

GATITU SECONDARY SCHOOL, P.O. BOX 327 - 01030, GATUNDU.  
 FORM 3 MATHEMATICS PP2. END OF TERM 2 EXAMINATION. 2013.

INSTRUCTIONS:

1. Write your name, admission number and class in the spaces provided above
  2. Answer all the questions in the spaces provided below each question.
  3. This paper has two sections. Answer all the questions in section A and five questions only in section B.
- Non-Programmable electronic calculators and KNEC Mathematical tables may be used unless where stated otherwise.

SECTION 'A' (50 Marks)

1. Solve the equation  $\frac{4}{3}x - 2 - \frac{3}{4}(3-x) = \frac{(x-2)}{2}$  (3mks)

$$4x - 8 - 9 + 3x = 6x - 12$$

$$7x - 17 = 6x - 12$$

$$x = 5$$

2. Evaluate  $\frac{243}{32}^{-3/5} \times \left(\frac{64}{27}\right)^{-2/3} \times (144)^{1/2}$  (4mks)

$$\left(\frac{32}{243}\right)^{3/5} \times \left(\frac{27}{64}\right)^{2/3}$$

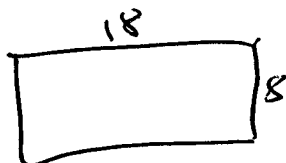
$$\left(\frac{2}{3^5}\right)^{3/5} \times \left(\frac{3}{4^3}\right)^{2/3} \times 12$$

$$\frac{2^3}{3^3} \times \frac{3^2}{4^2} \times 12$$

$$\frac{8}{3} \times \frac{1}{4} \times 12 = 2$$

3. A rectangle measuring 18cm by 8cm has the same area as a square. Find which figure has the greater perimeter and by how much. (3mks)

$$18 \times 8 = 144$$



$$Sq = 12 \times 12 = 144 \text{ cm}^2$$

$$Rec = 2(18+8) = 52 \text{ cm}$$

$$Rec = \underline{\underline{4 \text{ cm}}}$$

4. A group consisting of adults and children hired a bus for sh 18,600 in order to take a trip. To raise the money each adult paid sh 400 and each child paid sh 250. If altogether there were 60 passengers in the bus, find how many adults and how many children were there. (4mks)

$$A = x$$

$$C = y$$

$$x + y = 60$$

$$400x + 250y = 18,600$$

$$400x + 400y = 24,000$$

$$-400x + 250y = 18,600$$

$$150y = 5400$$

$$y = \frac{5400}{150}$$

$$y = 36$$

$$x = 60 - 36$$

$$x = 24$$

$$\text{Adults} \Rightarrow 24$$

$$\text{children} \Rightarrow \underline{\underline{36}}$$

5. A straight line passing through A(5, k) and B(k, 6) is perpendicular to the line whose equation is  $4y - 3x = 12$ . Find the value of k. (3mks)

$$4y = 3x + 12$$

$$y = \frac{3}{4}x + 3$$

$$G_1 = \frac{3}{4}$$

$$G_2 = -\frac{4}{3}$$

$$\frac{6-k}{k-5} = -\frac{4}{3}$$

$$6-k = -\frac{4}{3}(k-5)$$

$$3(6-k) = -\frac{4}{3}k + \frac{20}{3}$$

$$18 - 3k = -4k + 20$$

$$k = \underline{\underline{2}}$$

6. A Motorist travelled the first 90km at an average speed of 60kph and for the next 3 ½ hours he travelled at an average speed of 80 kph. Find the average speed for the whole journey.(3mks)

$$S = \frac{D}{T}$$

$$T = \frac{D}{S}$$

$$T = \frac{90}{60} = 1.5 \text{ hrs.}$$

$$\frac{7}{2} \times 80 =$$

$$D = 280 \text{ km}$$

$$90 + 280 = 370 \text{ km}$$

$$T = 5 \text{ hrs.}$$

$$\frac{370}{5} = \underline{\underline{74 \text{ km/h.}}}$$

7. Without using tables or a calculator evaluate.

(3mks)

