

NAME: ADM.NO.....

DATE: CLASS: INDEX NO:

121/1
MATHEMATICS
PAPER 1
JULY 2013
2½ HOURS

ALLIANCE HIGH SCHOOL MOCK EXAM
Kenya certificate of Secondary Education
MATHEMATICS
PAPEP 1

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 contains TWO Sections I and Section II.
4. Answer ALL the questions in Sections I and any five in Section II.
5. Answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculation, giving your answers at each stage in the spaces below each question.
7. Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.
8. This paper consists of 14 printed pages.
9. Marks may be given for correct working even if the answer is wrong.
10. 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	Total

Grand Total

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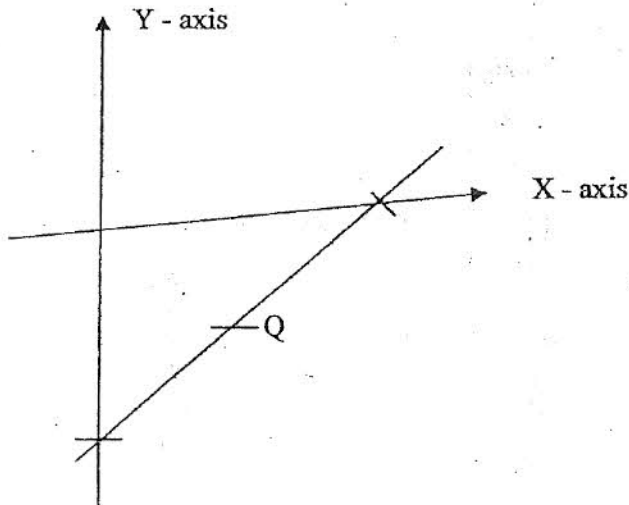
SECTION A

1. Use logarithm tables to evaluate

(4 mks)

$$\sqrt{\frac{(0.4532)^2 \times 0.8923}{1.704}}$$

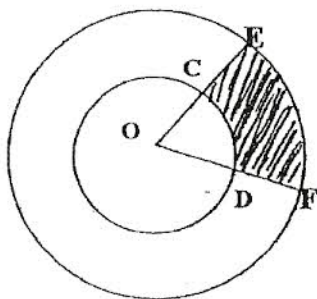
2. On the diagram below, the line whose equation $7y - 3x + 30 = 0$ passes through the points A and B. point A is the x intercept while point B is the y - intercept. Point Q is equidistant from the axes. Find the co-ordinates of point Q and A. (3 mks)



3. The volume of two similar solids are 4752 cm^3 and 1408 cm^3 , if the surface area of the curved smaller cylinder is 352 cm^2 , find the area of the curved surface of the larger cylinder (3 mks)

4. Given that $\sin(90-\theta)^\circ = 0.8$, where θ is an acute angle, find without using mathematical tables of the value of $\tan^2 \theta$. (3 mks)

5. The figure below shows two sectors in which CD and EF are arcs of concentric circles. Centre O. angle $\text{COD} = \frac{2}{3} \pi^\circ$ and $\text{CE} = \text{DF} = 5 \text{ cm}$.



If the perimeter of the shape CDFE is 48cm calculate the length OD. (3 marks)

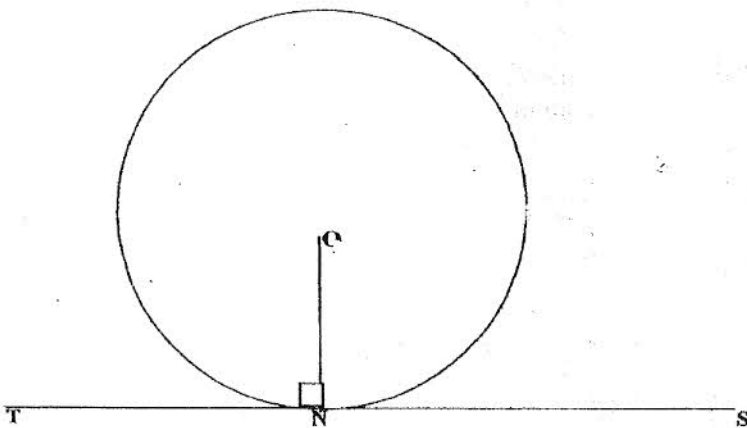
6. If $h^2 + p^2 = 29$; $h + p = 3$ determine $h - p$ (3 mks)

