Name .... Index Number ....

Adm. No ....

Class ....

121/2
MATHEMATICS (ALT A)
PAPER 2
JULY/AUGUST 2013
TIME: $2\frac{1}{2}$HRS

LENOCET EVALUATION TEST
KENYA CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS
PAPER 2
TIME: $2\frac{1}{2}$HRS

Instructions to candidates

1. Write your **Name** and **Index number** in the spaces provided above.
2. This paper consists of **TWO** sections: section **I** & section **II**.
3. Answer **ALL** questions in section I and only **FIVE** questions from section II.
4. All answers and working **must be** written on the question paper in the spaces provided **below** each question.
5. Show all the steps in your calculations, giving your answer at each stage in the spaces below each question.
6. Marks may be given for correct working even if the answer is wrong.
7. Non-programmable silent electronic calculators and KNEC mathematical tables **may be** used except where stated otherwise.
8. This paper consists of 18 printed pages.
9. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For Examiner's 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	25	**TOTAL**

GRAND TOTAL	

SECTION I: (50 MARKS)

Answer all questions in this section

1. Use logarithim to evaluate

$$\left(\frac{6.79 \times 0.3911}{\log 5}\right)^{3/4}$$
(4mks)

2. Make s the subject of the formulae (3mks)

$$a = \sqrt{\frac{s^2 + q}{p^2}}$$

3. A stone is thrown vertically upwards from point O. After t seconds the stone is s metres from O. Given that $s = 29.4t - 4.9t^2$, find the maximum height reached by the stone. (3mks)

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4. A pair of corresponding sides of two similar triangles are 5cm and 8cm long.
    (a)   find the Area Scale Factor   (1mk)

    (b)   If the larger triangle has an area of 256cm², what is the area of the smaller triangle?   (2mks)

5. Express as a surd and simplify.   (3mks)

$$\frac{1 + \cos30^0}{1 - \sin60^0}$$

6. Show that: $\dfrac{1}{sin^2\theta} - cos^2\theta = \dfrac{cos^2\theta + sin^4\theta}{sin^2\theta}$ (3mks)

7. The simple interest on a given sum of money borrowed for 4years at 10% p.a exceeds the simple interest on the same sum borrowed $2\frac{1}{2}$ years at 12% p.a by Ksh. 12,960. What was the sum of money borrowed? (3mks)

8. Given that $\sin (x + 60)^0 = \cos (2x)^0$ find $\tan (x + 60)^0$ (2mks)

9. The mass of people during a clinic session were recorded as shown in the table below.

Mass(Kg)	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74
No. of people	1	2	12	10	2	2	1

Calculate the mean mass. (4mks)

10.   Solve for x $(\text{Log}_2 x)^2 + \text{Log}_2 8 = \text{Log}_2 x^4$ (3mks)

11.   Use matrix method to solve   (3mks)
       $3x + y = 7$
       $5x + 2y = 12$

12.   (a)   Solve the inequality $2x - 5 > -11$ and $3 + 2x \leq 13$, giving your answer as a combined
              inequality.   (3mks)

(b) List the integral values of x that satisfy the combined inequality in (a) above. (1mk)

13. The image of a point A, under the transformation represented by the matrix

$T = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$ is A^{-1} (-2, 4)

(i) Find the coordinates of A (3mks)

14. (a) Expand and simplify $(2 - x)^5$ (2mks)

(b) Use the first 4 terms of the expansion in part (a) above to find the approximate value of $(1.8)^5$ to 2 decimal places. (2mks)

15. Five people can build 3 huts in 21 days. Find the number of people, working at the same rate that will build 6 similar huts in 15 days. (2mks)

16. The equation of a circle is given by $4x^2 + 4y^2 - 8x + 2y - 7 = 0$
    Determine the coordinates of the centre of the circle. (3mks)

17.   (a) Complete the table below giving your value correct to 2 decimal place.   (2mks)

x	0	30	60	90	120	150	180	210	240	270	300	330	360
Sin x	0.00	0.50		1.00		0.50	0.00	-0.50			-0.87		0.00
Cos $^2/_3$x	1.00		0.77		0.17		-0.50		-0.94	-1.00		-0.77	-0.50

(b)   On the grid provided, draw the graphs of $y = \sin x^0$ and $y = ^2/_3 x^0$ for $0^0 \le x \le 360^0$ (5mks)

(c)   Use the graph to;
       (i) solve the equation $\sin x^0 - \cos ^2/_3 x^0 = 0$ (2mks)