$$\sqrt[3]{\frac{0.945 \times 0.25}{0.0105 \times 0.18}}$$

$$\sqrt[3]{\frac{945 \times 25}{105 \times 18}}$$

$$\frac{21}{3}$$

$$\sqrt[3]{\frac{45 \times 5}{18}}$$

$$\sqrt[3]{5^3}$$

$$= \underline{\underline{5}}$$

8. A solution whose volume is 80 litres is made up of 40% water and 60% alcohol. When X litres of water are added, the percentage of alcohol drops to 40%. Find the value of X.

(4mks)

$$40 : 60$$

9. Use logarithms to evaluate the following.

(4mks)

$$\left( \frac{0.9324 \times 0.4671}{0.0345} \right)^{-2/3}$$

$$\left( \frac{0.0345}{0.9324 \times 0.4671} \right)^{2/3}$$

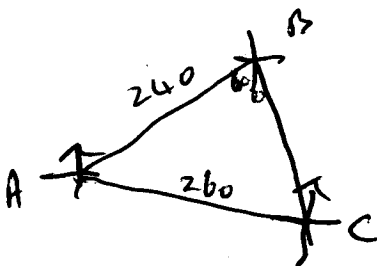
W.A	S.F	LOG.
<del>0.9324</del>	<del>9.324</del> × 10 <sup>-1</sup>	<del>7</del>
0.0345	3.45 × 10 <sup>-2</sup>	2.5278
0.9324	9.324 × 10 <sup>-1</sup>	1.9696
0.4671	4.671 × 10 <sup>-1</sup>	1.6694

$$\begin{array}{r} 2.5278 \\ - 1.6390 \\ \hline 0.8888 \times \frac{2}{3} \\ \hline 0.5925 \times 2 \\ \hline 1.1850 \\ - 1.6663 \times 2 \\ \hline -0.4813 \\ \hline 10^{-1} \times 2.151 \end{array}$$

$$= \underline{\underline{0.2151}}$$

10. The points on the surface of the earth are such that B is 240m on a bearing of 030° from point A. Point C is 120° from B and the distance of C from A is 260m.

a) Sketch the relative positions of A, B and C using the scale of 1cm to represent 40m. (3mks)



b) Calculate in hectares the area enclosed by the three points A, B and C

(3mks)

11. Given that  $\log_5 3 = 0.6813$  and  $\log_5 2 = 0.4368$ , evaluate the following.

(2mks)

i)  $\log_5 1.5$

$$\log_5 1.5 = \log\left(\frac{3}{2}\right)$$

$$= \frac{0.6813 - 0.4368}{0.2445}$$

$$\underline{\underline{0.2445}}$$

ii)  $\log_5 18$

$$\log_5 18 = 2 \times 3 \times 3$$

$$(0.6813 \times 2) + 0.4368$$

$$\underline{\underline{1.7994}}$$

$$\underline{\underline{1.7994}}$$

12. Calculate the compound interest on ksh 50,000 deposited for 3 years at 12% p.a. (3mks)

$$A = P \left(1 + \frac{R}{100}\right)^n$$

$$A = 50,000 \left(1 + \frac{12}{100}\right)^3$$

$$50,000 (1.12)^3$$

$$70,246.4$$

$$- \underline{50,000}$$

$$\underline{\underline{20,246.4}}$$

ii) By how much does the answer in (i) above differ from the simple interest on the same amount, deposited for the same period at the same rate? (2mks)

$$I = \frac{PRT}{100}$$

$$\frac{50,000 \times 12 \times 3}{100}$$

$$50,0 \times 36$$

$$\underline{\underline{18,000}}$$

$$\text{Diff} \underline{\underline{Sh 2,246.4}}$$

13. Solve for X in

$$\log 46 + \log (3x + 10) = 3 + \log (x - 5)$$

(3mks)

$$\log (46 (3x + 10)) = 1000 (x - 5)$$

$$138x + 460 = 1000x - 5000$$

$$5460 = 862x$$

$$\frac{5460}{862} = x$$

$$x = \underline{\underline{6.33}}$$

SECTION B (50 MARKS)

