NAME……INDEX NO……

CANDIDATE'S SIGN……DATE……...

SCHOOL……

121/2
MATHEMATICS
PAPER 2
MAY/JUNE 2014
TIME: 2 ½ HOURS

EKSIKA JOINT EVALUATION TEST.

Kenya Certificate of Secondary Education (K.C.S.E)

121/2
MATHEMATICS
PAPER 2
MAY/JUNE 2014
TIME: 2 ½ HOURS

INSTRUCTIONS TO CANDIDATES.

1) Write **your name** and **index number** in the spaces provided above.
2) Sign and write the date of examination in the spaces provided above.
3) This paper consists of two section **I** and **II**.
4) Answer **ALL** questions in section **I** and only **five** questions from section **II**.
5) Answers and working must be written on the question paper in the spaces provided below each question
6) Marks may be given for correct working even if the answer is wrong
7) Non-programmable electronic calculators may be used.

FOR EXAMINERS' USE ONLY.

SECTION I

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

SECTION II

17	18	19	20	21	22	23	24	TOTAL

Grand Total

This paper consists of 12 printed pages.
Candidates should check the question paper to ascertain that all pages are printed as indicated and no questions are missing.

1 Use logarithms only to evaluate,

$$\sqrt[4]{\frac{72.36 \times 0.69^{2}}{\log 168.4}}$$

Correct to four significant figures. (4mks)

2 Make 4 the subject of the formula.

$$t = \frac{2m}{n}\sqrt{\frac{L-A}{3k}}$$ (3mks)

...

3 Express the recurring decimal below as a fraction; 4.372 leaving your answer in the form of $^{a}/_{b}$ where a and b are integers. (2mks)

4 Determine the amplitude, period and the phase angle of the wave represented by the equation.

$$y = \frac{-2}{3}\sin\left(\frac{2}{5}x + 40^{0}\right)$$ (3mks)

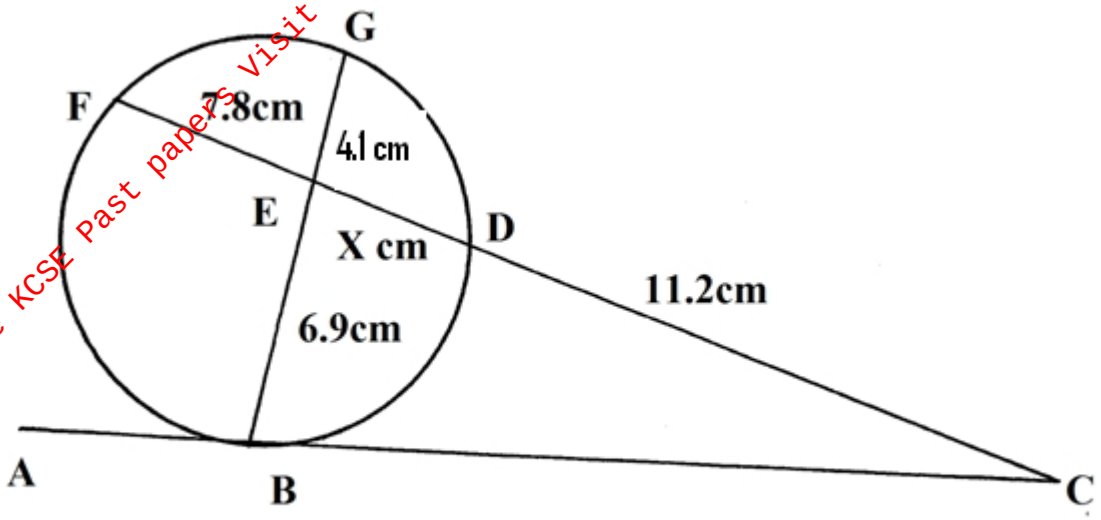
5 $Given\ that \frac{3}{3+\sqrt{5}} + \frac{3\sqrt{5}}{3-\sqrt{5}} = a + b\sqrt{5}$. Find the values of a and b (4mks)

6 The dimensions of a cuboid are 4.5cm by 3.5cm by 2cm.Find the percentage error in its volume giving your answer to 2 significant figure. (3marks)

