NAME: …………………………….. INDEX NO: ………………………….

SCHOOL: …………………………….. DATE : …………………………….

SIGNATURE: ……………………………

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST 2013
TIME: 2½ HOURS

NANDI NORTH DISTRICT JOINT MOCK EVALUATION TEST 2013

Kenya Certificate of Secondary Education (KCSE)
MATHEMATICS
PAPER 2
TIME: 2½ HOURS

INSTRUCTIONS TO CANDIDATES

a) Write your Name and Index Number in the spaces provided at the top of this page.
b) Sign and write the date of examination in the spaces provided above.
c) This paper contains TWO sections: section I and section II
d) Answer all the questions in I and any FIVE questions from section II.
e) All answers and working must be written on the question paper in the spaces provided below each question.
f) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
g) Marks may be given for correct working even if the answer is wrong.
h) Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

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

GRAND TOTAL

17	18	19	20	21	22	23	24	**TOTAL**

1

1. Use logarithm tables to evaluate. (4mks)

$$\sqrt[3]{\frac{0.0485 \times \text{Log } 3.846}{(0.9834)^2 + 88.3}}$$

2. Simplify: $\dfrac{3}{5-\sqrt{2}} + \dfrac{1}{\sqrt{5}}$ leaving the answer in the form a + b√c where a, b and c are rational numbers.

3. A point Q (-2, 3) is given translation ($^{-1}_{\ 4}$). Find point Q', the image of Q under translation. If Q' is given a translation ($^{1}_{-2}$) find the co-ordinates of Q", the image of Q'. What single translation maps   onto Q"? (3mks)

4. Make n the subject of the formula. (3mks)

$$A = \sqrt{\frac{y(n-y)}{n-1}}$$

2

5. The length and breadth of a rectangular paper were measured to the nearest centimeter and found to be 18cm and 12cm respectively. Find the percentage error in its perimeter. (2mks)

6. (a) Expand and simplify $(3 - x)^5$ (2mks)

   (b) Use the first four terms of the expansion in part (a) above to find the approximate value of $(3.8)^5$ to 2 decimal places. (2mks)

7. Under a transformation whose matrix is $\begin{bmatrix} x - 1 & 3 \\ 1 & x + 1 \end{bmatrix}$
   An object of area $12cm^2$ is mapped onto an image whose area is $60cm^2$. Find the possible value of x. (3mks)

8. Vector M passes through the points (6,8) and (2,4). Vector n passes through (x,-2)

3

and (-5,0). If m is parallel to n, determine the value of x. (3mks)

9. A box contains 6 yellow balls, 4 white balls and 2 blue balls, all balls being similar in shape. A ball is picked at random without replacement and its colour noted. Use a tree diagram to determine the probability that at least one of the first two balls picked is blue. (4mks)

10. A curve is given by the equation $y = 5x^3 - 7x^2 + 3x + 2$. Find the gradient of the curve at $x = 1$. (2mks)

11. The mass of a mixture A of beans and maize is 72kg. The ratio of beans to maize is

3:5 respectively.

(a) Find the mass of maize in the mixture. (1mk)

(b) A second mixture B of beans and maize of mass 98kg is mixed with A. The final ratio of beans to maize is 8:9 respectively. Find the ratio of maize to beans in B. (3mks)

12. The data below represents the ages in months at which 6 babies started walking; 9, 11, 12, 13, 11 and 10. Without using a calculator, find the exact value of the variance of the data. (3mks)

13. If x = 2 cos∝, show that $\sqrt{\dfrac{4 - x^2}{x}} =$ tan∝

(Consider positive square roots only) (2mks)

14. The first, the third and the seventh term of an increasing arithmetic progression are

5

three consecutive terms of a geometric progression. If the first term of the arithmetic progression is 10, find the common difference of the arithmetic progression. (4mks)

15. The length of a rectangle is $(3x + 1)$cm. Its width is 3cm shorter than its length. Given that the area of the rectangle is 25cm^2, find its length. (3mks)

16. The figure below represents a triangular prism. The faces ABCD, ADEF and CBFE are rectangles. AB = 8cm, BC = 14cm, BF = 7cm and AF = 7cm.
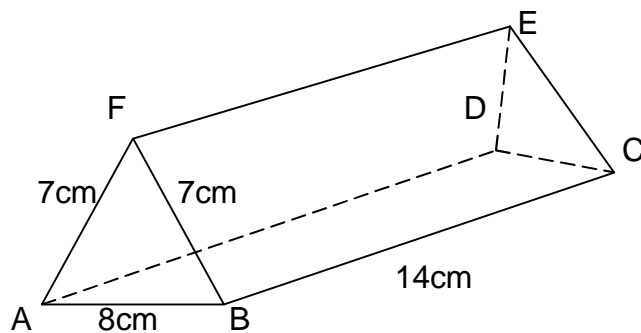
Calculate the angles between faces BCEF and ABCD. (3mks)