14. A line ( $L_1$ ) passes thro' point (2, 2) and has gradient  $\frac{1}{2}$ . Another line ( $L_2$ ) intersects  $L_1$  at point Q with X-ordinate 4.  $L_2$  also intersects  $L_3$  at R while  $L_3$  intersects  $L_4$  at S whose Y-ordinate is -3. If  $L_1$  and  $L_4$  intersect on y-axis at point T and given that QRST is a square find:

i) the equation of  $L_1$  and hence the co-ordinates of Q and T. (3mks)

$$L_1 \quad \frac{y-2}{x-2} = \frac{1}{2}$$

$$y-2 = \frac{1}{2}x-1$$

$$y = \frac{1}{2}x + 1$$

$$4 = \frac{1}{2}x + 1$$

$$3 + 2 = x$$

$$x = 6$$

$$Q(6, 4)$$

$$y = 1 \quad T(0, 1)$$

$$x = 0$$

ii) the equation of  $L_4$  and hence the co-ordinates of S. (2mks)

$$T(0, 1)$$

$$Q = -2$$

$$\frac{y-1}{x-0} = -2$$

$$y-1 = -2x$$

$$y = -2x + 1$$

$$-3 = -2x + 1$$

$$-4 = -2x$$

$$x = 2$$

$$S(2, -3)$$

iii) The equations of  $L_2$  and  $L_3$  and hence the co-ordinates of R. (3mks)

iv) the area of the square. (2 mks)

15. Complete the table below for the function  $y = 9 + 4x - 3x^2$

(3mks)

X	-3	-2	-1	0	1	2	3	4	5
Y	-30	-11	2	9	10	5	-6	-23	-46

b) Using a scale of 2cm to represent 1 unit on x-axis, draw the graph of  $y = 9 + 4x - 3x^2$  and hence write down the roots of  $9 + 4x - 3x^2 = 0$  (4MKS)

c) Draw a straight line to intersect the curve at  $X = 2$  and  $X = -2$ , Write down the equation of the straight line in the form  $y = mx + c$  (3mks)

