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## SCHOOL:

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121/1
MATHEMATICS
Paper 1
July/August
$21 / 2$ Haurss

## MASINGA DISTRICT JOINT EVALUATION TEST- 2011

Kenya Certificate of Secondary Education (K.C.S.E)

## 121/1

MATHEMATICS
Paper 1
July/August
$21 / 2$ Hours

## INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided above.
(b) Write the date of examination in the spaces provided above.
(c) This paper consists of TWO sections. Section I and Section II.
(d) Answer ALL the questions in section I and only 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 below each question.
(g) Marks may be given for correct working even if the answer is wrong.
(h) Non- programmable silent calculators and KNEC mathematical tables may be used except where stated otherwise.
(i) This paper consists 16 printed papers.
(j) Candidates should check the question paper to ascertain that all the papers are printed as indicated and that no questions are missing.

## FOR EXAMINER'S USE ONLY

SECTION 1

| 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 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
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Turn Over

## SECTION I ( 50 MARKS)

## Answer all questions in this section

1. Without using mathematical tables or calculators, evaluate

2. Three business people, Mutua, Kamau and Mwiti contributed a total of ksh.164,500 to start a retail business. The ratio of contribution of Mutua to Kamau was $2: 3$, that of Kamau to Mwiti was 4 : 5 . How much did Mutua contribute?
3. Munyao bought 24 trays of eggs at sh 225 each. Each tray contains 30 eggs but when transporting, 54 eggs broke. At what price must he sell each egg in order to realise a profit of $22 \%$. Give your answer correct to the nearest shilling.
4. A line $L_{1}$, passes through $\left(\frac{2}{2},-3\right)$ and $(-5,1)$. Find the equation of another line $L_{2}$ parallel to $L_{1}$ and itself passing through ( $4,-2$ ).

5. Solve the following simultaneous inequalities and state the integral values for the solution.
$\longrightarrow 1$
$3+1<-17$
6. Solve the equation.
7. Given the matrix below is asingular matrix. Find the values of $t$.
$\begin{array}{lll}8 & 3 & -8\end{array}$ ${ }^{2}$

(3 Marks)
8. A security guard observes that the angle of elevation to the top of an observation tower is $26^{\circ}$. If he walks 55 m towards the base of the tower, the angle becomes $47.5^{\circ}$. What is the height of the tower?
9. If $\mathrm{H}=-+-+-$, Find b when $\mathrm{a}=2, \mathrm{c}=4$ and $\mathrm{H}=6$.
10. Evaluate: $--+---2^{2} \quad 4 \div 5$.
11. Four farmers took their cows to the market. Kilonzo had two more cows than Mutua. Kyengo had three times as many cows as Kilonzo whereas Mwondu had ten less cows than both Kilonzo and Kyengo
a) Write a simplified algebraic expression with one variable representing the total number of cows.
(1 Mark)
b) Three butchers bought all the cows and shared them equally. If each butcher got 17 cows, find the number of cows Mutua had.
12. The interior angles of a hegtagon are $(3 \mathrm{p}+25)^{\circ},(2 \mathrm{p}-20)^{\circ}(2 \mathrm{p}+35)^{\circ}, 100^{\circ}, 135^{\circ}, 150^{\circ}$ and $125^{\circ}$. Find $P$.
(3 Marks)
13. Without using mathematical tables or a calculator, evaluate. Leaving your answer in surd form,
14. A map is drawn to a scale of $1: 50,000$ find;
i) The distance in km between two places which are 25 cm apart on the map.
(1 Mark)
ii) The area in $\mathrm{cm}^{2}$ of a field if the actual area of the field is $120,000 \mathrm{~m}^{2}$.
(2 Marks)
15. Draw a line $\mathrm{AB}=7.3 \mathrm{~cm}$. LS\$ing a ruler and a pair of compasses only, locate a point D such that

$$
\mathrm{AD}: \mathrm{DB}=1: 2 .
$$

16. The figure below represents a scale diagram (not drawn to scale) of a coffee plantation. Given that the scale used is 1 cm to 50 m . Calculate its area in hectares. $\mathrm{AB}=7 \mathrm{~cm}$.