7 A car was valued at kshs.500,000 in January 2010.Each year its value depreciated at 12% p.a.After how long would the value depreciate to kshs.250,000? (3mks)

8 Given that the matrix $\begin{pmatrix} 5-x & 2 \\ 3x & 4 \end{pmatrix}$ has no inverse, find x. (2mks)

9 In the figure below ABC is a tangent to the circle at point B.Given that BE =6.9cm, FE=7.8cm,GE=4.1cm,DC=11.2cm and ED = xcm.Determine the length BC,give your answer in four significant figures. (4mks)



10 Find the radius and the co-ordinates of the centre of the circle whose equation is $\frac{1}{2}x^2 + \frac{1}{2}y^2 = 3x - 5y - 9$. (3mks)

11 A quantity P varies partly as t and partly as the square of t.When t = 20, p = 45 , and when t = 24 , p = 60.

a) Express p in terms of t. (2mks)

b) Find p when t = 32. (2mks)

12 The position vectors of points A and B are a = 2i + j – 8k and b = 3i +2j – 2k respectively. Find the magnitude of AB. (3mks)

13 Write the expression of $(2 - {}^{1}/_{5}\, x)^{6}$ up to the term in x^4.Hence use the expansion to find the value of $(1.96)^6$ correct to 3 decimal places. (4mks)

14 Five men working 8 hours daily complete a piece of work in 3 days. How long will it take 12men working 5hours a day to complete the same work. (2mks)

15 Find the integral values of x which satisfy $6 \leq 2x + 1$ and $5x - 29 < -4$. (3mks)

16 In a fund-raising committee of 45 people, the ratio of men to women is 7 : 2.Find the number of women required to join the existing committee so that the ratio of men to women changes to 5 : 4. (3mks)

SECTION II (50 MARKS)

Attempt any five questions from this section

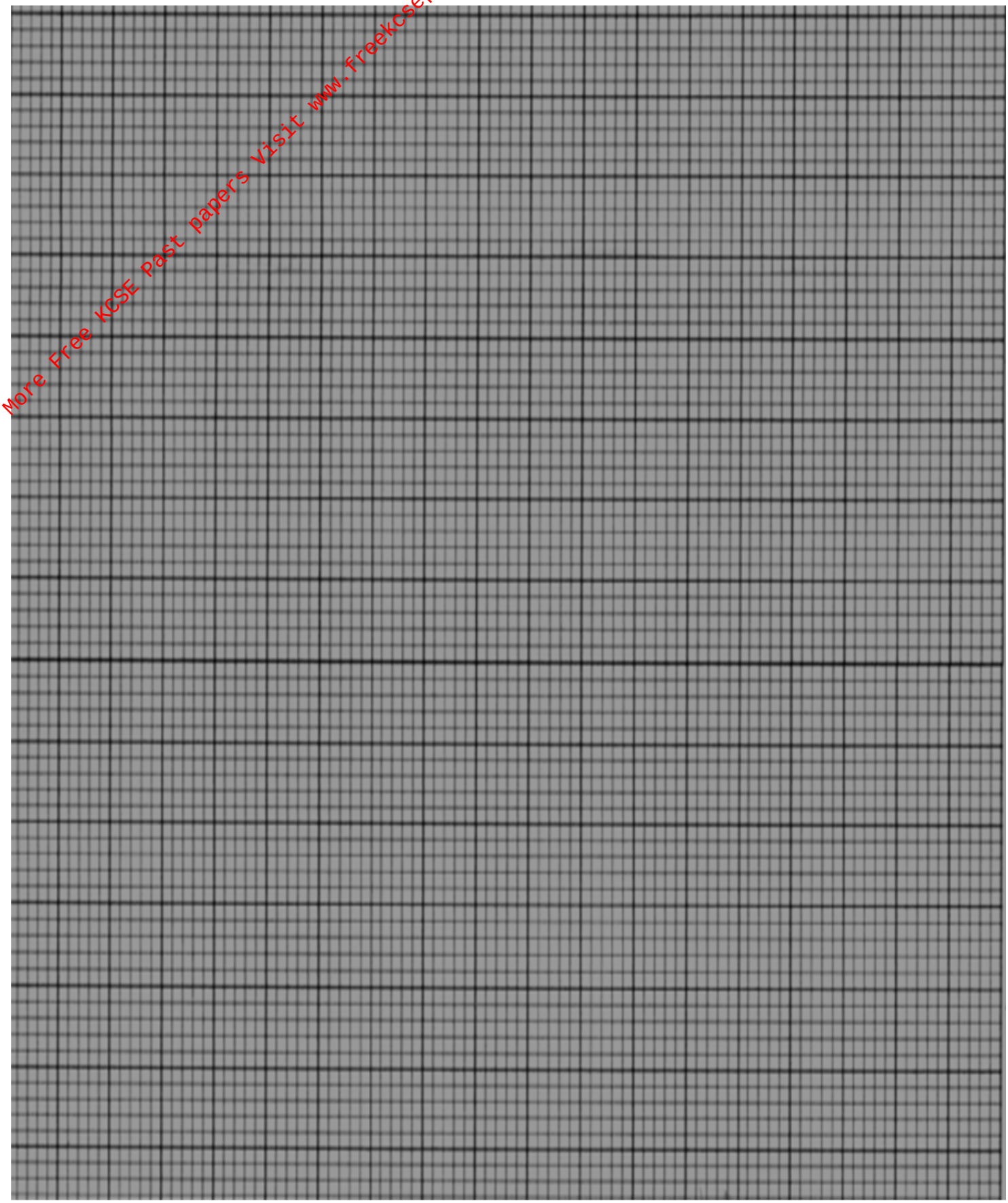
17 The table below gives the income tax rates.

