4C 2005   MEASUREMENT   6th April

(All measurements in centimetres)

Find the volumes of the following figures. (Give your answers to 4 significant figures)

1.   (b)   (c)

(a)

10

8   4   13   5   8   3·6   2·1

(d)

7·3

2·3

8·7   6·5

2.   (b)   (c)

(a)   ← 6·1 cm →

12 cm   2·6 cm

10 cm   2·1 cm   ← 16·3 cm →

10 cm
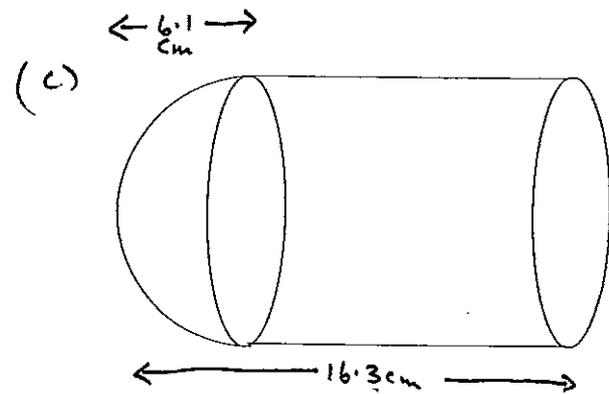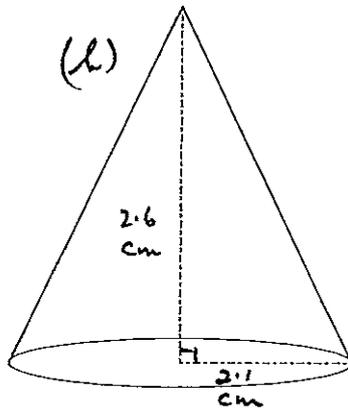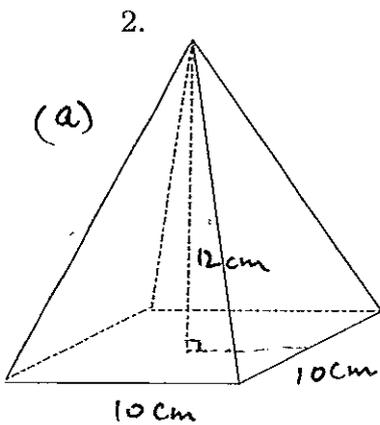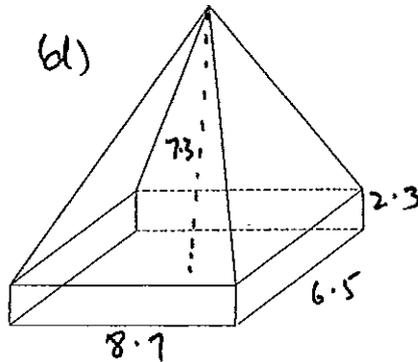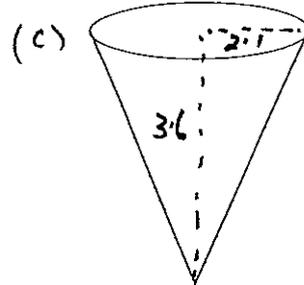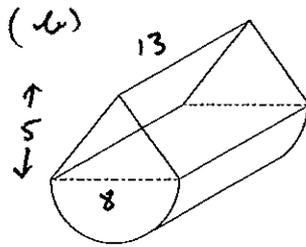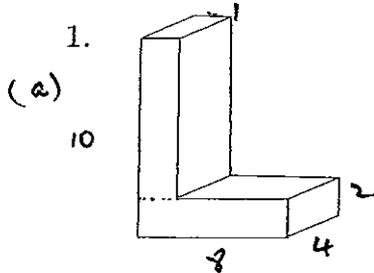
Find the surface areas of the above figures. (Give your answers to 1 decimal place)

3. A large cylindrical reservoir is used to store water. The reseroir has a radius of 16 m and a height of 9 m.

(a) Calculate the volume of the reservoir to the nearest cubic metre.

