SECTION I (50 Marks)

Answer all questions in this section

1.
$$\frac{\sqrt[3]{1728}}{\left(\frac{10}{7}-\frac{5}{8}\right)\times\frac{2}{3}}=\frac{\left(2^6\times3^3\right)^{\frac{1}{3}}}{\left(\frac{80-35}{56}\right)\times\frac{2}{3}}$$
$$=\frac{2^2\times3^1}{\frac{45}{56}\times\frac{2}{3}}=\frac{12}{\frac{15}{28}}$$
$$=12\times\frac{28}{15}=\frac{112}{5}$$
$$=22\frac{2}{5}$$
or
22.4

2. a) 1 US dollar = Sh. 100.1
100,000 USD = 100,000 X100.1
=10,010,000
=Sh. 10,010,000

b) Sh. 122.27 = 1 Sterling pound
$\therefore Sh.10010{,}000 = ?$
$$=\frac{10010{,}000}{122.27}$$
$$=81867.99706$$
$$=81868$$
Sterling pound

3.

$2^x + 3^y = 5$

$2^{x+3} - 3^{y+2} = 23$

Let $2^x = a$ *and* $3^y = b$

$\therefore 8.2^x - 9.3^y = 23$

$2^x + 3y = 5$

$a + b = 5 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (i)$

$8a - 9b = 23 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (ii)$

$-8a + 8b = 40$

$\underline{8a - 9b = 23}$

$17b = 17$

$b = 1$

$a = 4$

$\therefore\ 2^x = 2^2$

$x = 2$

$3^y = 3^0,\ y = 0$

4. $$\frac{t(2+3t)(2-3t\ )}{3t^2 - 6t + 2t - 4}$$
$$= \frac{t(2+3t)(2-3t)}{(3t+2)(t-2)}$$
$$= \frac{t(2-3t)}{t-2}$$

5. $$\underset{\sim}{p} = \begin{pmatrix}10\\20\end{pmatrix} - \begin{pmatrix}6\\10\end{pmatrix} = \begin{pmatrix}4\\10\end{pmatrix}$$
$$\underset{\sim}{q} = \begin{pmatrix}x\\12\end{pmatrix} - \begin{pmatrix}-10\\-8\end{pmatrix} = \begin{pmatrix}x+10\\20\end{pmatrix}$$
$$\therefore\ \underset{\sim}{q} = 2\underset{\sim}{p}$$
$$2\begin{pmatrix}4\\10\end{pmatrix} = \begin{pmatrix}x+10\\20\end{pmatrix}$$
$$\begin{pmatrix}8\\20\end{pmatrix} = \begin{pmatrix}x+10\\20\end{pmatrix}$$
$$\therefore\ x + 10 = 8$$
$$x = -2$$

6. $1:50{,}000 \Rightarrow 1cm\ rep\ \frac{1}{2}km$

$\therefore\ 1cm^2\ rep\ \frac{1}{4}km^2\left(250{,}000m^2\right)$

$64ha \Rightarrow 64\times 10{,}000$

$\Rightarrow 640000m^2$

Dimensions of square

$=\sqrt{\frac{640000}{250{,}000}}$

$=1.6cm\times 1.6cm$

7. $Log_2 y - Log_2 4 = Log_2 92$

$Log_2 \frac{y}{4} = Log_2 92$

$\frac{y}{4} = 92$

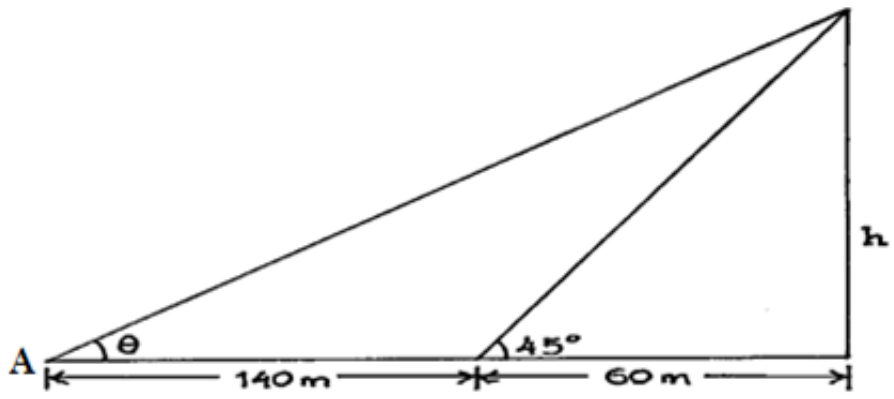
$y = 368$

8. $\frac{h}{4} = Cos53^0$

$\therefore Area = \frac{1}{2}\,4\,Cos53^0(11+7)$

$= 36\ Cos53^0$

$= 21.67cm^2$

9. 

$$\frac{h}{60} = \tan 45^0$$

$$h = 60 \times 1 = 60m$$

$$\tan\theta = \frac{h}{200}$$

$$\tan\theta = \frac{60}{200} = 0.3$$

$$\theta = \tan^{-1} 0.3 = 16.70^0$$

10. Let x be no. of pineapples sold at sh.72

$$\therefore \frac{72}{3}x + \left(\frac{144-x}{2}\right)60 = \frac{165}{100} \times \frac{144}{6} \times 100$$