(ii)   Determine the range of values for which $\sin x^0 < \cos ^2/_3 x^0$ for the domain
       $0^0 \le x \le 360^0$ (1mk)
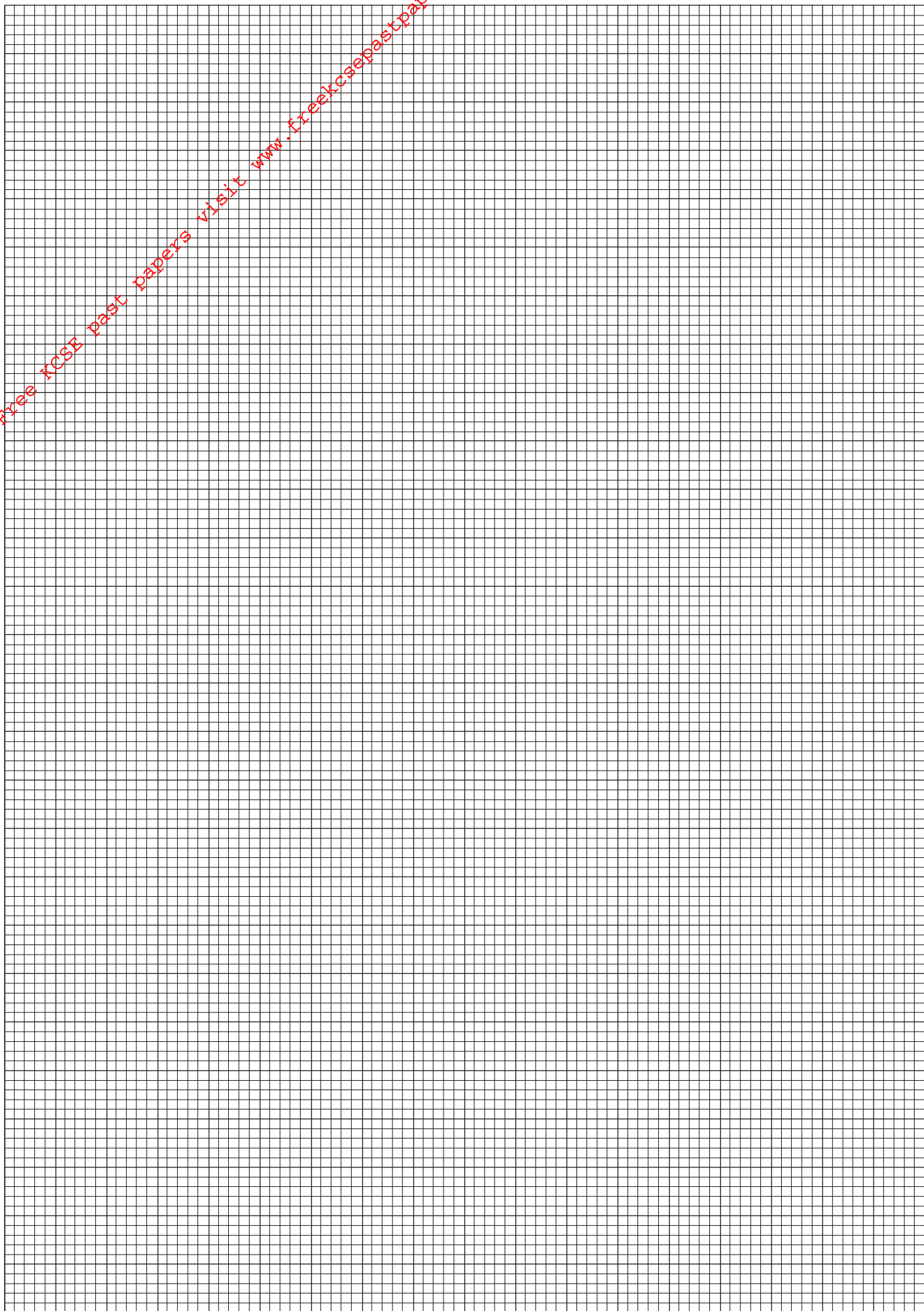
18. (a) Using a ruler and a pair of compasses only construct triangle ABC in which