7. The points P, Q, R and S have the position vectors $2\mathbf{p}$, $3\mathbf{p}$, \mathbf{r} and $3\mathbf{r}$ respectively, relative to an origin O. A point T divides PS internally in the ratio 1:6. Find in the simplest form the vector QT in terms of \mathbf{p} and \mathbf{r} . (3 mks)

8. Find the value of x in the equation
 $5^{2x} + 5 = 6(5^x)$

(4 mks)

9. The figure below, O is the centre of the circle and radius ON is perpendicular to the line TS at N.



Using a ruler and a pair of compasses only, construct a triangle ABC to inscribe the circle, given angle $ABC = 60^\circ$, $BC = 12$ cm and points B and C are on the line TS.

(4 mks)

10. A fruit seller bought 144 pineapples at Kshs.100 for every six pineapples. He sold some of them at Ksh.72 for every three and the rest at Kshs.60 for every two. If she made a 65% profit, calculate the number of pineapples sold at Kshs.72 for every three. (3 mks)

11. Solve the simultaneous equations below. (3 mks)
- $$\log_2 (2x + 5y) = 4$$
- $$\log_{17} (3x + 4y) = 1$$

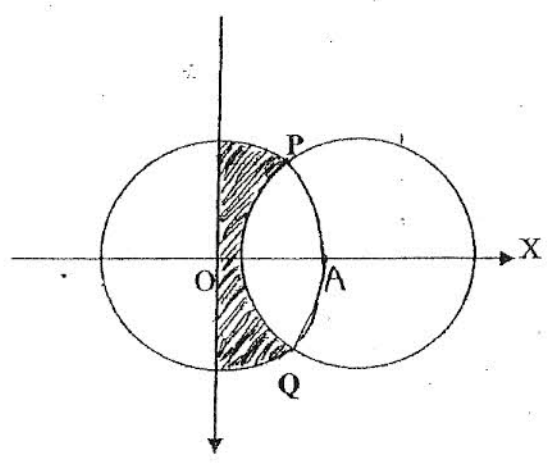
12. An angle of 1.8° at the centre of a circle subtends an arc of 46.8 cm. Find the area the arc encloses and the radius. (3 mks)

13. Simplify $\frac{6a^2 - 96}{96 - 48a + 6a^2}$

(3 mks)

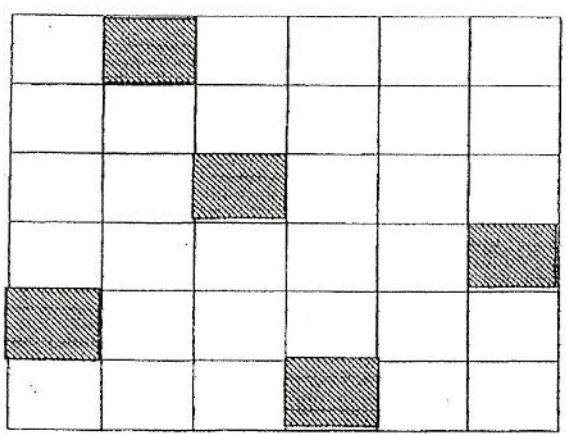
14. Two circles of equal radius of 5cm, have the centres at $O(0,0)$ and $A(5,0)$ respectively as shown below. Given that the angle $PAQ = 120^\circ$, calculate the area of the shaded region.

(4 mks)



15. In the figure below, show by shading a complete figure having a rotational symmetry of order 4.

(3 mks)