$$\therefore 24x + 4320 - 30x = 3960$$

$$= \frac{6x}{-6} = \frac{-360}{-6}$$

$$x = 60 \text{ pineapples}$$

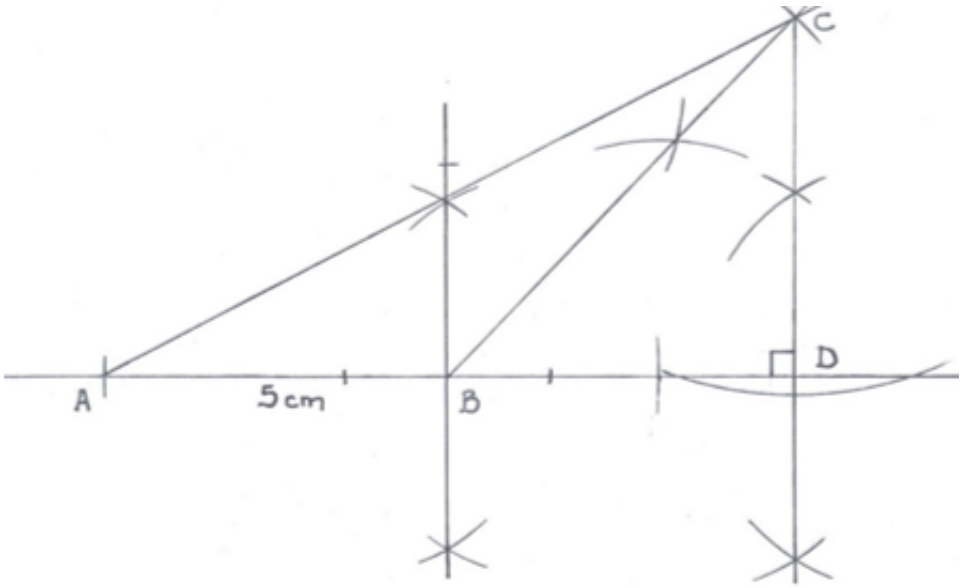
11. L.S.F=20:400 (1:20)
V.S.F=1:8000

Volume of larger= $\frac{8000}{1} \times 35.2$

=281,600litres

=2.816 x 10^5

12.



b) i) length BC
=7.2cm

13. $OA = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \quad \therefore AB = \underset{\sim}{B} - \underset{\sim}{A}$

$OB = \begin{pmatrix} 6 \\ -3 \end{pmatrix}$

$\vec{AB} = \begin{pmatrix} 6 \\ -3 \end{pmatrix} - \begin{pmatrix} 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 4 \\ -4 \end{pmatrix}$

$|AB| = \sqrt{4^2 + -4^2}$

$= 5.6569 \approx 5.66$

14. Each interior angle

$= \frac{(2n-4)90}{n}$

Each exterior angle $= \frac{360}{n}$

$n \times \left(\frac{(2n-4)}{n}\right) = \left(\frac{4 \times 360}{n}\right) \times n$

$2n \times 90 - 360 = 1440$

$\frac{180n}{180} = \frac{1800}{180}$

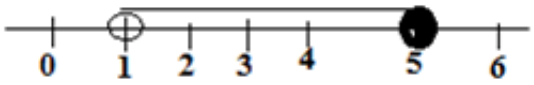
$n = 10 \ sides$

15. $4x - 9 \leq 6 + x \qquad 8 - 3x < x + 4$

$3x \leq 15 \qquad 4 < 4x$

$x \leq 5 \qquad 1 < x$

$\therefore \ 1 < x \leq 5$



16.

No	s.f	Log
7.321 Tan 60^0	7.321×10^0	$(0.8646) \times 2 = 1.7292$ 0.2386 + 1.9678
0.005127	5.127×10^{-3}	$\left(\bar{3}.7099\right) \times \frac{1}{2}$ $\left(\bar{4} + 1.7099\right) \times \frac{1}{2}$ $\bar{2}.8549$
1297	1.297×10^3	3.1129

SECTION II (50 Marks)

Answer only five questions in this section

17. a) i) Surface area

$\Rightarrow \pi rl + 2\pi r^2$

$\Rightarrow \frac{22}{7}(6 \times 10 + 2 \times 36)$

$\frac{22}{7}(60 + 72)$

$= 414.86 cm^2$

ii) $Volume \Rightarrow \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$

$\Rightarrow \frac{1}{3}\pi \times 36(8 + 12)$

240π

$= \frac{2,261.95}{3} cm^3$

$= 753.98 cm^3$

$1.3 = {}^{m}/_{753.98}$

b) $Mass = \frac{1.3 \times 753.98}{1000}$

$\Rightarrow 0.980174 kg$

18.

$a)\ Sin\theta = \frac{8}{12}$

$\theta = 41.81^0$

$\therefore < COD = 41.81 \times 2$

$= 83.62^0$

$b)\ Area\ of\ rec\tan gle \Rightarrow 20 \times 16 = 320$

$Sector \Rightarrow \frac{83.62}{360} \times \pi \times 12^2$

$\Rightarrow 105.08$

$Area\ of\ segment \Rightarrow 105.08 - \frac{1}{2} \times 144\ Sin\ 83$

$105.08 - 71.55$

$\Rightarrow 33.53$

$Total\ area \Rightarrow 320 + 33.53$

$= 353.53m^2$

$c)\ Cost \Rightarrow \frac{353.53 \times 10{,}000}{900} \times 76$

$= sh\ 298{,}536$

19.

a) i) Distance = S x T
=60km/h x 2hours
=120km
Distance from Nairobi
(400-120)km
=380km

ii)

Relative speed
$90 - 60 \Rightarrow 30 km/h$

$Time\ \ taken\ \frac{120}{30} = 4hrs$

Distance travelled by the car $\Rightarrow 90km/h \times 4hrs$
$= 360km$

b) Distance travelled by the bus while the car had stopped

$\frac{20}{60} \times 60 \Rightarrow 20\,km$

Distance remaining 20km.
Time taken 20min.

20.