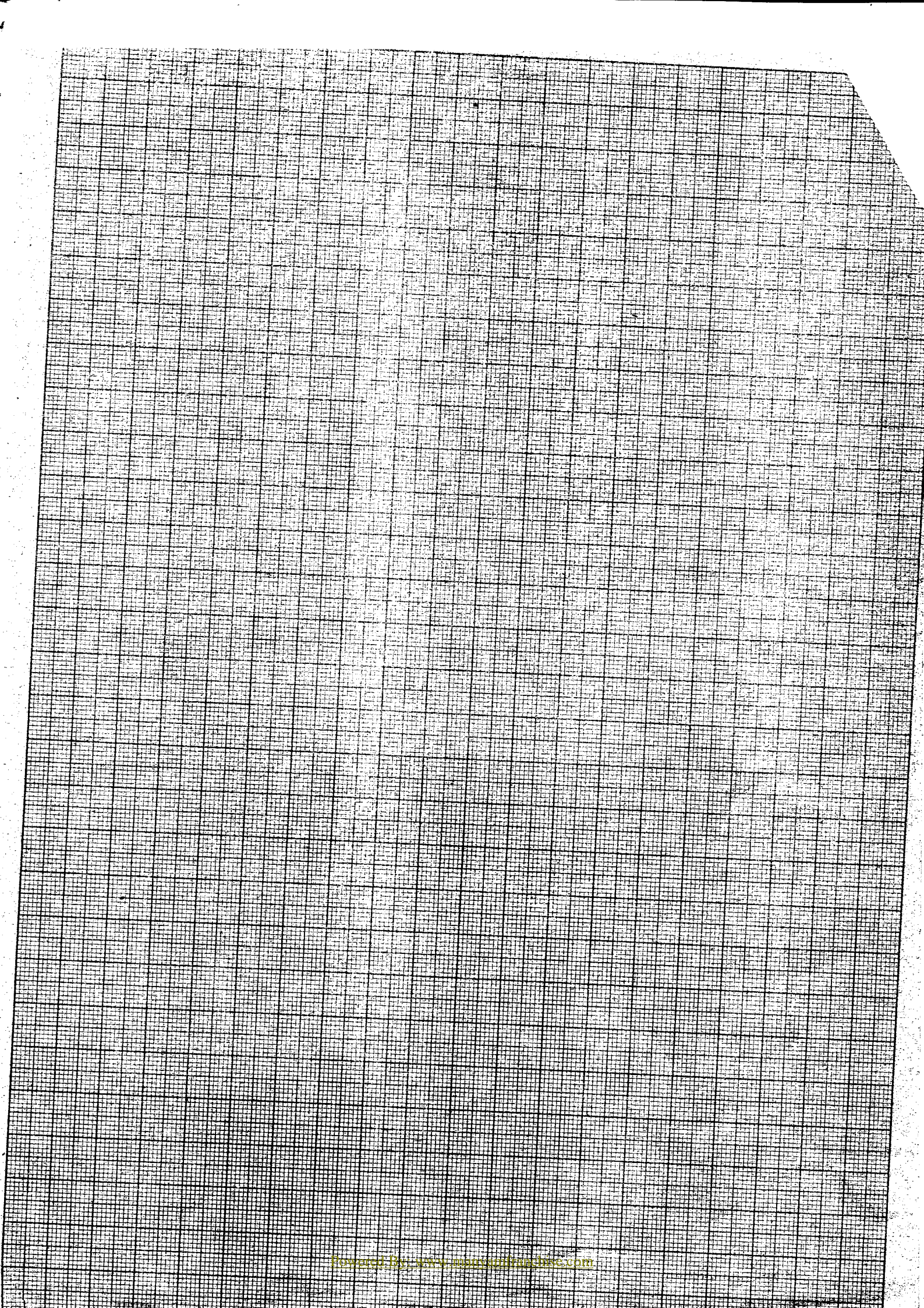
16) The marks scored by 100 students in a mathematics test are given in the table below.

MARKS	MID-POINTS ( $x$ )	FREQUENCY ( $F$ )	CF	FX
10 - 19	14.5	8	8	116
20 - 29	24.5	15	23	367.5
30 - 39	34.5	15	38	517.5
40 - 49	44.5	12	50	534.0
50 - 59	54.5	15	65	817.5
60 - 69	64.5	14	79	903.0
70 - 79	74.5	13	92	968.5

$\Sigma f = 92$        $\Sigma fx = 4224$

$\bar{x} = \frac{4224}{92} = \underline{\underline{45.91}}$







I) Complete the frequency distribution table.

(4mks)

ii) Determine the mean of the data

(3mks)

iii) Determine the median of the data.

(3mks)

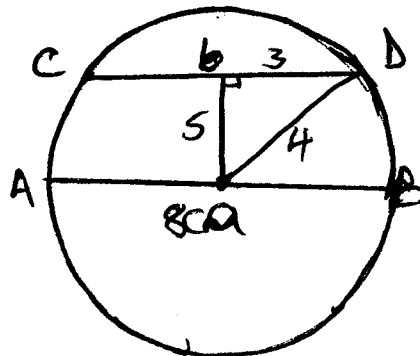
$$39.5 + \left(\frac{8}{12} \times 10\right) + 39.5 + \left(\frac{9}{12} \times 10\right)$$

$$\frac{46.17 + 47}{2}$$

$$46.585$$

$$\underline{46.59}$$

17. The figure below is a circle centre O and diameter AB is parallel to chord CD. Given that AB = 8cm and chord CD = 6cm long, Calculate the distance of the chord from O.