SECTION II (50 MARKS)

17. Mwenda borrowed a short-term loan of Shs. 300,000 from a bank and arranged to pay back in three equal yearly installments of sh. 100,000 each. The bank charges compound interest at the rate of 20% per annum and ledger fee at 2 ½ per annum on any outstanding balance at the beginning of that year. In order to clear the loan on time, Mwenda paid the installment plus interest and ledger fee at the end of each year for three years. Calculate the total amount of money Mwenda paid back in order to clear the loan. (10mks)

18. Draw line PQ 8cm long on the space provided below and locate L, midpoint of PQ.

7

(1mk)

(a) (i) Draw the locus of point R above line PQ such that the area of the triangle
PQR is 12cm^2. (3mks)
(ii) Given that point R is equidistant from P and Q, show the position of the point
R. (2mks)

(b) Draw all possible loci of point T such that $\angle RQL = \angle RTL$. (4mks)

19. Three variables p, q and r are such that p varies directly as q and inversely as the

square of r.
(a) When p = 18, q = 24 and r = 4.
      Find p when q = 30 and r = 10.   (4mks)

(b) Express q in terms of p and r.   (1mk)

(c) If p is increased by 20% and r is decreased by 10% find:
     (i)   A simplified expression for the change in q in terms of p and r.   (3mks)

     (ii) The percentage change in q.   (3mks)

20. (a) Complete the table below, giving the values correct to 2 decimal places.   (2mks)

x^0	0	30	60	90	120	150	180	210	240	270	300	330	360
Sin 2x	0		0.87		-0.87		0	0.87	0.87				0
3cosx-2	1	0.60		-2	3.5			-4.60			-0.5		1