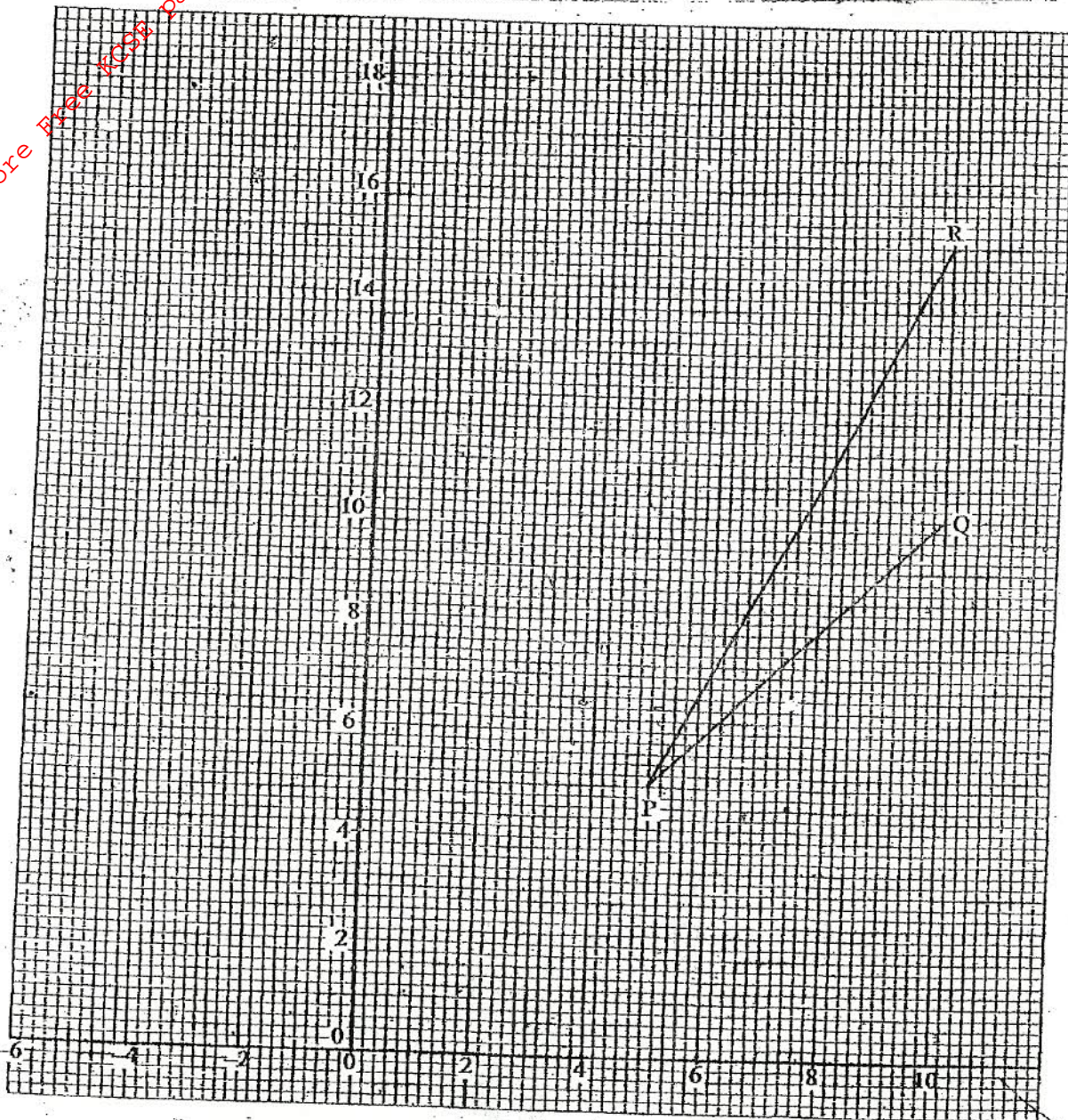


16. Triangle PQR shown on the grid has vertices P (5,5), Q (10,10) and R (10,15). Δ PQR is reflected along line L_1 to Δ ABC which is also obtained under the transformation matrix M whose matrix is

$$\frac{1}{5} \begin{pmatrix} -3 & +4 \\ +4 & +3 \end{pmatrix}$$

Draw triangle ABC and determine the equation of line L_1

(4 mks)



SECTION B

Answer any five questions in the spaces provided.

17. In a mathematics test, 50 students scored marks as shown below.

Marks	25-29	30-34	35-39	40-49	50-54	55-64	65-69
Number of students	3	5	7	x	8	9	4

a) Find the value of x (1 mk)

b) State the modal class (1 mk)

c) Calculate the mean mark (4 mks)

d) Draw a histogram to represent the above data. (4 mks)

18. 720 litres of a homogeneous paint is made by mixing three paints X, Y and Z. The ratio by volume of paint X to paint Y is 3: 2 and paint Y to paint Z is 1:2. Paint X cost Kshs.180 per litre and paint Y ksh.240 per litre and paint Z kshs. 150 per liter.

a) Determine the volume of each type of paint in the mixture. (4 mks)

b) The amount of money spent in making one litre of the mixture. (3 mks)

c) The percentage profit made by selling the mixture at kshs.225 per litre. (3 mks)

