NAME .... INDEX NUMBER ....

SIGNATURE ....

DATE ....

WESTLANDS FORM FOUR JOINT EXAMINATION 2014
Kenya Certificate of Secondary Education

MATHEMATICS
Paper 2
JULY/AUGUST 2014
Time: 2½ 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** sections: **I** and **II**

4. Answer **all** the questions in Section **I** and any **five** questions from Section **II**.

5. Show all the steps in your calculations giving your answers 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 K.N.E.C mathematical tables may be used, except where stated otherwise.

8. This paper consists of **16** 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.

10. Candidates should answer the questions in English.

FOR EXAMINER'S USE ONLY

SECTION I

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

SECTION II

QUESTION	17	18	19	20	21	22	23	24	TOTAL
MARKS									

GRAND TOTAL

1. Without using a calculator or mathematical table evaluate (3 mks)

$$\frac{\frac{2}{5} \div \frac{1}{2} \text{ of } \frac{4}{9} - 1\frac{1}{10}}{\frac{1}{8} - \frac{1}{6} \times \frac{3}{8}}$$

2. Make y the subject of the formula. (3 mks)

$$V = \left(\frac{ax^2 y}{w - y}\right)^{\frac{1}{3}}$$

3. Calculate relative error in calculating the volume of a cylinder whose radius is 3.5cm and height 14cm. Correct answer to 4sf (3 mks)

4. Simplify

$$\frac{(4x + 2y)^2 - (2y - 4x)^2}{(2x + y)^2 - (y - 2x)^2}$$
(3 mks)

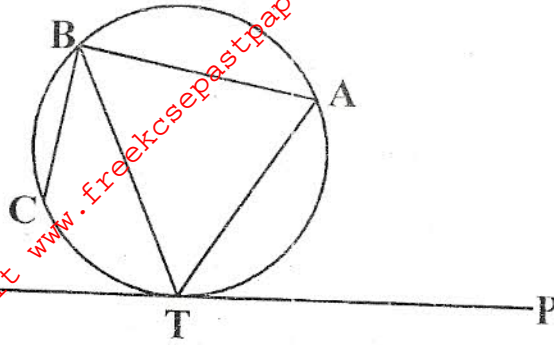5. Z varies jointly as the square of x and inversely as the square of y. When x =10 and y =4 Z = 15.
   a) Find z in terms of x and y (2 mks)

   b) Find the value of x when z = 8 and y = 12. (2 mks)

6. In the figure below PT is a tangent to circle ABCT. BA =BT and $\angle ATP = 82°$. Calculate angle BCT.
(3 mks)

7. Without using a calculator or tables simplify $\dfrac{5}{1 + \cos 135}$ leaving your answer in the form $a + b\sqrt{c}$ where a, b and c are integers.
(3 mks)

8. A customer deposited Ksh 15,500 in a savings account. Find the accumulated amount after 3½ years if interest was paid at 16% per annum compounded semi-annually.
(3 mks)

9. A civil servant started with a salary of Kshs 20,000 p.a. In each subsequent year he was given an annual increment of Ksh 2000. After how many years will he have earned a total salary of kshs 66,000. (3 mks)

10. OP = 3i + 2j - 4k and OQ = 4i + 5j - 2k. M divides PQ in the ratio 3:-2. Determine the coordinates of M. (3 mks)

11. Solve for x in $4 - 4Cos^2x = 4Sin\ x - 1$ in the range $0 \le x \le 360°$. (4 mks)

12. The sum of n terms of an arithmetic progression is 423. If the first and the last terms are 5 and 42 respectively, find how many terms are there in this progression. (2 mks)

13. Find the value of y in the equation:
$$Log_{10}5 - 2 + Log_{10}(2y + 10) = Log_{10}(y - 4)$$
(3 mks)

14. A circle whose equation is $(x - 1)^2 + (y - k)^2 = 10$ passes through the point (2, 5). Find the co-ordinates of the two possible centres of the circle. (3 mks)

15. Two boats A and B left port N at 11.00am. A sailed a speed at 45km/hr on a bearing of 225° and B sailed at 30km/h on a bearing of 140°. Calculate the distance between the two boats at 2.00pm the same day. (3 mks)

16. a) Expand $(2 - \frac{1}{5}x)^5$ upto the 4th term (2 mks)

b) Hence use the expansion to find the value of $(1.96)^5$ correct to 4 decimal places. (2 mks)

