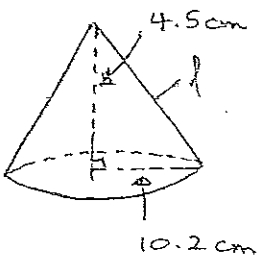


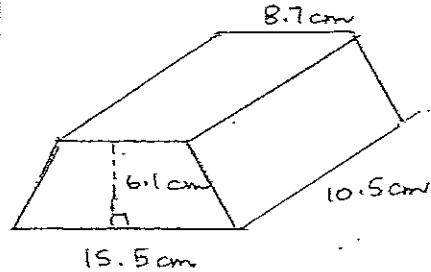
Q1: Find the surface area of a closed cone, diameter 16cm, slant height 12cm.

Q2: Find the surface area of a sphere with diameter 1.2 metres.

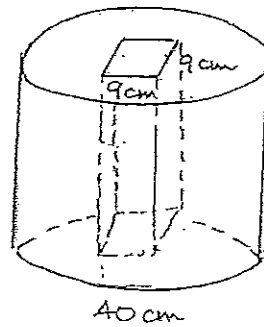
Q3: Find the curved surface area of this cone



Q4: Find the volume of this trapezoidal prism:



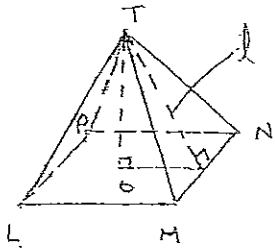
Q5:



This diagram represents a cylinder which has had a square section removed from the centre. Find the remaining volume

Q6: Find the volume of a square pyramid with base edge 3.2m and height 6.3 m

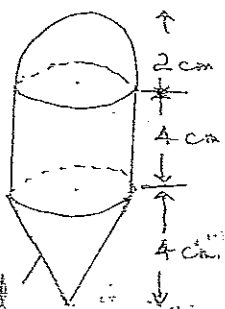
Q7: Find the surface area of this square pyramid



$LM = 10 \text{ cm}$   
 $TO = 10 \text{ cm}$

Q8: A sphere has a volume of  $350 \text{ cm}^3$ . Find the radius of the sphere correct to 1 decimal place.

Q9: Find the surface area of this composite figure made up of a hemisphere, a cylinder & a cone.

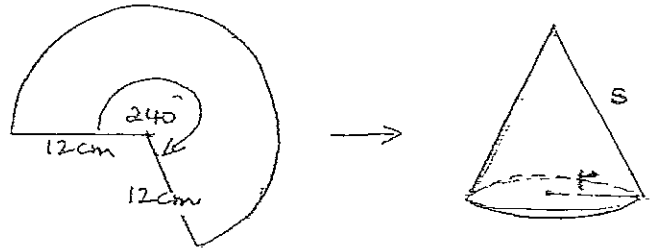


Q10:

A model of a statue is made with all dimensions one quarter of the original.

- By what factor is the surface area reduced?
- By what factor is the volume reduced?
- The surface area of the original statue was  $450 \text{ cm}^2$ . What is the S.A. of the model (ans. to 1 dp)

Q11 The sector shown is formed into a cone by joining its two radii



- Calculate area of sector
- What is the slant height of the cone?
- Find radius of cone  
 (Hint: consider area of sector and surface area of cone)  
 $C = 2\pi r$

ii) Hence find the volume of the cone  $V = \frac{1}{3}\pi r^2 h$

Q12 A swimming pool is rectangular in shape and has uniform depth. It is 12 m long, 3.6 m and 1.6 m deep.

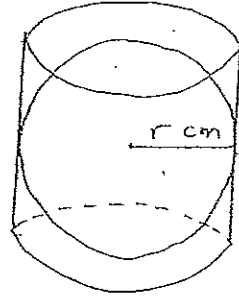
Calculate:

(a) the cost of tiling it at  $\$35/m^2$

(b) The amount of water in litres that needs to be added to raise the level of water from 1.2 m to 1.4 m.

(3)

Q15: The diagram shows a sphere of radius  $r$  cm which fits inside a cylinder. The cylinder has the same diameter and height as the sphere.



Calculate: (in terms of  $r$ )

(a) the height of the cylinder

(b) the volume of the sphere

(c) the volume of the cylinder

(d) the volume of the cylinder not occupied by the sphere.

# SOLUTIONS

-1/2 -2

YEAR 10: VOLUME AND SURFACE AREA TEST

NAME: Chanel Chan

Q1: Find the surface area of a closed cone, diameter 16cm, slant height 12cm.