(b) On the grid provided draw the graph of y = sin 2x and y = 3cosx – 2 for
0$^0 \leq$x$\leq$360^0, on the same axes.
Use the scale of 1cm to represent 30^0 on the x-axis and 2cm to represent 1 unit
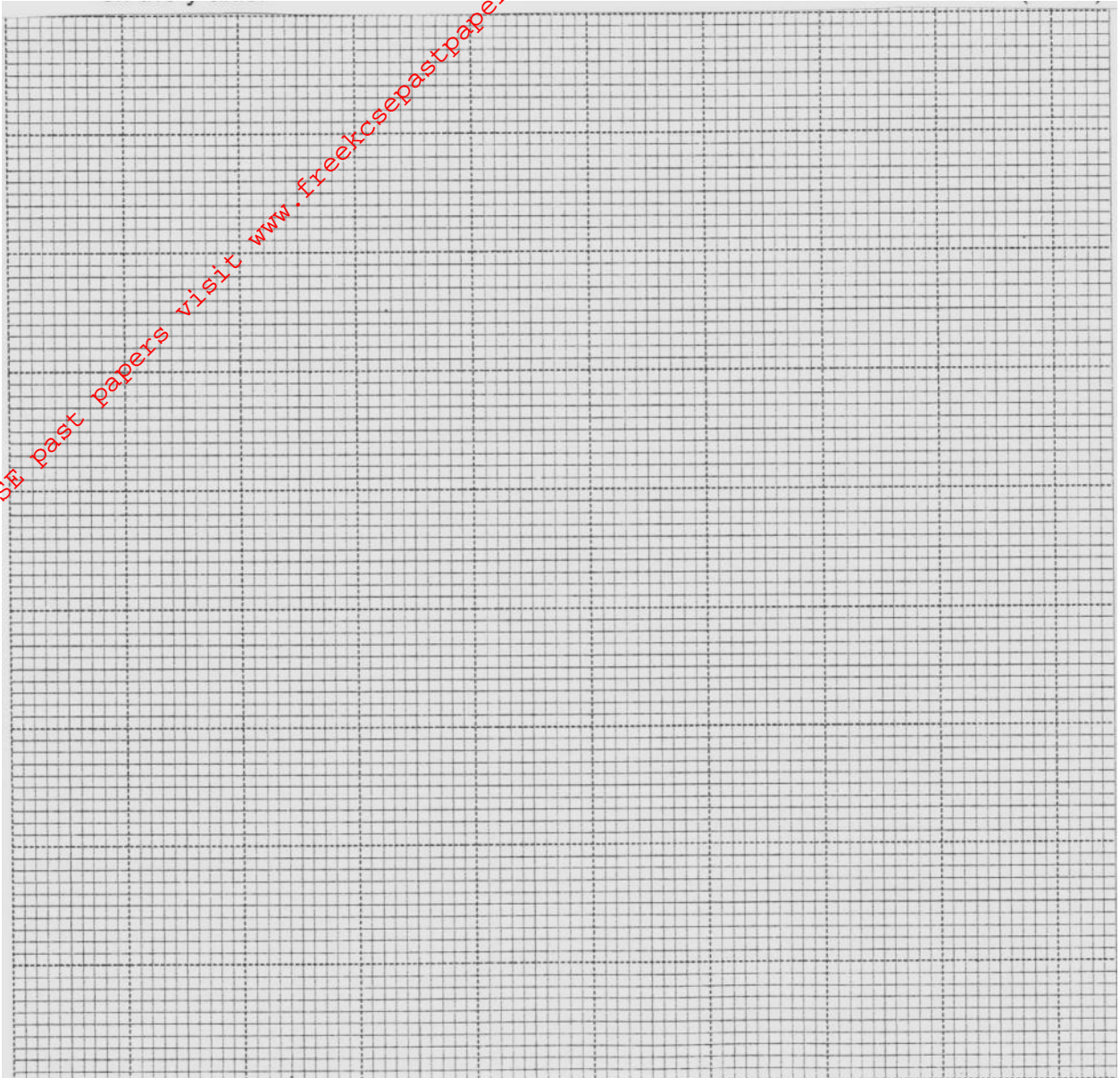on the y-axis.   (5mks)
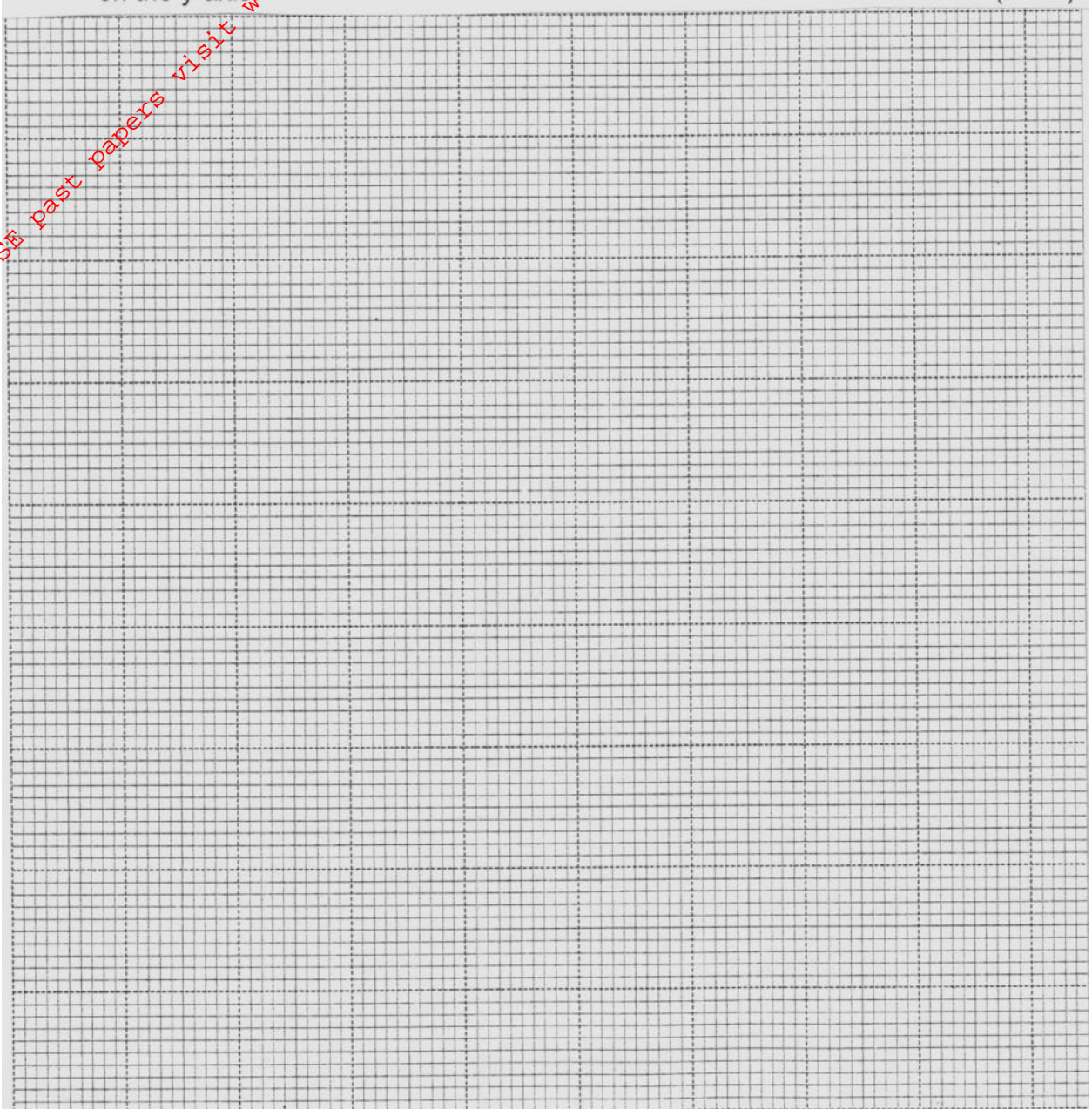
(c) Use the graph in (b) above to solve the equation 3cosx – sin 2x = 2.   (2mks)