AB = 6cm, BC = 5.5cm and angle ABC = 60^0. Measure AC. (3mks)
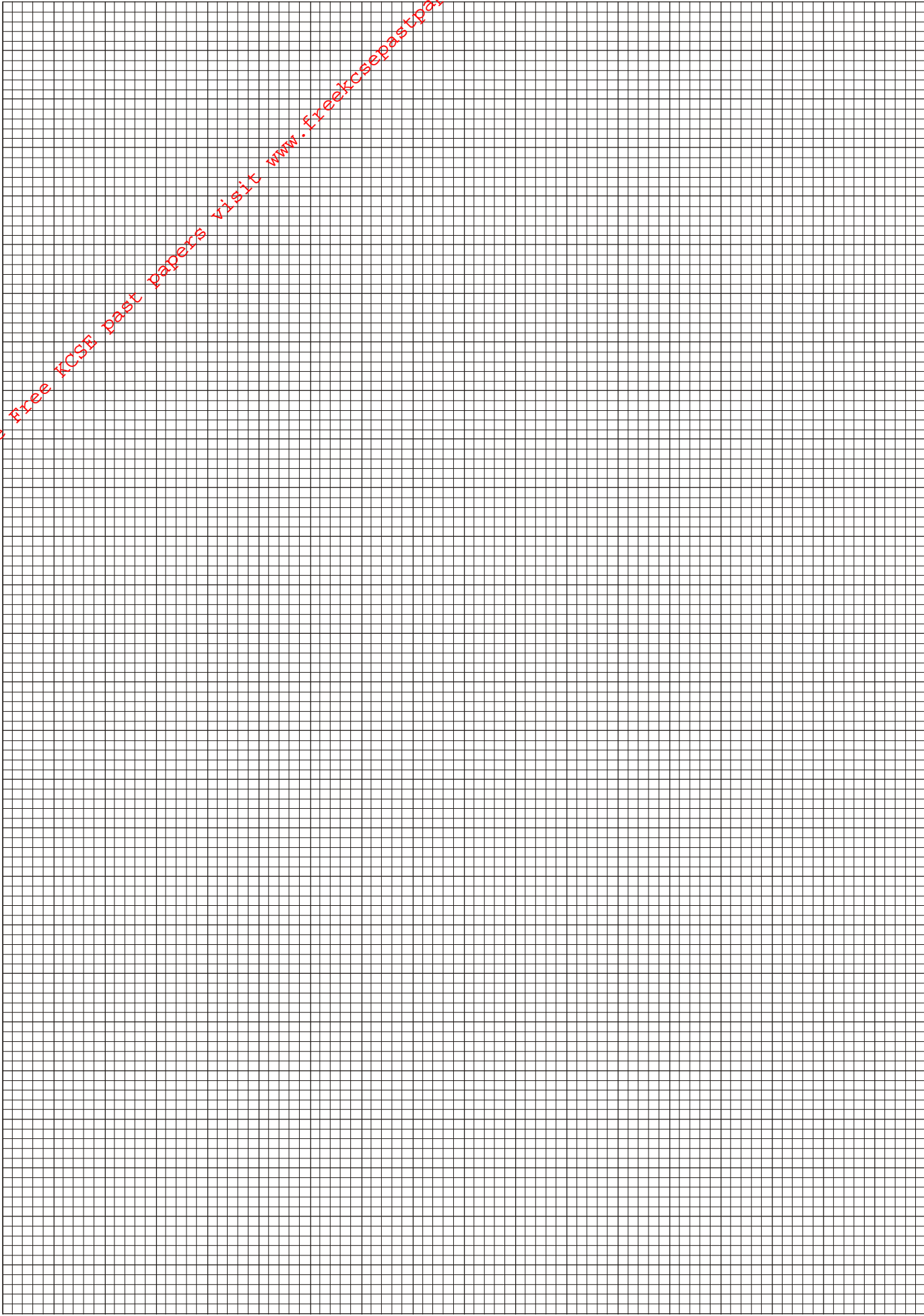
(b) On the same side of AB as C.
(i) determine the locus of a point p such that angle APB = 60^0. (2mks)

