SECTION I: 30 MARKS

1. Use logarithms to evaluate: $\sqrt[3]{\frac{27.25\times0.01471}{1.938}}$ (4mks)

No	Log
2.725×10^{1}	1.4354 M_1
1.471×10^{-2}	$\bar{2}.1676+$
	$\bar{1}.6030$
1.938×10^{0}	0.2874

$\bar{1}.6030$
$0.2874-$
$\bar{1}.3156$ M_1

$\frac{\bar{1}.3156}{3}$

$= \frac{\bar{2}+2}{3} + \frac{0.3156}{3}$ M_1

$= \frac{\bar{3}+2.3156}{3}$

$= \bar{1}.7719$

$10^{-1} \times \text{Log}^{-1}(0.77$

$= 0.5915$ A_1

2. Use reciprocal table to work out: $\frac{17}{0.051}+\frac{3}{0.0027}$ (3mks)

$\frac{17}{5.1\times10^{-2}} + \frac{3}{2.7\times10^{-3}}$ M_1

$17(0.1961\times100) + 3(0.3704\times1000)$ M_1

$= 333.37 + 1111.2$

$= 1444.57$ A_1

3. Find the cube root of 3375 using factor method. (3mks)

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

$M_1 = 3^3 \times 5^3$ M_1

$\sqrt[3]{3375} = \sqrt[3]{3^3\times5^3}$

$= 3\times5$

$= 15$ A_1

1

4.Solve for x: (3mks)

$9^{4x} \div 3^{2x} = 2187$

$3^{2(4x)} \div 3^{2x} = 3^7$ M_1

$3^{8x-2x} = 3^7$ M_1

$6x = 7 \quad x = \frac{7}{6}$ A_1 $1\frac{1}{6}$

5.A line L is perpendicular to y=3x. If L passes through point (0,4), find:

a) The equation of L (2mks)

$m_1 = 3 \quad m_2 = -\frac{1}{3}$

$\frac{y-4}{x} = -\frac{1}{3}$ M_1

$y = -\frac{1}{3}x + 4$ A_1

b) The point Q where L intersects the line y=3x (2mks)

$3x = -\frac{1}{3}x + 4$

$3x + \frac{1}{3}x = 4$ M_1

$\frac{10}{3}x = 4$

$x = \frac{6}{5}$

$y = \frac{6}{5} \times 3 = \frac{18}{5}$

$Q\left(\frac{6}{5}, \frac{18}{5}\right)$ A_1

6.Two spheres have surface areas of $36cm^2$ and $49cm^2$ respectively. If the volume of the smaller sphere is $20.2cm^3$, calculate the volume of the larger one (3mks)

$A.S.F = \frac{36}{49}$

$L.S.F = \sqrt{A.S.F} = \frac{6}{7}$ M_1

$V.S.F = L.S.F^3 = \frac{216}{343}$

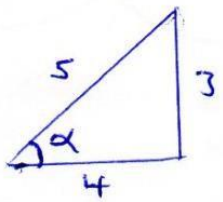
$\frac{216}{343} \times \frac{20.2}{x}$ M_1

$x = \frac{343 \times 20.2}{216}$

$= 32.08 cm^3$ A_1

7.If $\sin \alpha = \frac{3}{5}$, find: (4mks)

a) Cos α



$\sin \alpha = \frac{O}{H}$ M_1

$\cos \alpha = \frac{A}{H} = \frac{4}{5}$ A_1

b) Tan α

$\tan \alpha = \frac{O}{A}$ M_1

$= \frac{3}{4}$ A_1

8. A triangular flower garden measures 10m by 15m by 24m. find the area of the garden (3mks)

$A = \sqrt{s(s-a)(s-b)(s-c)}$

$s = \frac{1}{2}(10+15+24)$ M_1

$= 24.5$

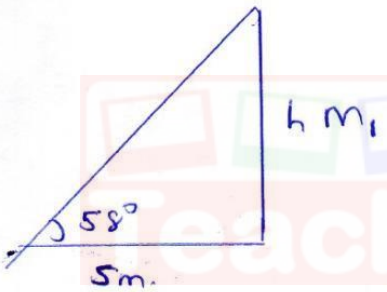
$A = \sqrt{24.5(24.5-10)(24.5-15)(24.5-24)}$