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

$$l = 12^2 + 8^2 \quad \left(\frac{1}{2}\right)$$

~~$$\pi \times 8 \times 12 + \pi \times 8^2 = \pi \times 208$$~~

~~$$= 563.53 \text{ cm}^2 \text{ (to 2dp)}$$~~

$$SA = \pi \times 8 \times 12 + \pi \times 8^2$$

$$= 502.65 \text{ cm}^2 \text{ (to 2dp)} \checkmark$$



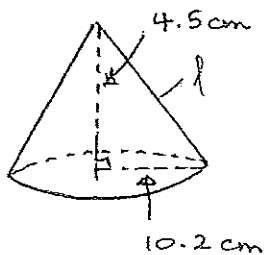
Q2: Find the surface area of a sphere with diameter 1.2 metres.

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

$$4 \times \pi \times 0.6^2$$

$$= 4.52 \text{ m}^2 \text{ (to 2 dp)} \quad \left(\frac{2}{2}\right)$$

Q3: Find the curved surface area of this cone



$$SA = \pi r l \checkmark$$

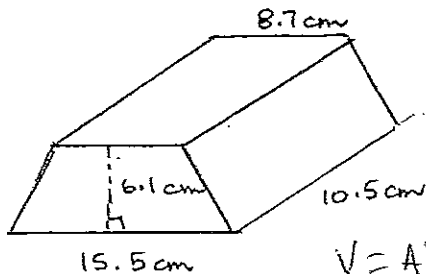
$$\pi \times 10.2 \times 4.5 = 124.29$$

$$= 357.247 \text{ cm}^2 \text{ (to 3dp)} \checkmark$$

$$l = 4.5^2 + 10.2^2$$

$$= \sqrt{124.29} \quad \left(\frac{3}{3}\right)$$

Q4: Find the volume of this trapezoidal prism:



$$V = Ah$$

$$A = \frac{1}{2}h(a+b) \checkmark$$

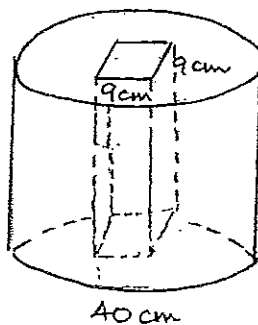
$$\frac{1}{2} \times 6.1 \times (8.7 + 15.5) \times 10.5 \quad \left(\frac{2}{3}\right)$$

$$= 775.005 \text{ cm}^3 \text{ (to 3 dp)} \checkmark$$

~~$$= 286.125 \text{ cm}^3 \text{ (to 3 dp)}$$~~

Q5:

This diagram represents a cylinder which has had a square section removed from the centre. Find the remaining volume



$$\text{Cyl} - V = \pi r^2 h \checkmark$$

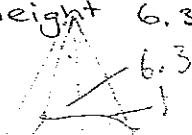
$$\pi \times 20^2 \times 30 = 37699.112 \quad \left(\frac{3}{3}\right)$$

$$\text{sq. Prism} - V = Ah \quad \text{Remaining Volume}$$

$$9 \times 9 \times 30 = 2430 \checkmark$$

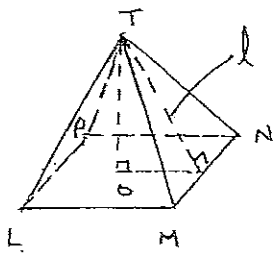
$$37699.112 - 2430 = 35269.112 \text{ cm}^3 \checkmark$$

Q6: Find the volume of a square pyramid with base edge 3.2m and height 6.3m



$$= \frac{1}{3} \times 3.2 \times 3.2 \times 6.3 = 21.504 \text{ m}^3 \text{ (to 3dp)} \checkmark$$

Q7: Find the surface area of this square pyramid



LM = 10 cm  
TO = 10 cm

$$l = 10^2 + 5^2$$

$$= \sqrt{125}$$

$$10 \times 10 + 4 \left( \frac{1}{2} \times 10 \times \sqrt{125} \right)$$

$$= 323.607 \text{ cm}^2 \text{ (to 3dp)}$$

Q8: A sphere has a volume of  $350 \text{ cm}^3$ . Find the radius of the sphere correct to 1 decimal place.