17. a) Karimi borrowed Kshs 225,000 at 8% compound interest. He repayed kshs 43,000, one year after the loan was taken out and Kshs 56,000 every 12 months, thereafter. How much does he still owe immediately after the third repayment of 56,000/=   (5 mks)

b) i) An army vamp has enough food to last 48 soldiers for 56 days. After 26 days, another 12 soldiers arrived in the camp. For how many more days will the remaining rations last the 60 men? (3 mks)

ii) To what number of days can this be increase if all the soldiers decided to have only ¾ of the usual ration each day?   (2 mks)

8. In the figure below, $QA = \underset{\sim}{a}$ and $QB = \underset{\sim}{b}$ and $QC = 3QB$. Given that point D divides OA in the ratio of 1:2 while N is the mid-point of AC. Line CD and AB meet at M.
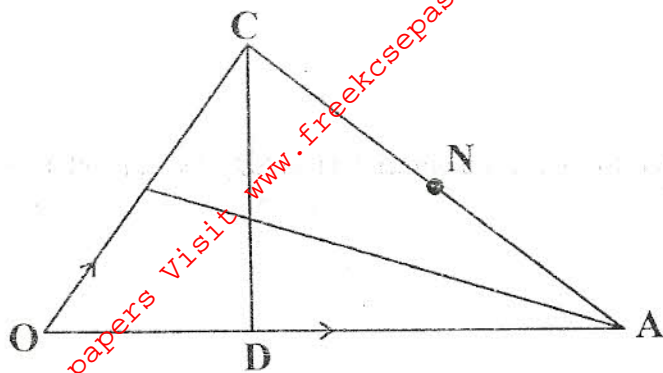
a) Determine in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$:

   i) $\underset{\sim}{AB}$ (1 mk)

   ii) $\underset{\sim}{CD}$ (1 mk)

b) Given that $\underset{\sim}{CM} = k\underset{\sim}{CD}$ and $\underset{\sim}{AM} = h\underset{\sim}{AB}$. Determine the values of the scalars k and h.   (5 mks)

c) Show that O, M and N are collinear.   (3 mks)

19. An unbiased coin is tossed three times. List all the possible outcomes if one face is Heat (H) and the other one is designated Tail (T). (1 mk)

Find the probability of getting
   i) at least two heads (1 mk)

   ii) only one tail (1 mk)

b) During a certain motor rally the probability that the weather will be dry (D) is $^4/_5$ or else it will be wet (W).
   If it is dry, the probability that the driver gets a accident (A) is $^1/_6$ while getting accident when it is wet is $^3/_5$. The probability for a driver to complete (C) the rally after accident is $^1/_5$ while competing when there is no accident is ¼.
i) Draw a tree diagram for this event. (2 mks)

c) What is the probability of
   (i) completing the rally? (3 mks)

   ii) Completing when the weather is wet. (2 mks)

20. A baker is required to supply two types of cakes to hotel, type A and type B. The total number must be more than 560. He has to supply more type B than type A. The number of type B must not exceed 400 while the number of type A must not be less than 120. Let x be the number of type A cakes and y be number of type B cakes.

a) Write down in terms of x and y all the linear inequalities representing the information above.

(4 mks)

b) On the grid provided, draw the inequalities and shade the unwanted region. (4 mks)