$= \sqrt{24.5(14.5)(9.5)(0.5)}$ M_1

$= \sqrt{1687.4375}$

$= 41.08\ m^2$ A_1

9. When the angle of elevation of the sun is 58°. A vertical pole casts a shadow of length 5m on a horizontal ground. Find the height of the pole. (3mks)



h M_1

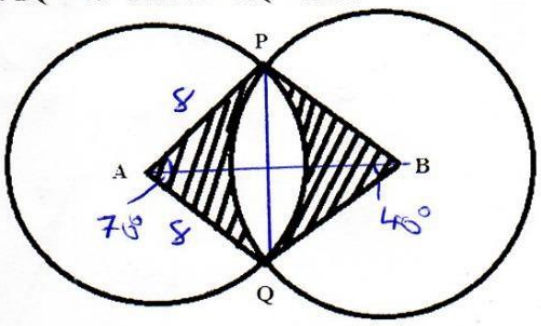
$\tan 58° = \frac{h}{5}$ M_1

$h = 5 \tan 58°$

$= 8\text{m}.$ A_1

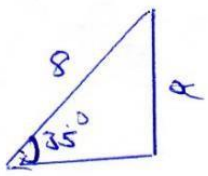
SECTION II: 20 MARKS

10. The diagram below shows two circles, centre A and B which intersect at points P and Q. Angle PAQ = 7 and PBQ = 40^0 and PA = AQ = 8cm.



Use the diagram to calculate to two decimal places:

a) The length PQ (2mks)



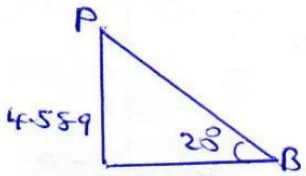
$\sin 35° = \frac{x}{8}$ M_1

$x = 8 \sin 35°$

$PQ = 8 \sin 35° \times 2$

$= 9.178\text{ cm}$ A_1

b) The length PB (2mks)



$\sin 20^\circ = \frac{4.559}{PB}$ M_1

$PB = \frac{4.559}{\sin 20^\circ}$

$= 13.42\text{ cm}$ A_1

c) Area of minor segment circle centre A. (2mks)

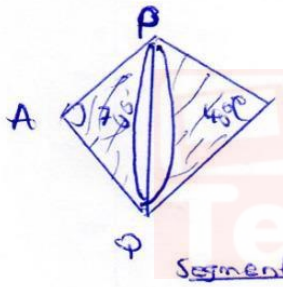
$A = \frac{\theta}{360} \pi r^2 - \frac{1}{2} ab \sin\theta$ M_1

$\frac{70^\circ}{360^\circ} \times \frac{22}{7} \times 8^2 - \frac{1}{2} \times 8 \times 8 \sin 70^\circ$

$= 39.11 - 30.07$

$= 9.04\text{ cm}^2$ A_1

d) Area of the shaded region. (4mks)



Segment centre B M_1

$\frac{40}{360} \times \frac{22}{7} \times 13.42^2 - 57.88 = 5.01\text{ cm}^2$

Kite M_1

$\frac{1}{2} \times 8^2 \sin 70^\circ + \frac{1}{2} \times 13.42$

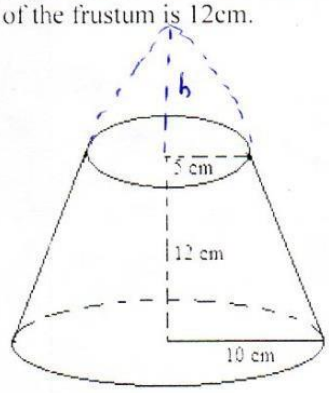
$30.07 + 57.88 = 87.95$

shaded

$87.95 - (9.04 + 5.01)$

$= 73.9\text{ cm}^2$ A_1

11. The figure below shows a frustum. The top and bottom radii are 5cm and 10cm respectively, while the ve height of the frustum is 12cm.



Find the: -

a) Slant height of the frustum. (3marks)

$\frac{5}{10} = \frac{h}{h+12}$ M_1

$10h = 5h + 60$

$h = 12$

$H = 12 + 12 = 24$ cm

$L = \sqrt{5^2 + 12^2}$

$= 13$ cm M_1

$L = \sqrt{10^2 + 24^2}$

$= 26$ A_1

$L - l = 26 - 13 = 13$ cm

b) curved area of the frustum. (3marks)

$\pi r^2 = \pi \times 5^2 = 25\pi$ M_1

Bottom

$\pi R^2 = 100\pi$ M_1

Curved area

$\pi RL - \pi rl$ M_1

$= \pi [RL - rl]$

$= \pi (10 \times 26 - 5 \times 13)$ M_1

$= 195\pi$

$= 612.6\ cm^2$ A_1

$25\pi + 100\pi + 195\pi$

320π / 1005.3 cm^2 A_1

c) Volume of the frustum. (4marks)

$V = \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$ M_1

$= \frac{1}{3}\pi [R^2 H - r^2 h]$ M_1

$= \frac{1}{3}\pi [10^2 \times 24 - 5^2 \times 12]$

$= \frac{1}{3}\pi [2400 - 300]$ M_1

$= 700\pi\ cm^3$

or

$2199.11\ cm^3$ A_1