(b) Find the capacity in litres.
   Note: $1 l = 1000 \, \text{cm}^3$

4. What is the volume of a sphere whose surface area is 4096 cm^2. (4 sig. figures)

① a) $V = Ah$

$A_b = (10 \times 1) + (7 \times 2)$

$= 10 + 14$

$= 24$

$V = 24 \times 4$

∴ Volume $= \underline{96 \, cm^3}$

$SA = (24 \times 2) + (8 \times 4) + (7 \times 4)$
$+ (10 \times 4) + (8 \times 4)$

$= 48 + 32 + 28 + 40 + 32$

Surface area $= 180 \, cm^2$

b) $V = $ semi-cylinder + triangular prism

$= \dfrac{\pi r^2 h}{2} + \dfrac{bh \cdot H}{2}$

$= \dfrac{\pi 4^2 \cdot 13}{2} + \dfrac{8 \times 5 \times 13}{2}$

$= 104\pi + 260$

$= \underline{586.72\cancel{8}}$

Volume $= 586.7 \, (c4sf) \, cm^3$

c) $V = \pi r^2 h / 3$

$= \pi 2.1^2 \times 3.6 / 3$

$= 2.1^2 \pi \, 1.2$

$= 16.625$

Volume $= \underline{16.63 \, (c4sf) \, cm^3}$ ✓

↳ b) SA $= (\pi r^2 + \pi r h) + bh + 2lb$

$= (\pi 4^2 + \pi 4 \times 13) + (5 \times 8) + (2 \times 13 \times \sqrt{41})$

$= 68\pi + 40 + 26\sqrt{41}$

$= 420.109 \ldots$

Surface area $= 420.11 \, (c2dp)$

d) $V = \dfrac{lbh}{3} + lbh$

$= \dfrac{8.7 \times 6.5 \times 5}{3} + 8.7 \times 6.5 \times 2.3$

Volume $= \underline{224.3\cancel{4}}$ ✓

$= 224.3 \, (c4sf)$

② a) $V = \dfrac{s^2 h}{3}$

$= \dfrac{10^2 \times 12}{3}$

Volume $= 400 \, cm^3$

SA $= 4 \cdot \dfrac{2bh}{} + s^2$

$= (2 \times 10 \times 13) + 10^2$

$= \underline{360 \, cm^2}$ ✓

b) $V = \dfrac{\pi r^2 h}{3}$

$= \dfrac{\pi 2.1^2 \times 2.6}{3}$

Volume $= 12.01 \, (c4sf)$

b) SA $= \pi r^2 + \cancel{\pi l^2} \times \dfrac{r}{l} = \pi r^2 + \pi r l$

$= \underline{35.9 \, cm^2}$ ✓

c) SA $= \pi r^2 + 2\pi r h + 4\pi r^2 \times \dfrac{1}{2}$

$= \underline{741.6 \, cm^2}$ ✓

c) $V =$ hemisphere + cylinder

$$= \frac{2\pi r^3}{3} + \pi r^2 h$$

$$= \frac{2\pi 6.1^3}{3} + \pi 6.1^2 \times 10.2$$

$$= 1667.75\ldots$$

Volume $\doteq 1668$ (c4sf) cm³

③ a)

16 m

9 m
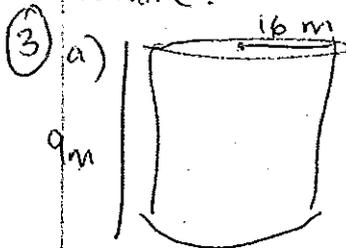
$V = \pi r^2 h$

$$\doteq 7238$$

(c.4sf) m³ ✓

$\leftarrow \begin{cases} 1\,cm^3 = 1\,ml \\ 1\,m^3 = 1\,kL \end{cases}$ or

b) Capacity $= 7238\,kL$

$= 7\,238\,000\,L$ ✓

⑤

12   h

r (9.5)
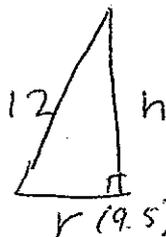
- Volume of a cone is $\frac{\pi r^2 h}{3}$

- we need to know 'r & h'

$C_A = 2\pi R \times \frac{285}{360}$

$= 2\pi 12 \times \frac{285}{360}$

$= 59.6902\cancel{6042}\ldots$

$C = 2\pi r$

$59.69\ldots = 2\pi r$

$r = 9.5$ ✓

New forh

$h^2 = 12^2 - 9.5^2$

$= 53.75$

$\therefore h = \sqrt{53.75}$

$= 7.331$ ✓

$V = \frac{\pi r^2 h}{3}$

$= \frac{\pi 9.5^2 \times 7.331}{3}$

$= 692.891\ldots$

Volume $\doteq 692.89$ cm³ ✓

⑥ $1L = \cancel{1000\,mL}$

$= \cancel{1000\,cm^3}$

4 the litre of
water must be added ✗

④ $SA = 4\pi r^2 = 4096$

$\therefore r = \frac{32}{\sqrt{\pi}}$ ✓✓

$\therefore Vol = \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi \left(\frac{32}{\sqrt{\pi}}\right)^3$

≈ 24650 cm³ ✓✓

⑥ If depth is doubled
New Volume is 2^3 ⑧
times bigger than
old volume
So additional
Volume is 7 ×
larger.
$\Rightarrow$ add 7 Litres