## SECTION B

## Answer only five questions from this section

17. a) A carpet measufing $(x+4) \mathrm{m}$ by $(\mathrm{x}+1) \mathrm{m}$ is laid down in a rectangular room measuring 2 x m by $\mathrm{x} m$ leaving out uncovered floor near the walls all round the room. If the carpet is $36 \mathrm{~m}^{2}$, calculate the area $\frac{0}{\text { O }}$ the uncarpeted floor.
b) If 20 cm square tiles were used to carpet the uncarpeted section of the floor in (a) above, calculate the cost of carpeting the whole floor if the carpet costs sh300 per metre square and each tile costs sh100.

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121/ 1 mathematics paper 1 18. a) Draw on the grid provided the graph of $y=x^{3}-4 x^{2}$ for $-2 \leq x \leq 5$. Taking 2 cm to 1 unit on the x -axis and 2 cm to 5 znits on the y -axis.
b) Use your graph to solve ${ }^{2}$
i) $4 x^{2}=x^{3}$
(1 Mark)
(2 Marks)
c) Find a cubic equation whose solutions are $\mathrm{x}=3, \mathrm{x}=4$ when the graph of $\mathrm{y}=\mathrm{x}^{3}-4 \mathrm{x}^{2}$ is used to solve it.
19. Given that the position vector of $A, B$ and $C$ are $3 i-2 j,-6 i+4 j$ and $-9 i-3 j$ respectively.
a) State the column vectors,
i) AB
(2 Marks)
ii) CB
(2 Marks)
b) Find the distance from to C through B

d) If point $\mathrm{C}^{1}$ is the image of C under translation vector , find the co-ordinates of $\mathrm{C}^{1}$. (2 Marks)
20. A cylindrical water tank can be filled to a depth of 2.8 m by a pipe A in 2 hours. Pipe B takes 8 hours to fill the tank to the same depth. Pipe C can empty this amount in 6 hours.
a) Starting with tank empty and pipe A running alone in one hour, find the depth of water it fills.
(2 Marks)
b) If pipe A is turned offand pipe C left open for one hour, what will be the new depth of water?

(3 Marks)
c) If the tank is initially empty and pipe A and B are both running while pipe C is left open, after how long will the depth of water reach 2 m ?
(5 Marks)
21. The bearing of towns P and Q on a horizontal ground from a tower are $050^{\circ}$ and $142^{\circ}$ respectively. The angle of elevation of the top of the tower from town P is $34^{\circ}$. Given that P is 200 m from the top of the tower and Q is 120 m from the base of the tower. Determine,
a) The height of the tower.
(3 Marks)
b) The angle of elevation of the top of the tower from Q .

(5) Ahe distance between the two towns P and Q .
(4 Marks)
22. A cone is made by cutting off a sector as shown below from a circle and gluing the straight edges of the sector. The cone formed has a slant height 14 cm and circular base of perimeter 11 cm .
(Take $=$ - )

a) Determine the value of $\theta$
b) The radius of the cone circular base

(3 Marks)
d) The cone is cut uniformly on a horizontal plane 1 cm below the apex. Calculate the slant height of the frustum so formed correct to 2d.ps.
(3 Marks)
23. In the figure below RY is the diameter with O as the centre. If $\angle \mathrm{PRZ}=108^{\circ}, \angle \mathrm{PPZ}=24^{\circ}, \angle \mathrm{PQZ}=8^{\circ}$ and PQ is a tangent to the circle. ZNQ is a straight line.


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Calculate the following angtes;
a) \(<\mathrm{XRP}\)

(2 Marks)

\(j^{2}\)
\(s^{2}\)
\(x^{30}\)
b) \(<\mathrm{RPX}\)
(2 Marks)
c) \(<\mathrm{PXY}\)
(2 Marks)
d) \(<\mathrm{YZN}\)
(2 Marks)
e) \(<\mathrm{ZYN}\)
(2 Marks)
24. Use ruler and compasses for all construction in this question
a) Construct a quadrilateral PQRS such that the base \(\mathrm{PQ}=5 \mathrm{~cm}, \mathrm{PS}=5 \mathrm{~cm}\) and \(\mathrm{SR}=4.5 \mathrm{~cm}\). Angle \(\mathrm{SPQ}=75^{\circ}\) and arg \({ }^{\circ}\) le \(\mathrm{PSR}=90^{\circ}\)
(4 Marks)
b) Drop a perpendicular from point \(S\) to meet line \(P Q\) at \(N\). measure \(S N\).
(2 Marks)
c) Constructa aircle passing through vertices \(\mathrm{P}, \mathrm{Q}\) and R of the quadrilateral PQRS . Measure the radius of the circle.
d) Determine the area of the quadrilateral PQRS .```