$$\frac{\sqrt{4^2 - 3^2}}{\sqrt{16 - 9}}$$

$$\sqrt{7}$$

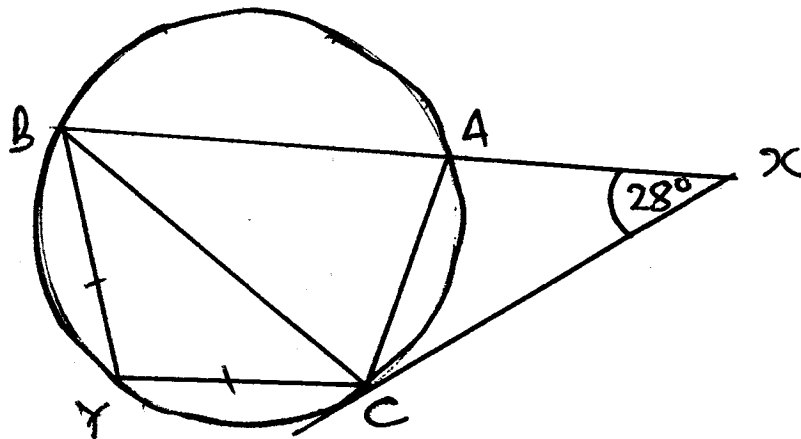
$$= \underline{\underline{2.65 \text{ cm}}}$$

ii) In the figure below,  $XC$  is a tangent to the circle  $ABYC$  at  $C$  and  $Y$  is the midpoint of arc  $BC$ . If angle  $BXC = 28^\circ$  and  $\angle BCA = 2 \angle ACX$ , Find.