(ii) Construct the locus of R such that AR = 3cm (1mk)

(iii) Identify the region T such that AR $\geq$ 3cm and $\angle$APB $\geq 60^0$ by shading
the unwanted part. (2mks)

(iv) Determine point Q such that area of AQB is half the area of ABC and that
$\angle$AQB = 60^0. (2mks)

19. A sequence is formed by adding corresponding terms of an AP and GP. The first, second and third terms of the sequence formed are 14, 34 and 78 respectively. Given that the common ratio of the GP is 3;

   (i)   Find the first term of the AP and GP and the common difference of the AP.   (2mks)

   (ii)   Find the sixth term and the sum of the first six terms of the sequence.   (3mks)

   (b)   The second and third terms of a geometric progression are 24 and $12(x + 1)$ respectively. Find the whole number value of x and hence the first term given the sum of the first three terms of the progression is 76.   (5mks)

20. Income tax rate are as shown below.

Income (kf p.a)	Rate (Ksh per £)
1- 4200	2
4201 - 8000	3
8001 - 12600	5
12601 - 16800	6
16801 and above	7

Omari pays Sh. 4000 as P.A.Y.E per month. He has a monthly house allowance of Ksh. 10800 and is entitled to a personal relief of Ksh. 1,100 per month. Determine;

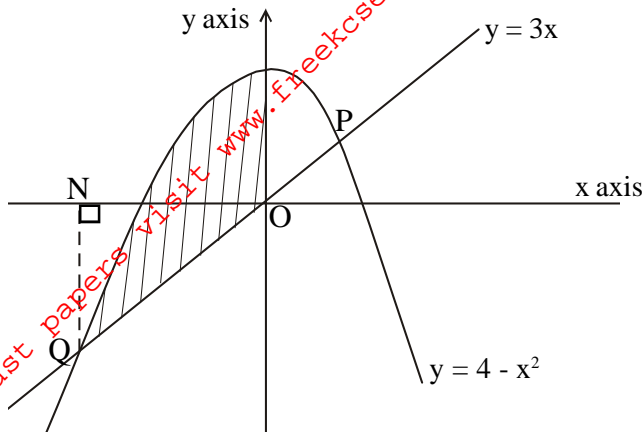(i)   his gross tax p.a in Ksh   (2mks)

(ii)   his taxable income in kf p.a   (4mks)

(iii)   his basic salary in Ksh. p.m   (2mks)

(iv)   his net salary per month   (2mks)

21. The diagram below shows a sketch of the line $y = 3x$ and the curve $y = 4 - x^2$ intersecting at point P and Q.

(a) Find the co-ordinates of P and Q (4mks)

(b) Given that QN is perpendicular to the x-axis at N, calculate
(i) the area bounded by the curve $y = 4 - x^2$, the x-axis and line QN. (2mks)

(ii) the area of the shaded region that lies below the x - axis (2mks)

(iii) the area of the region enclosed by the curve $y = 4 - x^2$, the line $y = 3x$ and the y-axis (2mks)

22. The figure below shows points on the earth's surface.
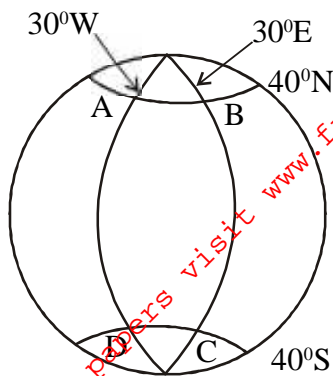
(a) State the positions of A, B, C and D in coordinate form. (2mks)

(b) An aircraft flies from A to B along latitude 40^0N, B to C, along longitude 30^0E, C to D along latitude 40^0S. Calculate to 4 s.f the total distance it covered.
(Take radius of the earth = 6371km, $\pi = 3.142$) (5mks)
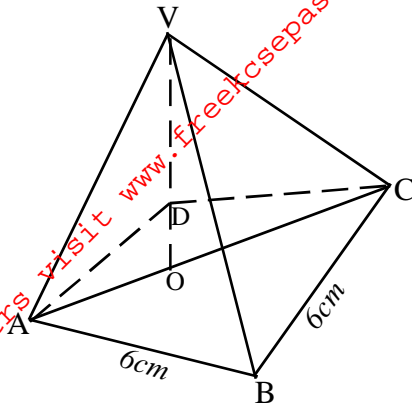
(c)   If the aircraft leaves A at 8.00 a.m at a speed of 720km/h to B. At what local time is
         it expected at B?   (3mks)

23. Below is a square based pyramind ABCDV with AB = BC = 6cm and height VO = 10cm.

(a) State the projection of VA on the base ABCD (1mk)

(b) Find the length of VA. (3mks)

(c) Find the angle between VA and the plane ABCD (3mks)

(d) The angle between plane VDC and ABCD (3mks)

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24. In a chemistry form 4 class in Jaribu high school $\frac{1}{3}$ of the class are girls and the rest are boys. $\frac{4}{5}$ of the boys and $\frac{9}{10}$ of the girls are right handed while the rest are left handed. The probability that a right-handed student breaks a conical flask in any practical session is $\frac{3}{10}$ and the corresponding probability for a left handed student is $\frac{4}{10}$. The probabilities are indepedent of the students' sex.

   (a)   Represent the above information on a tree diagram.   (2mks)

   (b)   Determine the probability that a student chosen at random from the class is left handed and does not break a conical flask in simplest form.   (2mks)

   (c)   Determine the probability that the flask is broken in any Chemistry practical session in simplest form.   (3mks)

   (d)   Determine the probability that a conical flask is broken by a right handed student in simplest form.   (3mks)