Income (k£)	Rate (p.a)
1-1980	10%
1981-3960	15%
3961-5940	25%
3941-7920	35%
7921-8650	45%
Over 8651	50%

a) Calculate income tax of Wanga's taxable income of kshs.50,400 per month allowing a family relief of kshs. 520 per month. (8mks)

b) Calculate the total tax as a percentage of taxable income (2mks)

18 a) Draw ΔPQR whose vertices are P(1,1)Q(-3,2) and R(0,3) on the grid provided



b) Find and draw the image of ΔPQR under the transformation whose matrix is $\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}$ and label the image P'Q'R' (2mks)

P'Q'R' is then transformed into P^{11} Q^{11} R^{11} by the transformation with the matrix $\begin{pmatrix} -1 & 0 \\ 1 & 3 \end{pmatrix}$ (2mks)

c) Find the co-ordinates of P^{11} Q^{11} R^{11} and draw P^{11} Q^{11} R^{11} (3mks)

d) describe fully the single transformation which maps PQR onto P^{11} Q^{11} R^{11}
find the matrix of this transformation (3mks)

19) The probability of passing K.C.P.E depends on performance in the school mock examination. If the candidate passes in mock, the probability of passing K.C.P.E is $^4/_5$. If the candidate fails in mock, the probability of passing K.C.P.E is $^3/_5$. If the candidate passes K.C.P.E, the probability of getting employed is $^1/_3$, the probability of passing mock is $^2/_3$.

a). Draw a well label tree diagram to represent the above information (2mks)

b) Use your tree diagram in (a) above to find the probability that she

i) Passes KCPE exams (2mks)

ii) Gets employed (2mks)

iii) Passes KCPE and gets employed (2mks)

iv) Passes mock and gets employed (2mks)

20. The diagram below shows triangle O.A.B in which N is the mid point of AB.Mis a point on OA such that OM :MA=2:1.Lines ON and BN meet at X such that vector OX=h vector ON and ,MX= kMB

Given that vector OA =a and vector OB=b

i) Express the following interms of a and b

a) Vector AB (1mk)

b) Vector ON (2mks)

c) Vector BM (1mk)

ii) By expressing vector OX in two different ways ,determine the values of h and k

(6mks)

21). Using a ruler and a compass only

a) Construct a parallelogram ABCD such that AB = 10cm BC=7cm and < ABC 105^{o} (5mks)