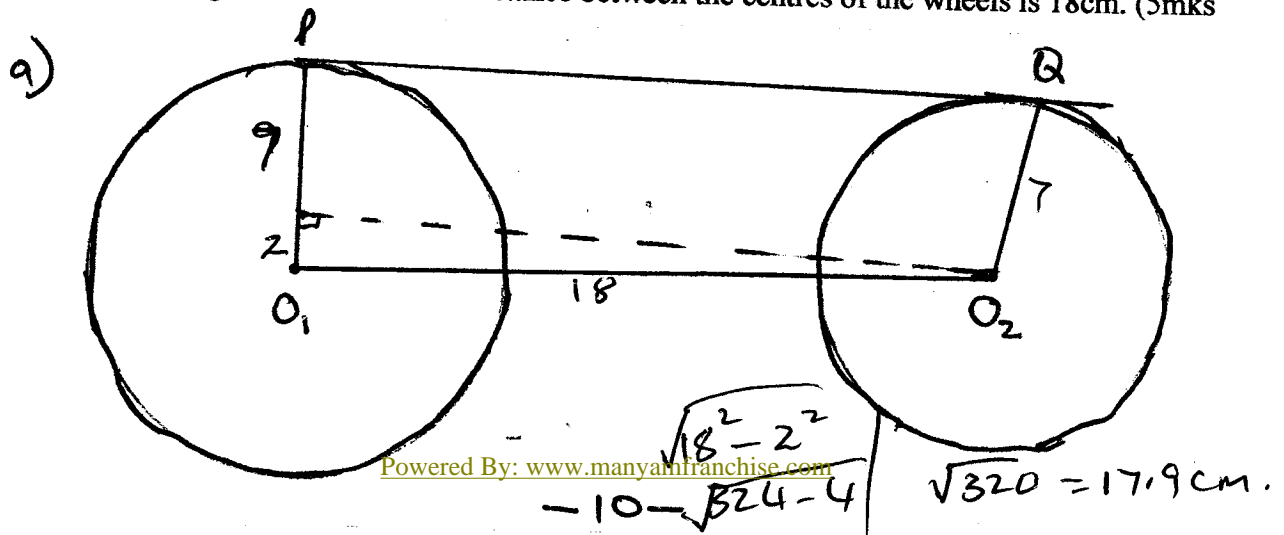
a)  $\angle CBA$

b)  $\angle CBY$

c)  $\angle BYC$

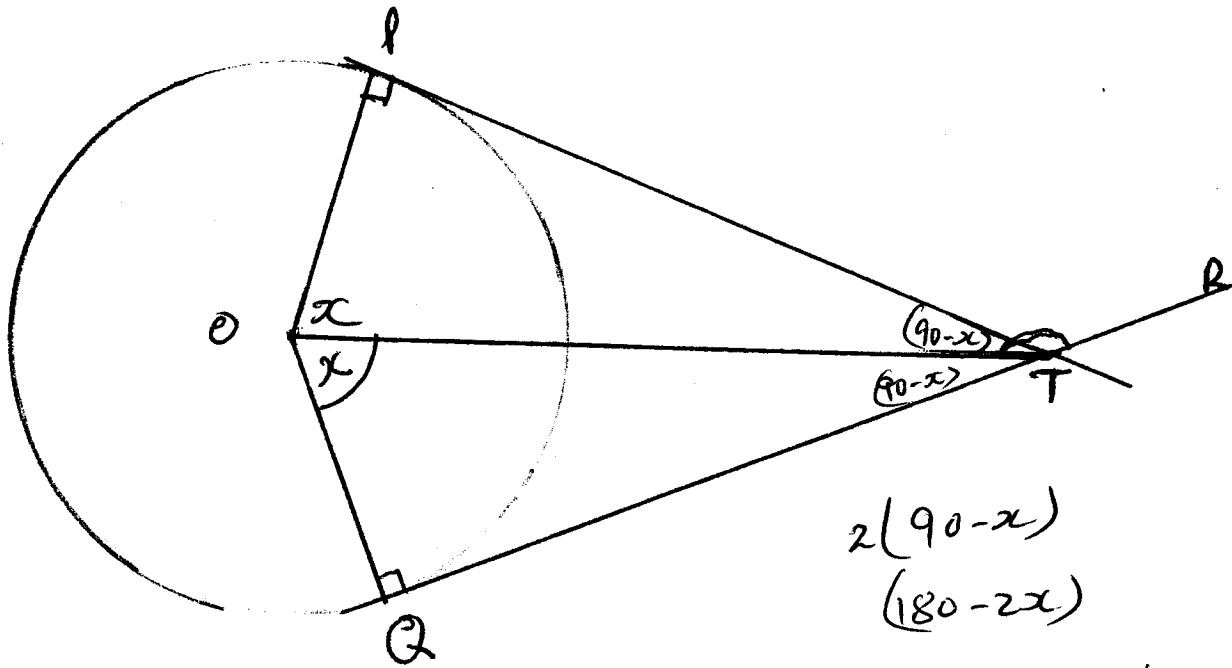


18. The figure below shows a pulley system with two wheels of radii 9cm and 7cm and centres  $O_1$  and  $O_2$  respectively. A continuous belt goes round the wheels. By construction calculate the length of the belt if the distance between the centres of the wheels is 18cm. (5mks)



a)

b)



$$2(90-x)$$
$$(180-2x)$$

$$180 - (180 - 2x)$$
$$180 - 180 + 2x$$

$$\angle PTR = \underline{\underline{2x}}$$

In the figure above PT and QT are tangents to the circle centre O. If QT is produced to R and  $\angle QOT = X$ , show that  $\angle PTR = 2\angle QOT$ . (5mks)



19. The dimensions of a cuboid are stated as 4.8cm, by 3.6cm and 2.5cm. within what limits does its: (a) Volume

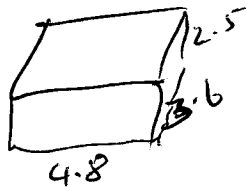
$$A.E = 0.05$$

$$4.85 \times 3.65 \times 2.55 = 45.14 \text{ cm}^3$$

(5mks)

$$4.75 \times 3.55 \times 2.45 = 41.313 \text{ cm}^3$$

b) Surface area lie?



