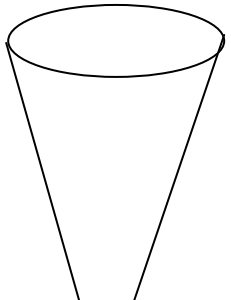
2. Volume and capacity

1.	$\frac{1}{2}\times14\times22\sin75^0-\frac{75}{360}\times\frac{22}{7}\times14\times14$ $7\times22\sin75-\frac{55\times7}{3}$ $=20.42$	M_1 M_1 M_1 A_1	
		4	
2.	LSF 1 cm rep 50000cm 1cm rep 500m ASF 1cm2 rep 250000m2 Area = $\left(\frac{6.16\times250000}{10000}\right)$ = 154ha	B1 M1 A1	ASF given
		03	

3.	Area = 4 x 4sin 42^0 - $\frac{42}{360}\times\frac{22}{7}\times4\times4$ = 10.71 – 5.867 = 4.796	**M1** **M1** **A1**	✓area of rhombus & sector ✓difference in area
		03	
4.	a) (i) $\frac{30+h}{h}=\frac{40}{30}$ h = 90 $\frac{1}{3}\ \Pi\times1600\times120-⅓\ \Pi\times900\times90$ $(64\,000\ \Pi-27\,000)\div1000$ 37 Π litres (ii) Volume of water = $\frac{2}{5}\times\prod\times1.44\times1.35$ =777.6 Π litres b) $\frac{777.6\prod}{37\prod}$ = 22	M_1 A_1 M_1 M_1 A_1 M_1 A_1 M_1 M_1 A_1	Divide by 1000 Mult by 1000

5. 16 12



$\frac{12}{16} = \frac{L}{30 + L}$

L = 90 — B1 — for 90

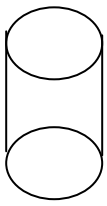
$h = \sqrt{90^2 - 12^2}$
$= 89.2$

$H = \sqrt{120^2 - 16^2}$
$= 118.9$ — B1 — for both 89.2 1189

Vol. big core = $^1/_3 \times 3.142 \times 16^2 \times 118.9$ — M1
31879.151
Small cone = $^1/_3 \times 3.142 \times 12^2 \times 89.2$ — M1
$= 13452.789$

∴ Volume of water
$31879.151 - 13452.789$ — M1
$= 18426.3645$ — A1

(b) 4.5 12



$3.142 \times 12^2 \times h =$
18426.364 — M1

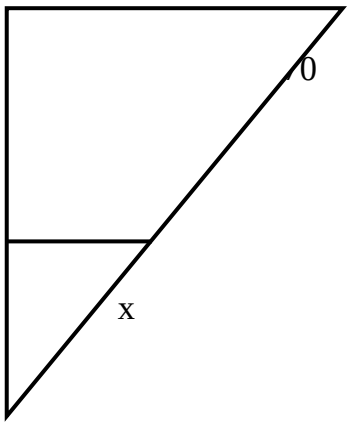
$h = 40.73$ — A1

$S.A = 2 \times 3.142 \times 12 (45 - 40.73)$ — M1
$= 321.99cm^2$ — A1

10

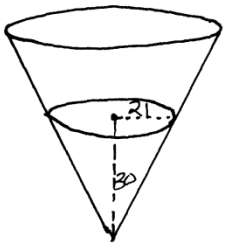
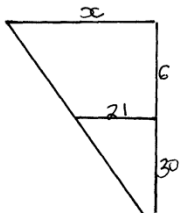
6.	(a) (300x5) + (140x8) = 1500 + 1120 = 2620fans (b) Cost of fuel Boeng 747 = 120x10.5x60x5x2x0.3 =226800 dollars Boeng 740 = 200x10.5x60x8x2x0.3 =604,800 dollars	M1 A1 M1 A1 M1 A1	

	(c) Total collection Boeng 747 = 300x5x800 = 1,200,000 dollars Boeng 740 = 140x8x800 = 896,000 dollars (d) Net profit Boeng 747 = 1200000 – 226800 = 973,200 dollars Boeng 740 = 896,000 – 604,800 = 291,200 dollars	B1 B1 B1 B1	
		10	

7. a.)	50  $^{50}/_{15} = {}^{70+x}/_{x}$ 50x = 15(70 + x) 50x = 1050 + 15x 35x = 1050 = 30 cm Total height = $\sqrt{100^2 - 50^2}$ = $\sqrt{7500}$ = 86.60am $\frac{50}{15} = \frac{86.60}{Y}$ Y = $\frac{86.6 \times 15}{50}$ = 25.98 Height = 86.60 – 25.98 = 60.62	M1 A1 B1 M1 A1 A1

b.)	Volume $= (^{1}/_{3} \times ^{22}/_{7} \times 50^{2} \times 86.60) - (^{1}/_{3} \times ^{22}/_{7} \times 15^{2} \times 25.98)$ $= 1/3 \times 22/7 (216500 - 5845.5)$ $= 220685.67am3$ $= 221litres$	M1 M1 M1 A1 10

8.	a)		

