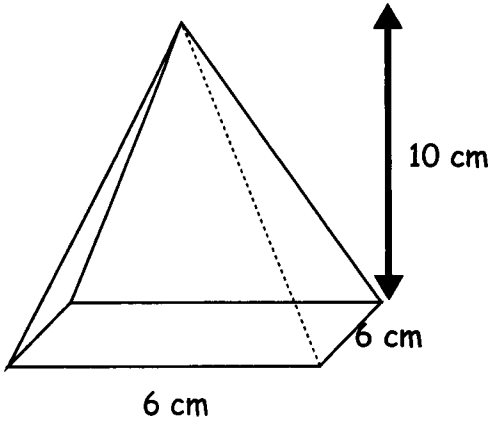
r =
h =
l =
V=

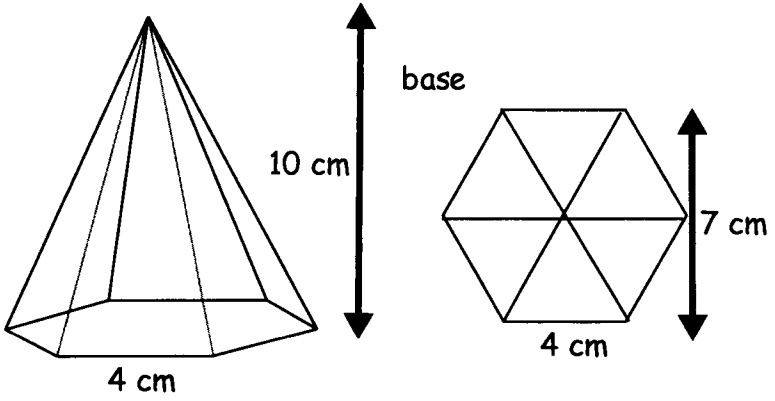
S.A. =



r =
h =
l =
V=

S.A. =



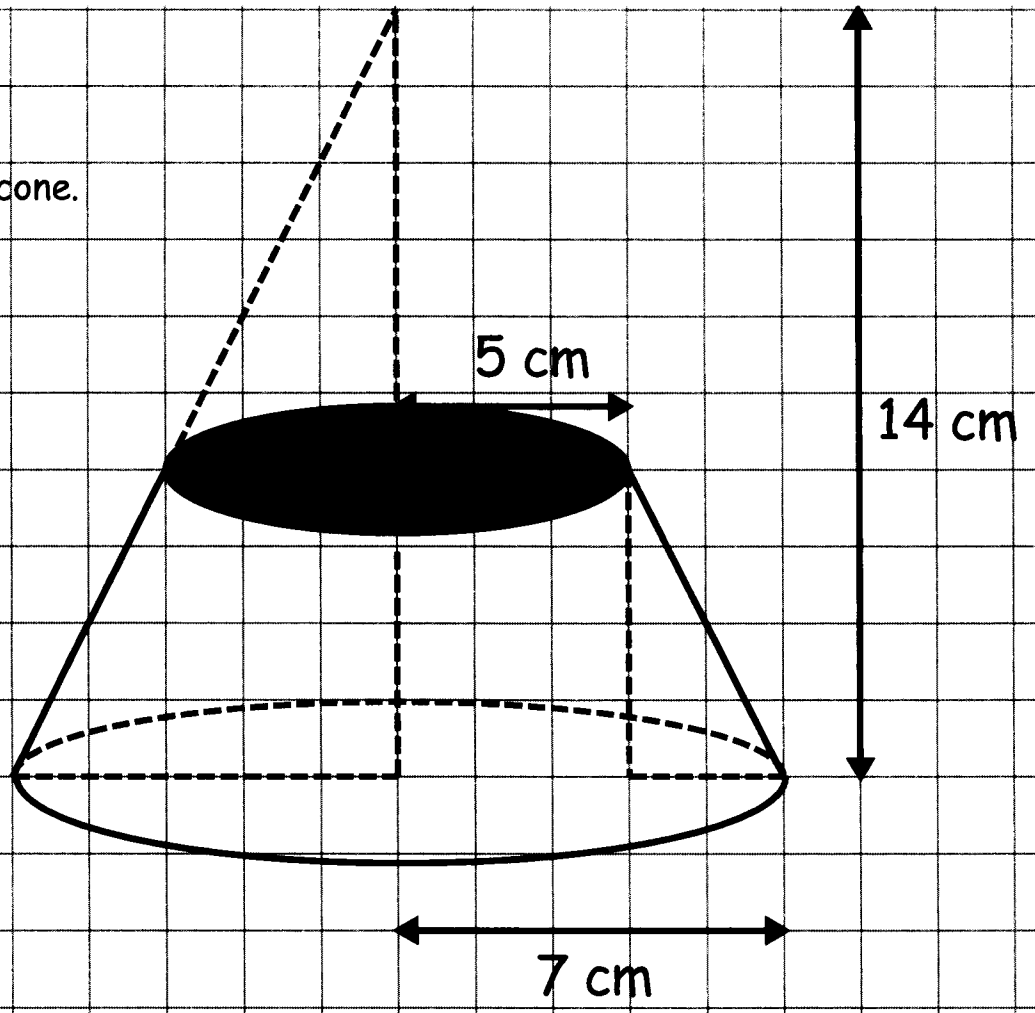


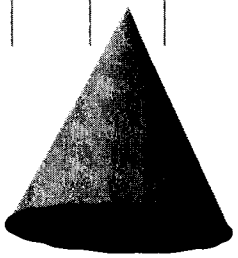
Volume of frustrum

A frustrum is formed when the top is sliced off a cone.

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

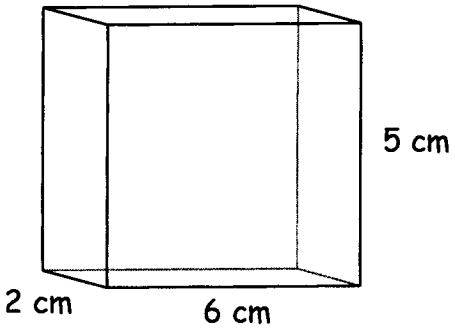
You may need to use trigonometry or similar triangles to work out missing dimensions.