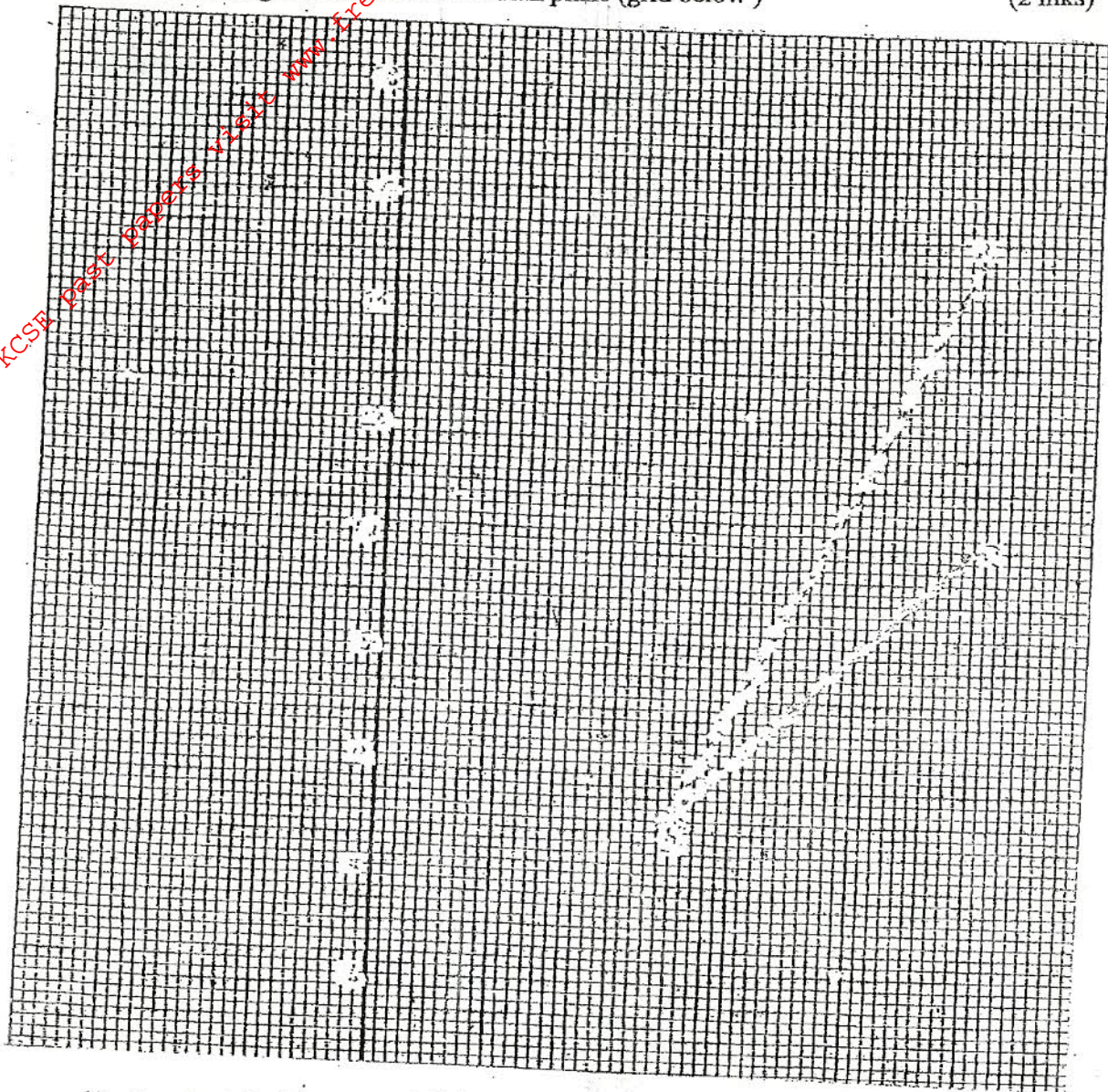
19. a) Express $\frac{1}{x-2} - \frac{2}{x+5} - \frac{3}{x+1}$ in the form $ax^2 + bx + c = 0$ where a,b and c are constants hence solve for x. (4 mks)

- b) Friday did x tests and scored a total of 240 marks. He did two more tests which he scored 28 and 26 marks. The mean score of the first x tests was 6 marks more than the mean score for all tests he did. Find the total number of tests that he did. (6 mks)

