

Name Class.....

Index Number:

121/1
MATHEMATICS
Paper 1
July/August 2014
TIME: 2 1/2 Hours

KAMUKUNJI DISTRICT KCSE EVALUATION

Instructions to candidates

- Write your name, index number, admission number and class in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- The paper contains **TWO** sections: **Section I** and **Section II**.
- Answer **ALL** the questions in **Section I** and any **five** questions from **Section II**
- All answers and working must be written on the question paper in the spaces provided below each question.
- **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.**
- 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

17	18	19	20	21	22	23	24	Total

Grand
Total

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This paper consists of 20 printed pages
Candidates should check the question paper to ascertain
that all the pages are printed as indicated and no questions are missing.

SECTION I

ANSWER ALL QUESTIONS IN THIS SECTION (50 MARKS)

1. Evaluate the following:

$$\frac{\frac{1}{2} \text{ of } \frac{2}{5} + \frac{3}{15} + \frac{7}{10} \times \frac{6}{7} - 1\frac{1}{2} \times \frac{1}{3}}{\frac{5}{3} \times \frac{6}{10} + \frac{5}{4} - \frac{1}{4}}$$

(3 marks)

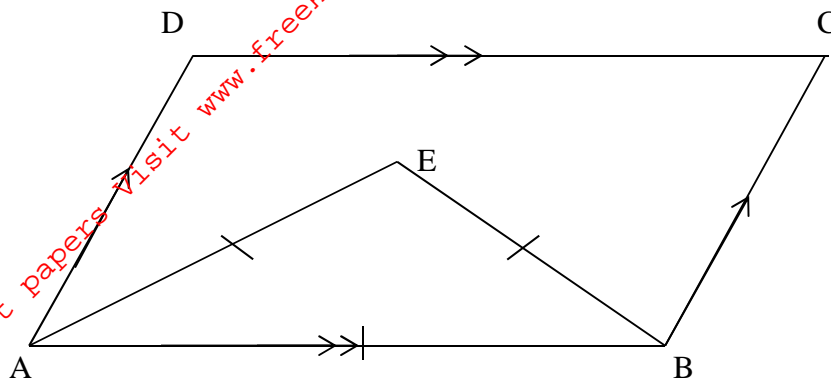
2. Simplify

$$\frac{9t^2 - 25a^2}{6t^2 + 19at + 15a^2}$$

(3 marks)

3. The marked price of a pair of shoes is Sh. 2400. A customer buys the shoes and is offered a 10% discount and the seller still makes a profit of 20% on the cost of the shoes. Determine the cost price. (3 marks)

4. The figure below ABCD is a rhombus and triangle ABE is equilateral. Angle DAE = 18°.



Calculate angle DEC

(3 marks)

5. Solve for x in the equation

$$9^{1/2x-1} + 25^{11/2} = 8^{21/3}$$

(3 marks)

6. The exchange rates are as follows:

$$1 \text{ U.S dollar} = \text{Ksh. } 87.6094$$

$$1 \text{ Sterling Pound} = \text{U.S dollars } 1.6987$$

Mr. Brown sold a camera to Mr. Njoroge which he had bought at 214 Sterling pounds and at a loss of Ksh. 11847.90. How much did Mr. Njoroge pay in Kenya shillings? (3 marks)

7. The sum of the digits of a two digit number is 11. If the digits are interchanged the value of the number decreases by 63. What is the number? (3 marks)

8. Use tables of cubes, square roots and reciprocals to evaluate to 4 s.f. (3 marks)

$$\frac{1}{\sqrt{3.74}} + \frac{2}{1.782^3}$$

9. Solve the following quadratic equations by completing the square method.

$$3x^2 - 7x - 5 = 0$$

(3 marks)

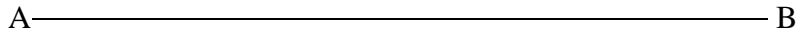
10. If $\sin x = \frac{5}{13}$ and x is an obtuse angle, evaluate

$$\frac{\cos x + \tan x}{\sin x - \cos x}$$

(3 marks)

11. A point $P(-2, 5)$ is mapped onto $P^1(1, 9)$ by a translation T_1 . If P^1 is mapped onto P^{11} by a translation T_2 given by $\begin{pmatrix} -4 \\ -1 \end{pmatrix}$. Find the coordinates of P^{11} and hence a single transformation which maps P onto P^{11} . (3 marks)

12. Using the protractor, ruler, pair of compasses and on the line AB shown below, show the locus of a point P such that angle APB = 78° . (3 marks)



13. Three towns A, B and C are situated so that $AB = 65$ km and $AC = 115$ km. The bearing of B from A is 062° and the bearing of C from A is 278° . Calculate:

a) The distance BC (2 marks)

b) The bearing of B from C (2 marks)

14. Two grades of tea costing sh. 120 and sh. 150 per kilogram are mixed. In what ratio should the two grades be mixed in order to produce a mixture that costs sh. 144 per kilogram?

(3 marks)

15. A straight line $Y = mx - 6$ passes through the point $(3, -2)$. Find the value of M and the angle the line makes with the $x -$ axis.

(3 marks)

16. Using a ruler and a pair of compasses only, construct a triangle ABC such that $AB = 6.3\text{cm}$, $BC = 4.5\text{cm}$ and angle $ABC = 120^\circ$. Measure line AC .

(3 marks)

SECTION II

17. A number of people working at a factory decided to raise sh. 72,000 towards a famine relief. Each person was to contribute the same amount. Before the contributions were collected, five of the people retired from working at the factory. This means that the remaining contributors had to pay more to meet the same target.