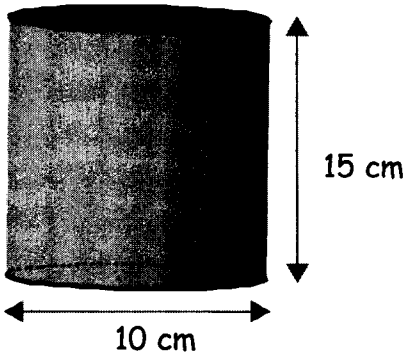


Calculate the volume and surface area of these shapes

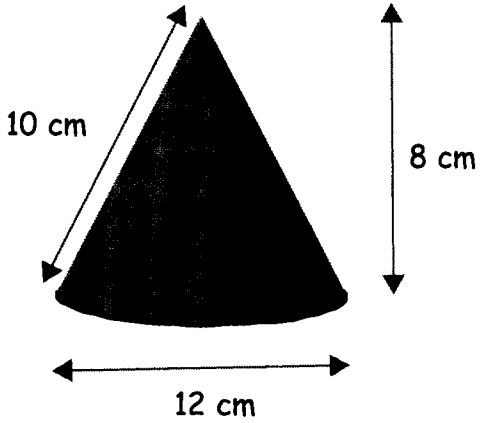
1) A Cuboid



3) A Cylinder

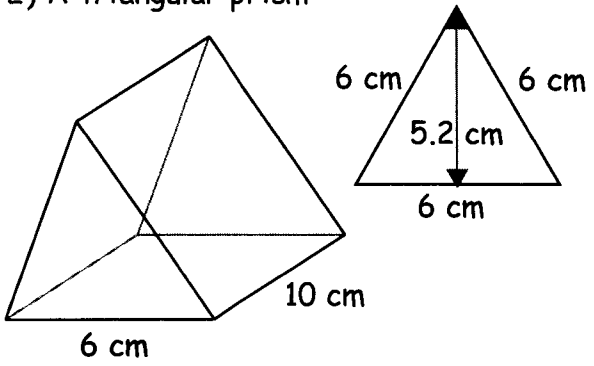


5) A cone

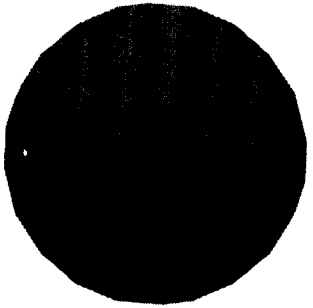


2) A triangular prism

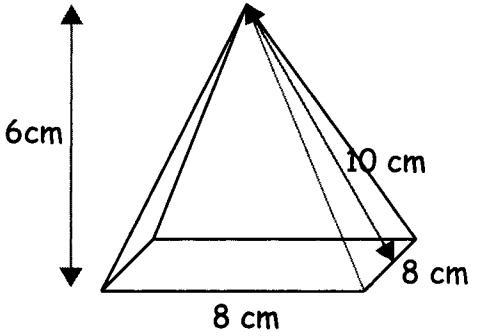
cross-section



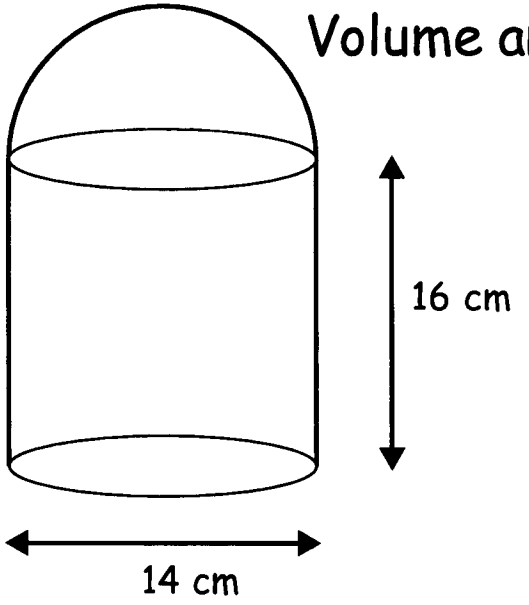
4) A sphere



6) A square based pyramid

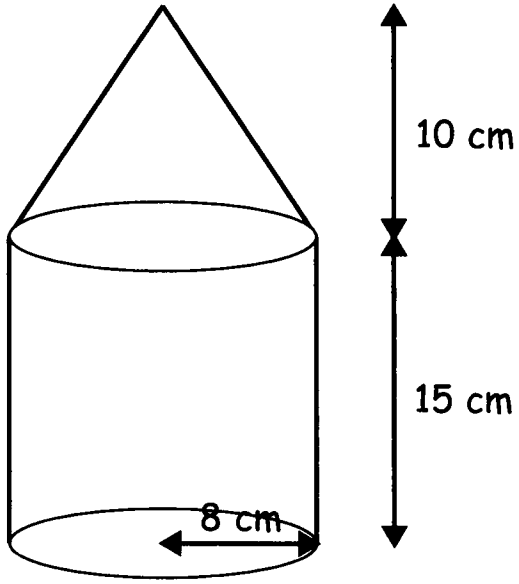


1



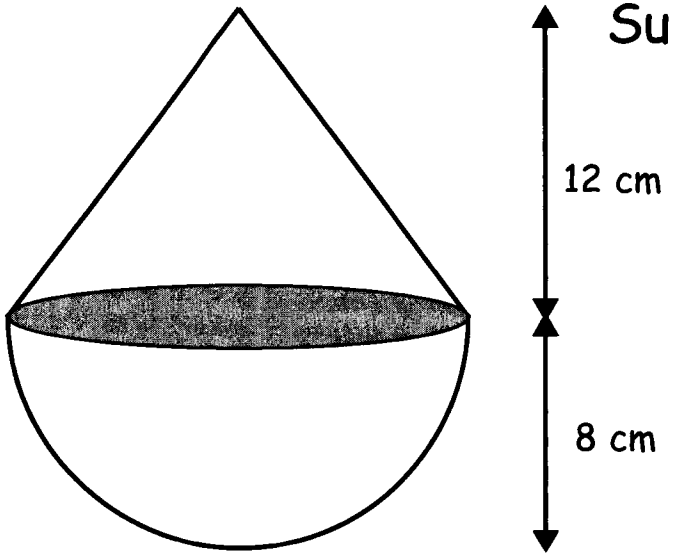
Volume and surface area

2

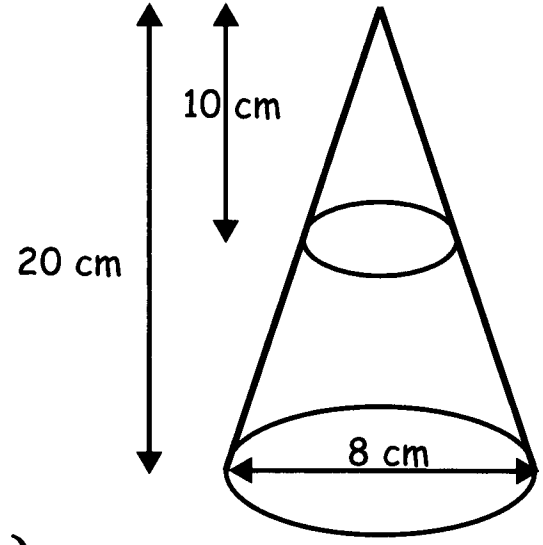


Volume and Surface Area

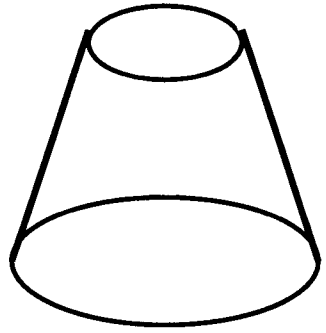
3

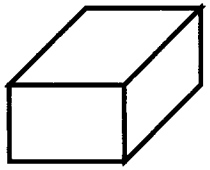
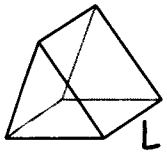
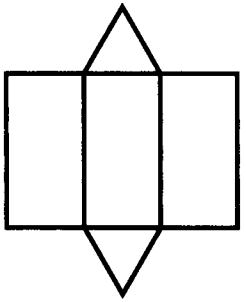