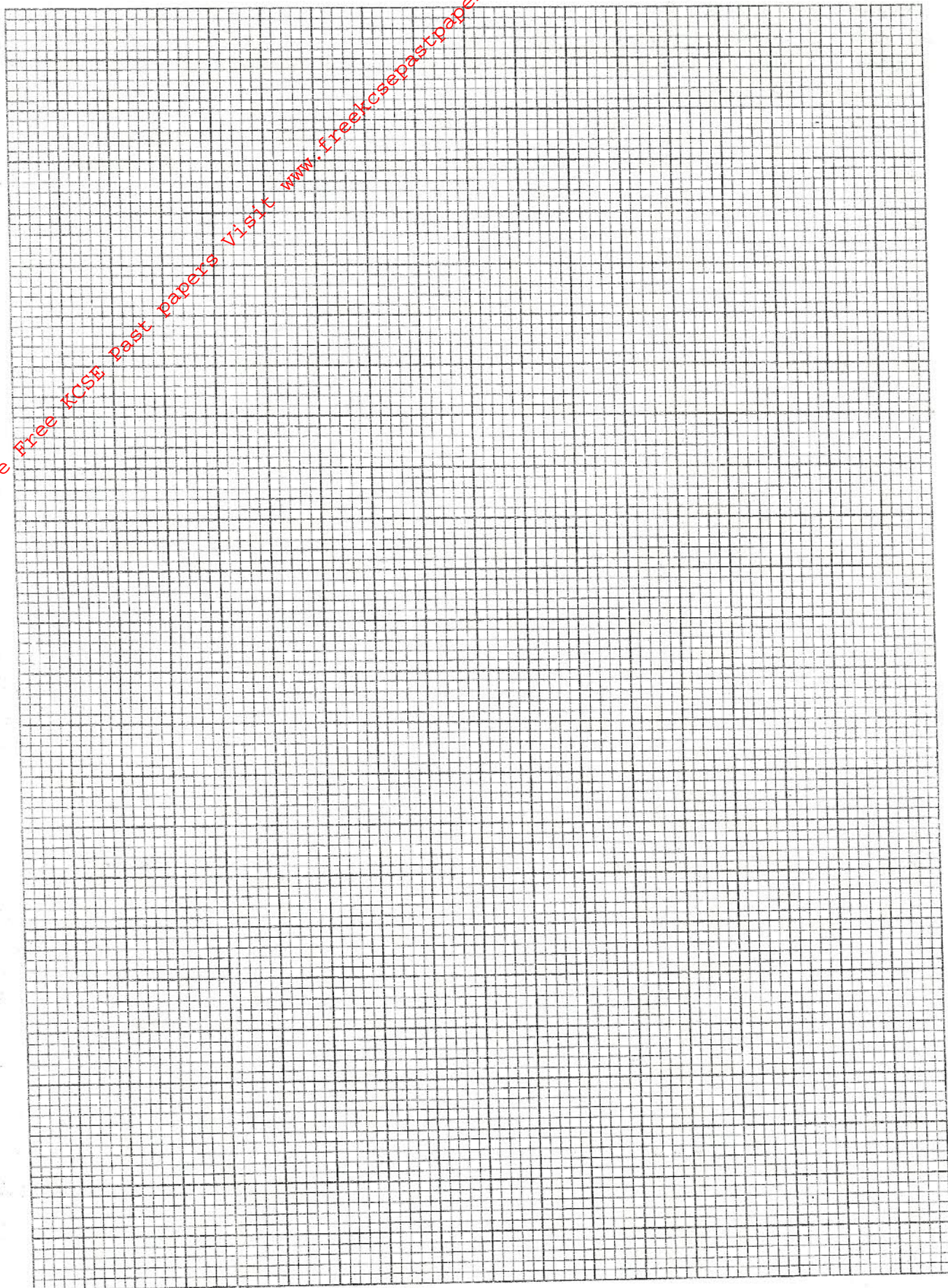c) The profits were as follows
    Type A sh 6 per cake
    Type B shs 5 per cake
i) Use the graph to determine the number of cakes of each type that should be supplied to the maximize the profit. (1 mk)

ii) Calculate the maximum possible profit. (1 mk)

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21. A certain sequence of numbers is formed by adding corresponding of an AP and GP. The common ratio of the GP is 3 and the first three terms of the sequence are 12, 26 and 64. If a is the first term of the AP with a common ratio difference of d and a is the first term of GP, Find

   i) The first term of the AP and GP   (4 mks)

   iii) The common difference of the AP   (1 mk)

   iii) Calculate the ninth term of the sequence.   (2 mks)

   iv) The sum of the first 10 terms of the sequence   (3 mks)

22. The position of airports A and B are (50°N, 45°W) and (50°N, K°W) respectively . It takes a plane five hours to travel from A to B at an average speed of 800knots. The same plane takes 1½hours to reach another airport C North of B at the same average speed. If C is on the same longitude as B, calculate to the nearest degree

a) The value of K   (4 mks)

b) The latitude of C   (3 mks)

c) If the plane started at A at 9.00am and flew to C through B. Find the local time at C when the plane arrived there.   (3 mks)

23. A car accelerates from 20m/s for 5 seconds with a constant acceleration of $3m/s^2$. It then continues with velocity for 10 seconds after which it breaks to rest with a constant retardation of $5m/s^2$. Determine the percentage of distance covered in the last 5 seconds. (10 mks)

24. Use a ruler and a pair of compass only in this construction below.

a) Draw triangle ABC such that AB = 6cm, <A = <B= 67.5° (3 mks)

b) Draw the locus of P such that <ACB is twice <APB and is on the same side of AB as C (1 mk)

c) Indicate by shading the locus of Q such that BQ ≤ AQ. Q is closer to BC than AB and <AQB≥ 90°. (4 mks)

d) Using your construction above, calculate the maximum area of triangle ABQ. (2 mks)