20. A triangle has vertices A(1,2) B(7,2) and C (5,4)

a) Draw triangle ABC on the Cartesian plane (grid below)

(2 mks)



b) Construct the image $\Delta A^I B^I C^I$ of ΔABC under a rotation of 90° clock wise about the origin. (2 mks)

c) Draw $\Delta A^{II} B^{II} C^{II}$, the image of $\Delta A^I B^I C^I$ under reflection in the line $y = x$, state the co-ordinates of A^{II}, B^{II} and C^{II} (2 mks)

d) $\Delta A^{III} B^{III} C^{III}$ is the image of $\Delta A^{II} B^{II} C^{II}$ under reflection in the line $y = 0$ Draw $\Delta A^{III} B^{III} C^{III}$ and state the co-ordinates of its vertices. (2 mks)

e) Describe a single transformation that maps $\Delta A^{III} B^{III} C^{III}$ onto ΔABC . (2 mks)

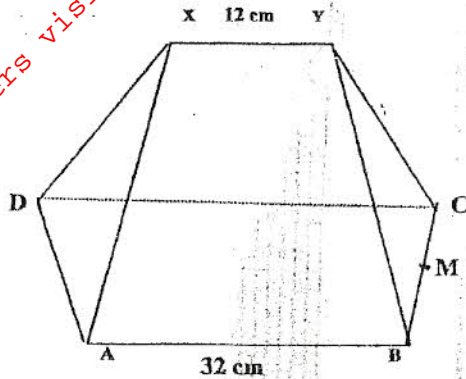
21. The posts P, Q and R are on the vertices of a triangular plain field. P is 350m directly south of Q.
- a) Using a scale of 1cm to represent 50m, draw a diagram to show the positions of the posts. (3 mks)

- b) Use the scale drawing to determine:
- i) the distance between R and Q in metres. (2 mks)

- ii) the bearing of R from Q (1 mk)

- c) Find the area of the field in hectares, correct to one decimal place. (4 mks)

22. The figure below shows a model of roof with a rectangular base ABCD. $AB = 32\text{ cm}$ and $BC = 14\text{ cm}$. the ridge $XY = 12\text{ cm}$ and is centrally placed. The faces ADX and BCY are equilateral triangles. M is the mid - point of BC .



Calculate

- a) (i) the length of YM (1 mk)
- ii) The height of Y above the base $ABCD$. (2 mks)
- b) The angle between the planes $CDXY$ and $ABCD$ (4 mks)
- c) The acute angle between the lines XY and BD . (3 mks)

23. Bob deposited Ksh. 218750 in a financial institution which paid simple interest at the rate of 12% p.a. at the end of 2 years, he withdrew all the money. He then invested the money in shares. The value of the shares depreciated at 6% p.a. during the first year of investment. In the next 3 years, the value of the shares appreciated at the rate of 8% every four months.

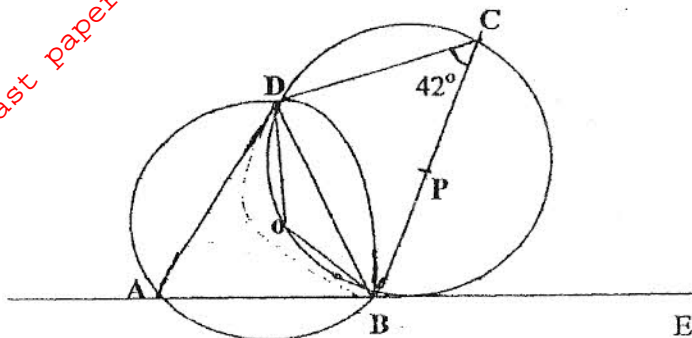
a) Calculate the amount Bob invested in shares. (3 mks)

b) Calculate the value of Bob's shares
i) at the end of first year. (2 mks)

ii) at the end of the fourth year, to the nearest shilling. (3 mks)

c) Calculate Bob's gain from the shares as a percentage. (2 mks)

24. In the figure below, points O and P are centres of intersecting circles at B and D. Line ABE is a tangent to circle BCD at B. Angle BCD = 42° .



a) Stating reasons, determine the size of:

i) $\angle CBD$

(2 mks)

ii) Reflex $\angle BOD$

(3 mks)

iii) Show that $\triangle ABD$ is isosceles

(3 mks)

iv) $\angle OBD$

(2 mks)