(a) Taking 'n' as the number of people working in the factory originally, write down an expression for the increase in the contribution per person. (3 marks)

(b) If the increase in the contribution per person was sh. 1200, find the number of people originally. (4 marks)

(c) How much would each person have contributed to the nearest shilling if the five had not retired? (1 mark)

(d) Calculate the percentage increase in the contribution per person caused by retirements giving your answer to the nearest hundredth.

18. On the grid provided and using scale of 1 cm to 1 unit on both axis, draw triangle ABC where A (1, 2), B (5, 1) and C (3, 4), hence use it to answer the following:

(a) (i) Draw the image $A_1B_1C_1$ of ABC under a rotation of 90° clockwise about the origin and state the coordinates. (2 marks)

(ii) Draw the image $A_2B_2C_2$ of $A_1B_1C_1$ under a reflection in line $y = x$ and state the coordinates of $A_2B_2C_2$. (2 marks)

(b) $A_3B_3C_3$ is the image under a reflection in the line $x = 0$. Draw the image $A_3B_3C_3$ and state its coordinates. (2 marks)

(c) Describe a single transformation that maps ABC onto $A_3B_3C_3$. (2 marks)

19. A cylindrical storage tank of diameter 14 cm is initially two thirds full of water. The tank is filled by a pipe of internal diameter 10 cm through which water flows at the rate of 56 litres per minute. Water starts flowing into the tank at 10:15 am and the tank is full at 2:55 pm.

(a) Determine the height of the tank. (5 marks)

(b) Starting with the full tank, school uses water from this tank at the rate of $11,550 \text{ cm}^3$ per day. Find how long it takes to consume all the water assuming that no more water is added. (3 marks)

(c) How long does it take for the tap to fill the tank when empty? (2 marks)

20 Points D ($0^{\circ} 24^{\circ}\text{E}$), E ($0^{\circ} 21^{\circ}\text{W}$), T ($60^{\circ}\text{N } 170^{\circ}\text{W}$) and G ($60^{\circ}\text{N } 110^{\circ}\text{E}$) are marked on a globe representing the earth with a radius 0.7m. Taking $\pi = \frac{22}{7}$:

(a) Find the length of the arc DE (3 marks)

(b) If A is the centre of the latitude 60°N and B is the centre of latitude 0° , find:

(i) Length AB (3 marks)

(ii) Area of the major sector ATG (4 marks)

(iii) Calculate the time taken to move from D to E

(2 marks)

21. Using a ruler and a pair of compasses only:

(i) Construct a triangle ABC such that $AB = 6.5$ cm, angle $CAB = 60^\circ$ and angle $ABC = 75^\circ$.

(3 marks)

(ii) Construct a perpendicular of line AC at C and the perpendicular bisector of line BC and let them meet at point O. (2 marks)

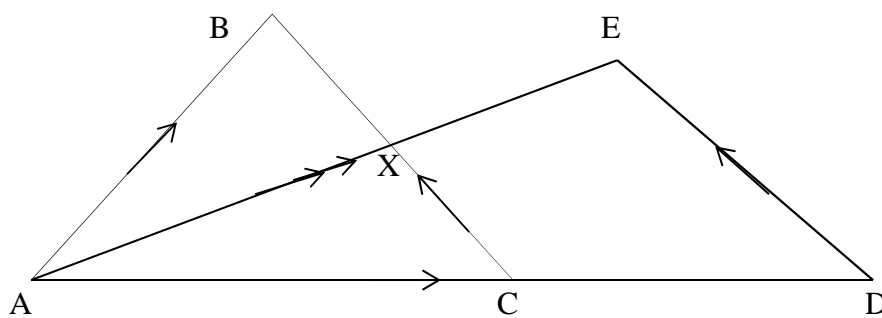
(iii) Draw a circle radius OB and centre O. The line AB extended meets the circle at point O. (1 mark)

(iv) Construct a line parallel to line AC and passing through point D. This line meets the circle at point E. (1 mark)

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(v) Measure the sizes of lines DE and BC and hence find the area of BDEC. (3 marks)

22. In the figure below $AB = \frac{3}{4} \underline{a}$ $AX = \frac{2}{3} \underline{b}$. BC is parallel to ED such that $BX = \frac{1}{3} ED$. AC: CD = 3:7



(a) Express the vectors BX and ED in terms of \underline{a} and \underline{b} only. (2 marks)

(b) Given that $BC = hBX$, express AD in terms of a , b and h . (3 marks)

(c) Given that $AE = kAX$, write an expression for AD in terms of a , b , and k . (2 marks)

(d) Solve for the values of h and k above. (3 marks)

23. The distance between two towns A and B is 460 km. A minibus left town A at 7:15 am and travelled towards B at an average speed of 65 km/h. A car left B at 9:45 am on the same day and travelled towards A at an average speed of 100 km/h.

(a) How far from B did they meet? (4 marks)

(b) At what time did the two vehicles meet? (3 marks)

(c) A motorist started from his home at 8:15 am on the same day and travelled to B at an average speed of 120 km/h. He arrived at the same time as the minibus. Calculate the distance from B to his home. (3 marks)

24. The motion of a particle P moving along a straight line is described by the equation $s = 8t + 10t^2 - t^3$. Where s is the distance in metres and t is time in seconds.

Calculate:

(i) The distance when $t = 2.5$ sec. (2 marks)

(ii) The maximum velocity of the motion (4 marks)

(iii) The acceleration of motion after 3 seconds (2 marks)

(iv) The time at which the velocity is zero (2 marks)