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

$$\frac{4}{3} \pi r^3 = 350$$

$$\therefore r = 4.4 \text{ cm (to 1dp)}$$

a) Hemisphere =  $2\pi r^2$

$$= 2(\pi \times 4^2)$$

$$= 32\pi \text{ ①}$$

Cylinder =  $2\pi r h$

$$= 2(\pi \times 2 \times 4)$$

$$= 16\pi \text{ ②}$$

Cone =  $\pi r s$

$$= \pi (2 \times \sqrt{17}) \text{ ③}$$

$$V = \text{①} + \text{②} + \text{③}$$

$$= 202.6 \text{ cm}^2 \text{ (1 dec. pl.)}$$

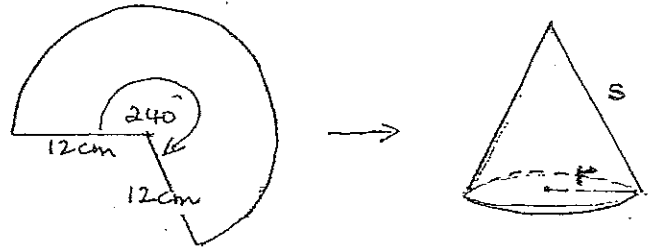
$$176.70 \text{ (to 2dp)}$$

Q10:

A model of a statue is made with all dimensions one quarter of the original.

- a) By what factor is the surface area reduced? 16 times
- b) By what factor is the volume reduced? 64 times
- c) The surface area of the original statue was  $450 \text{ cm}^2$ . What is the S.A. of the model (ans. to 1dp)
- $$450 \div 16 = 28.1 \text{ cm}^2 \text{ (to 1dp)}$$

Q11: The sector shown is formed into a cone by joining its two radii.



(i) calculate area of sector

$$A = \pi r^2$$

$$\pi \times 12^2 \times \frac{240}{360}$$

$$= 301.59 \text{ cm}^2 \text{ (to 2dp)}$$

(ii) What is the slant height of the cone? 12 cm

(iii) Find radius of cone

(Hint: consider area of sector and surface area of cone)

$$C = 2\pi r$$

$$2 \times \pi \times 12 \times \frac{240}{360}$$

$$= 16\pi \text{ cm}$$

$$16\pi s = 2\pi r$$

$$\therefore r = 8 \text{ cm}$$

∴ Hence find the volume of the cone  $V = \frac{1}{3} \pi r^2 h$

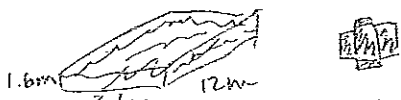
$$\frac{1}{3} \times \pi \times 8^2 \times \sqrt{80}$$

$$= 549.451 \text{ cm}^3 \text{ (to 3 dp)}$$

$$h = 12^2 - 8^2 = \sqrt{80}$$

Quiz A swimming pool is rectangular in shape and has uniform depth. It is 12 m long, 3.6 m and 1.6 m deep.

Calculate:



(a) the cost of tiling it at \$35/m<sup>2</sup>

$$2(3.6 \times 12) + 12(1.6 + 3.6 + 1.6)$$

$$= 93.12 \text{ m}^2$$

$$93.12 \times \$35 = \$3259.20$$

(b) The amount of water in litres that needs to be added to raise the level of water from 1.2 m to 1.4 m.

$$V = Ah$$

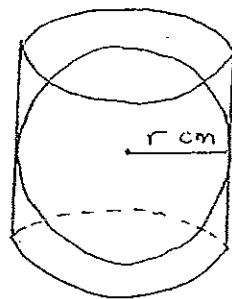
$$0.2 \times 3.6 \times 12$$

$$= 8.64 \text{ m}^3$$

$$= 8.64 \text{ KL}$$

$$= 8640 \text{ L}$$

Qu5: The diagram shows a sphere of radius  $r$  cm which fits inside a cylinder. The cylinder has the same diameter and height as the sphere.



Calculate: (in terms of  $r$ )

(a) the height of the cylinder

$$h = 2r$$

(b) the volume of the sphere

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

(c) the volume of the cylinder ANS.

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

$$V = 2\pi r^3 \quad (h = 2r)$$

$$\therefore \cancel{V = \pi r^2 \cdot 2r}$$

$$= \cancel{\pi r^3} - \frac{4}{3} \pi r^3$$

(d) the volume of the cylinder not occupied by the sphere.

$$\cancel{V = \pi r^2 h} \quad V = 2\pi r^3 - \frac{4}{3} \pi r^3$$

$$\therefore \cancel{\pi r^2 h} = \pi r^3 \left( 2 - \frac{4}{3} \right)$$

$$= \cancel{\pi r^3} = \frac{2}{3} \pi r^3$$