	 $volume = \frac{\pi}{3} r^2 h$ $= \frac{3.142}{3} \times 21 \times 21 \times 30$ $= 13856.22 cm^3$ b)  $\frac{x}{21} = \frac{36}{30}$ $x = 25.2cm$ ii) New volume = $^1/_3$ x 3.142 x 25.2 x 25.2 x 36 = 23943.55cm^3 Volume change = 23943.55 – 13856.22 = 10087.33cm^3 iii) $2/3\pi r^3 = 10087.33$ $r^3 = 10087.3 \times {}^3/_2 \times {}^1/_\pi$ $r^3 = 4815.72$ $r = \sqrt[3]{4815.72}$ r = 16.89cm diameter = 16.89 x 2 = 33.78cm	M1 A1 M1 A1 M1 A1 B1 M1 A1 B1	Attempt ✓vol of hemisphere
		10	

9. *L.s.f. = 18/24 = 3/4*

A.s.f = 9/16

v.s.f = 27/64

h/3.2 = 3/4 ⇒ 4h = 3h + (3 x 3.2)

h = 9.6

(i) surface area of small cone:

L = $\sqrt{9^2 + 9.6^2}$ = 13.16m

S.A = (3.142 x 9 x 13.6) = 384.581

Curved area of frustrum

$= \frac{7}{1} \times \frac{3.142 \times 9 \times 13.16}{9}$

$= 289.4$

Top area $= (3.142 \times 9^2) = 254.5cm$

$\therefore$ Total area $= 543.9m^2$

(ii) Volume of smaller cone $= \frac{3.142 \times 9^2 \times 9.6}{3}$

$= 814.41$

Volume of frustrum $= \frac{(37 \times 814.41)}{27}$

$= 1116.043m^3$

$= 1116043L$

Litres used per day $= (15 \times 15 \times 40) + (116 \times 65) = 16540L$

No. of days $= \frac{1116043}{16540} = 67.5days$

10. $L.S.F = \frac{3}{2} = \frac{28 + h}{h}$

$56 + 2h = 3h$

$h = 56cm$

Volume $= 1/3\ r^2H - 1/3r^2h$

$= {}^1/_3 \times {}^{22}/_7 \times 15 \times 15 \times 56 - {}^1/_3 \times {}^{22}/_7 \times 10 \times 10 \times 28$

$= 13200 - 29331/_3$

$= 10.2667litres$

(b) Slant height $= 152 + 562 = 3361$

$= 57.97cm$

Curved surface $= RL - rl$

11. $2.6 \times 4.8 \times 3.2 = 39.936m^3$

$1m^3 = 1000litres$

$39.936m^3 = 39.936 \times 1000$

$= 39936\ litres$

12. The top surface of the frustrum is-2/3 way up the vertical height of the original one.

$\Rightarrow VX: XY = 1/3h: h = 1:3$

Using similar triangle we have

$\frac{R}{R} = \frac{VX}{VY} = \frac{1}{3}$

$R:R = 1:3$

$\frac{r}{R} = \frac{1}{3} \Rightarrow R = 3r$

$R = 3x7 = 21cm$

(c) height of removed cone is ${}^1/_3$ height of original cone

$h = {}^1/_3 \times 45 = 15cm$

volume of removed cone $= {}^1/_3\ r^2h$

$= 1 \times \frac{22}{7} \times 7 \times 7 \times 15$

$= 770cm^3$

Now L. S. F $= {}^1/_3$

V. S. F $= ({}^1/_3)^3 = {}^1/_{27}$

Hence ratio of volumes $= 1:27$

Volume of original cone = 27x Vol. of small cone
= 770 x 27= 20790cm^3

Capacity of frustrum
= vol. of original cone – vol. of removed cone
= 20790 – 770= 20020cm^3
$\frac{20200}{1000} = 20\ l$

(d) capacity of tank $= \frac{150 \times 120 \times 80}{1000} = 1440l$

No. of buckets $= \frac{1440}{20} = 72buckets$

13. *Mass of water = 1 x 3000 cm^3 = 3000 g*
Mass of alcohol = 0.8 x 1200 = 9600g
Mass of mixture = 12,600g
Volume of mixture = 15,000 cm^3

Density of mixture $= \frac{12600}{15000}$
$= 0.84g/cm^3$

14. *(a) Vol. of tank = 22 x 144 x 1.7 = 5.236*
Vol. of milk = $^3/_5$ x 5.236 = 3.146m^3
Vol. in liters = 3.1416 x 1000 = 3141.6litres

(b) (i) Vol. of packet ($^1/_3$ x 10 sin 60) x 13.6
= 26.97 x 13.6
= 3.66.75cm^3
= 367cm^3

(ii) No. packets $= \frac{(3141.6 \times 1000)}{367}$

(iii) Amount = 8560.2 x 20
= 171204.3597
= Shs.171,204.40

15. *Volume of culvert*
$= {}^{22}/_7 (76^2 - 64^2) \times 300 \times 10^{-6}$
$= {}^{22}/_7 \times \frac{1680 \times 300}{10000000000}$
$= 1.584m^3$