(5mks)

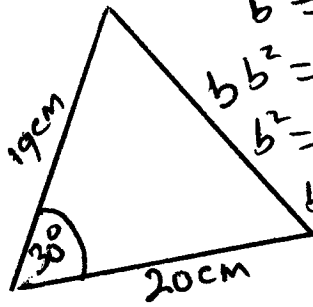
$$\begin{aligned} 4.85 \times 3.65 \times 2 &= 35.405 \\ 3.65 \times 2.55 \times 2 &= 18.615 \\ 4.85 \times 2.55 \times 2 &= 24.735 \\ \hline &= 78.755 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} 4.75 \times 3.55 \times 2 &= 33.725 \\ 4.75 \times 2.45 \times 2 &= 23.275 \\ 3.55 \times 2.45 \times 2 &= 17.395 \\ \hline &= 74.395 \text{ cm}^2 \end{aligned}$$

20.  
i)

Solve the following triangles.

(3mks)



$$b^2 = 19^2 + 20^2 - 2 \times 19 \times 20 \cos B$$

$$b^2 = 761 - 760 \cos B$$

$$b^2 = 761 - 658.2$$

$$b^2 = 102.8$$

$$b = \underline{\underline{10.14 \text{ cm}}}$$

$$\frac{10.14}{\sin 30} = \frac{20}{\sin \alpha}$$

$$\sin \alpha = \frac{20 \sin 30}{10.14}$$

$$\sin \alpha = 0.986$$

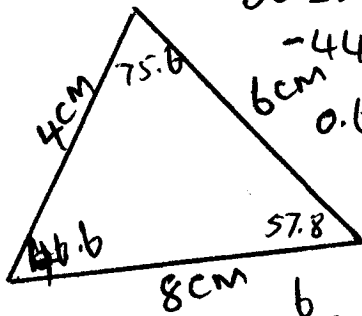
$$\alpha = \underline{\underline{80.5^\circ}}$$

180 -

$$\underline{\underline{69.5^\circ}}$$

(3mks)

ii)



$$36 = 80 - 6 \times 6 \cos \alpha$$

$$-44 = -36 \cos \alpha$$

$$0.6875 = \cos \alpha$$

$$\alpha = \underline{\underline{46.6^\circ}}$$

$$\frac{b}{\sin 46.6} = \frac{8}{\sin \alpha}$$

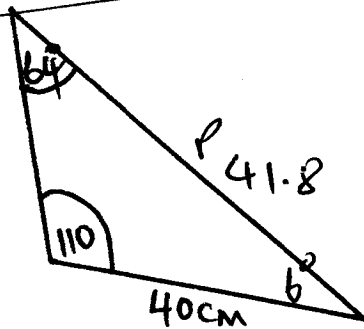
$$\sin \alpha = \frac{8 \sin 46.6}{b}$$

$$\sin \alpha = 0.9688$$

$$\alpha = \underline{\underline{75.6^\circ}}$$

(3mks)

iii)



$$\frac{40}{\sin 64} = \frac{P}{\sin 110}$$

$$P = \frac{40 \sin 110}{\sin 64}$$

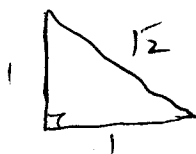
$$P = \frac{37.58}{0.8988}$$

(1mk)

b)

Express in surd form and rationalize.

$$\frac{1}{2 + \sin 45^\circ}$$



$$\frac{1}{2 + \frac{1}{\sqrt{2}}}$$

$$\frac{1}{2\sqrt{2} + 1}$$