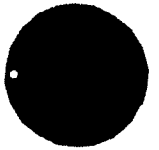
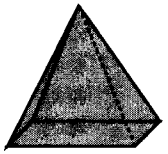
4 The top of a cone is removed to make a frustrum. Find the volume of the frustrum.



Volume of Frustrum

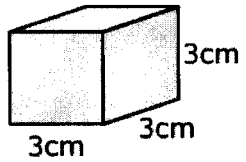


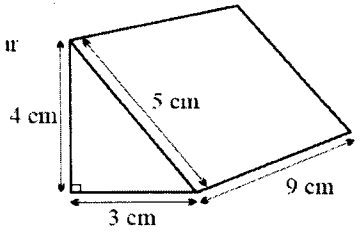
NAME	VOLUME OF PRISMS area of cross section x length	SURFACE AREA
Cube/ Cuboid	 length x width x height	add areas of all the 6 faces together
Cylinder	 $V = \pi r^2 h$	πr^2 $\pi d \times h$ πr^2
Triangular Prism	 V = base x height ÷ 2 x Length	 3 rectangles + 2 triangles
Any prism	V = area of cross section x height	Area of all the faces added together

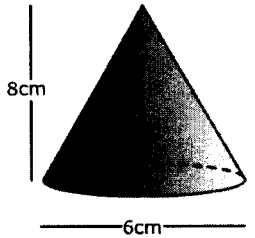
NAME	VOLUME	SURFACE AREA
Sphere	 $\frac{4}{3} \pi r^3$	$4 \pi r^2$
Hemisphere	 $\frac{4}{3} \pi r^3 \div 2$	$4 \pi r^2 \div 2 + \pi r^2$