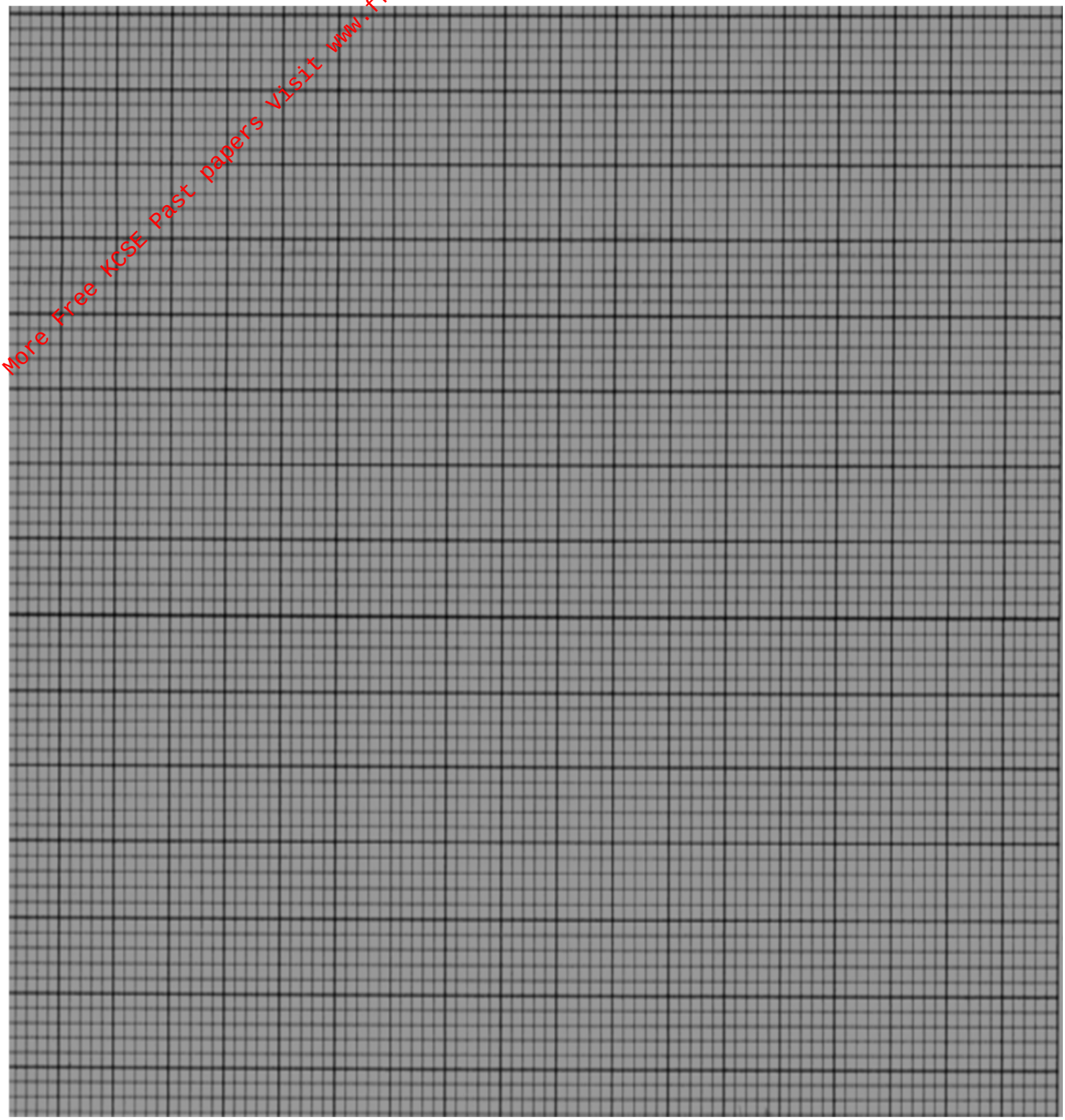
b) Construct the loci of P and Q within the parallelogram such that AP < 4cm and BQ < 6cm (2mks)

c) Calculate the area within the parallelogram and outside the region bounded by the two loci (3mks)

22. a) Complete the table below

x	-30	0	30	60	90	120	150	180	210	240	270
Sin (x+30)	0	0.50		1.00	0.87			-0.50			-0.87
Cos (x-15)	0.71		0.97		0.26				-0.97	-0.71	-0.26

b) Draw the graph of y = sin (x+30) and y=cos(x-15) for $-30 \leq X \leq 270^0$ on the same grid. Take 1cm to represent 30^o on x-axis and 1cm to represent 0.2units on y-axis.