(d) State the amplitude of y = 3cosx – 2   (1mk)

21. A quadrilateral ABCD has vertices A(4, -4), B(2,-4), C(6,-6), D(4,-2)

(a) On the grid provided, draw the quadrilateral ABCD.   (1mk)

(b) A'B'C'D' is the image of ABCD under positive quarter turn about the origin. On the same grid draw the image A'B'C'D'. Show the coordinates of A'B'C'D'. (3mks)

(c) A"B"C"D" is the image of A'B'C'D' under the transformation given by the matrix

$$\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$$

(i)   Determine the coordinates of A"B"C"D".   (2mks)

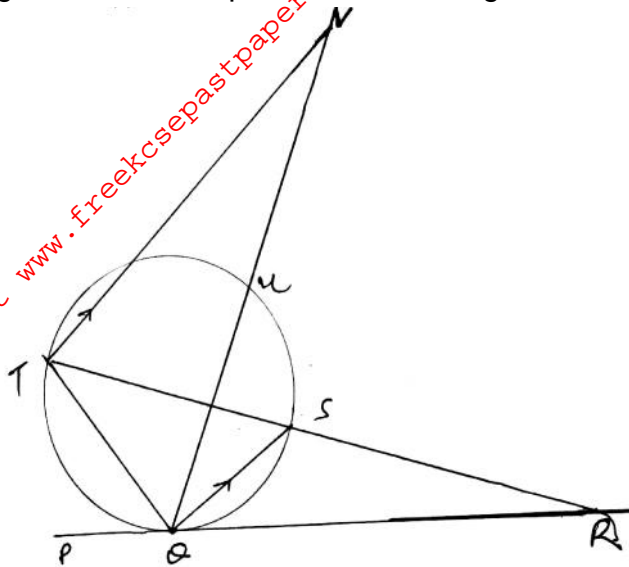(ii)   On the same grid, draw the quadrilateral A"B"C"D"   (1mk)

(d) Determine a single matrix that maps ABCD onto A"B"C"D"   (3mks)

22. In the figure below PQR is a tangent to the circle at Q. TS is a diameter and TSR

and QUV are straight lines. QS is parallel to TV. Angles SQR = 40^0 and TQV = 55^0.

(a) Find the following angles giving reasons each case.

    (i)   <QTS   (2mks)

    (ii)   <QRS   (2mks)

    (iii) <QVT   (2mks)

    (iv) <QUT   (2mks)

(b) Given that QR = 8cm, and SR = 4cm. Find the radius of the circle.   (2mks)

23. (a) Using the trapezoidal rule, estimate the area under the curve y = ½ x^2 – 2

between the lines x = 0 and x = 6 using 6 strips. (3mks)

(b) Use the integration to evaluate the exact area under the curve. (3mks)

(c) Hence calculate the percentage error in calculating the area using trapezoidal rule. (2mks)

24. A plane leaves an airport x $(41.5^0N, 36.4^0W)$ at 9.00a.m. and flies due North to airport

y on latitude 53.2^{0}N.

(a) Calculate the distance covered by the plane in kilometers. (3mks)

(b) After stopping for 30 minutes to refuel at Y, the plane then flies due east to airport Z, 2500km from Y. Find:-

   (i)   The position of Z.

   (ii)   The time the plane lands at Z, if its speed is 500km/h.

(Take the value of π as $^{22}/_7$ and radius of the earth as 6370km) (7mks)