Pyramid	 $\frac{1}{3}$ x area of base x height	Area of all the faces added together May need pythagoras
Cone	 $\frac{1}{3} \pi r^2 h$	$\pi r^2 + \pi r L$ L is the slant height $L^2 = r^2 + h^2$

Shape	Cube/Cuboid	Prism	Pyramid	Sphere
	V =length x width x height	V = area of cross section x height	V =area of base x height ÷ 3	$V = \frac{4}{3}\pi r^3 \quad S.A = 4\pi r^2$

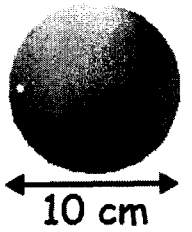
Find the Volume and Surface Area of each shape.

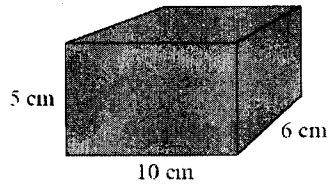


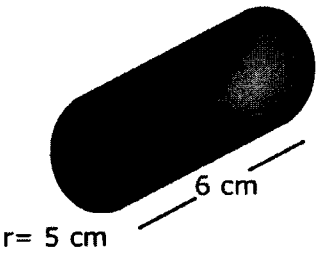


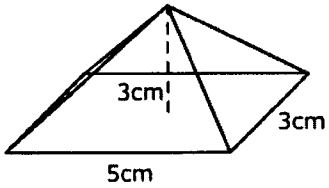


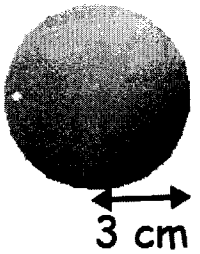
$S.A. = \pi r^2 + \pi rl$











AREAS Triangle = base x height ÷ 2 Trapezium = add parallel sides x height ÷ 2 Circle = π x radius^2