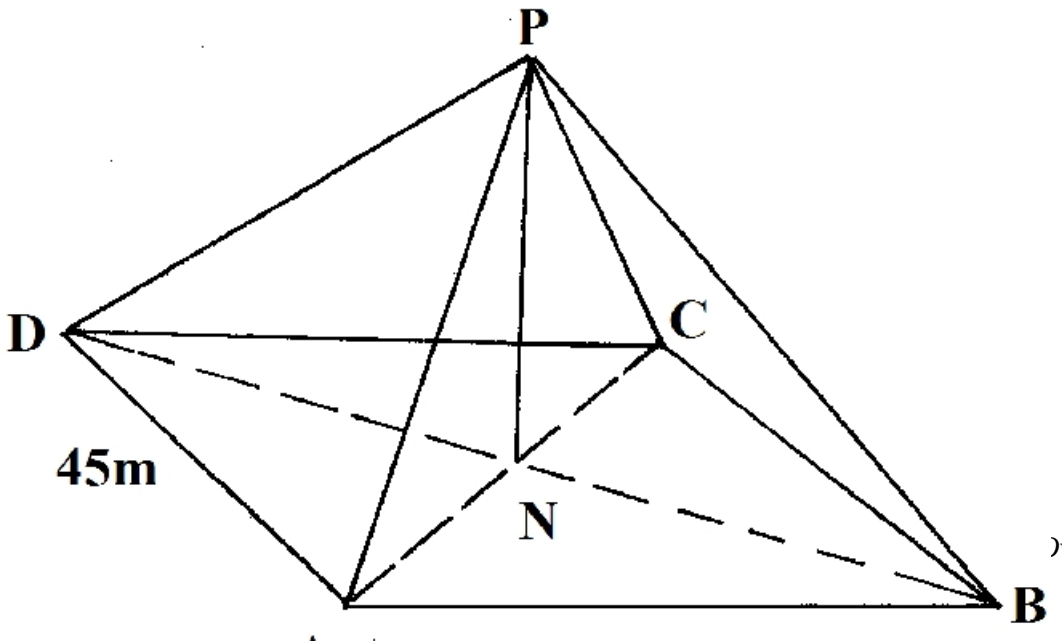
a) Using your graph drawn (b) above

i) Find the values of x for which cos (x-15) –sin (x+30) = 0 (2mks)

ii) State the co-ordinates of the turning point of the curvefor the function y =cos (x-15) on the negative section of y-axis (1mk)

iii) Estimate the angle corresponding to cos (x-15) = 0.6

23. The figure below shows rectangular plot ABCD with AB =60m and BC=45m. PN is a vertical pole of length 30m to which four taut wire PB_1, PC1,PD and PA are attached



 ...ver

Calculate

a) length of the projection of PCon the plane ABCD (2mrks)

b) the angle PC made with the base ABCD (3mks)

c) The angle between the planes PBC and ABCD (3Mrks)

c) If point A is to be the North of point C. calculate the bearing of B from A

(2mks)

24. a) The first term of an arithmetic progression (AP) is 2.The sum of the first 8 terms of AP is 256.

i) Find the common difference of AP

(2mks)

ii) Given that the sum of the first n terms of the AP 416. Find n

(2mks)

b) The 3^{rd}, 5^{th},and 8^{th} terms of another AP forms the first three terms of a geometric progression (GP).If the common difference of the AP is 3

.Find

i) The first term of GP (4mks)

ii) The sum of the first 9 terms of the GP to 4 s.f

(2mks)