NAME $\qquad$
SCHOOL $\qquad$ .SIGNATURE $\qquad$ .DATE

121/1

## MATHEMATICS

## JULY/AUGUST 2012

$21 ⁄ 2$ HOURS

# BUNGOMA JOINT INTERSCHOOLS EVALUATION TEST (JISET) 

## Kenya Certificate of Secondary Education 2012

 MATHEMATICS ALT 'A'PAPER 1

$$
2 ½ \text { HOURS }
$$

Instructions to candidates

1. Write your name and index number in the spaces provided above.
2. Answer ALL questions in section 1 and only five questions in sec II
3. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
4. Marks may be given for correct working even if the answer is wrong.
5. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

For examiners 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 | Grand |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |$\quad$|  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |
|  |  |  |  |  |

Attempt ALL questions from this section

1. Evaluate without using calculator or mathematical tables leaving your answer as a simplified fraction.

$$
\frac{\frac{4}{110}-\frac{f^{5}}{5}\left(\frac{3}{4}-\frac{1}{20}\right)}{e^{2} x^{2}\left(3+\frac{1}{3}\right) \div\left(1+\frac{1}{10}\right)}
$$

2. What is the exact value of $\frac{2 W(x-2)^{2}}{y+1}$ if $x=3, y=x+3$ and $w=2 x+y$
3. Simiyu and Nasike each collected a number of stones in an arithmetic lesson. If Simiyu gave Nasike 5 stones, Nasike would have twice as many stones as Simiyu. If initially Simiyu had five stones less than Nasike, how many stones did each have?
(3mks)
4. The figure below shows vectors $\underset{\sim}{a}$ arod $\underset{\sim}{b}$. Construct on the same grid, $\underset{\sim}{c}$ given that

$$
\underset{\sim}{c}=2 \underset{\sim}{a}-\underset{\sim}{b}
$$

5. A cylinder of radius 14 cm contains water. A metal solid hemisphere of radius 6.8 cm is submerged into the water in the cylinder. Find the change in height of the water in the cylinder.
6. At $90 \mathrm{~km} / \mathrm{h}$, a car takes 2 hours to cover a distance A to B. How long would it take to cover the same distance if the car was travelling at $120 \mathrm{~km} / \mathrm{h}$ ?
7. Solve for x and y in the equation

$$
36^{x}(24)^{y}=192
$$

8. A gales man earns a basic wage of Ksh 1,500 per week. In addition, he is paid commission per week as follows:

For sales up to Ksh 50,000

> Commission

For sales above Ksh 50,000
i) For the first Ksh 25,000 2\%
ii) For the next Ksh 25,000
iii) For any amount above Ksh100, 000

During that week, he sold goods worth Ksh 115,000.What was his total pay for that week?
9. The coordinates of the points P and Q are $(1,-2)$ and $(4,10)$ respectively. A point T divides the line PQ in the ratio $2: 1$
a) Determine the coordinates of T
b) Find the equation of the line 0 erpendicular to PQ and passing through T .
10. For the quad filateral ABCD given below, find its image under reflection in the line $\mathrm{y}=0$ followed by reflection in the line $\mathrm{y}=-\mathrm{x}$

## GRAPH

11. The figure below shows an arc $A C E$ of a circle with centre $O$ and radius 6 cm . If $\mathrm{BC}=\mathrm{CD}=4 \mathrm{~cm}$, calculate the area of the shaded region if $\mathrm{DE}=\mathrm{AB}=1.53 \mathrm{~cm} . \quad(4 \mathrm{mks})$

12. The diagram below shows part of the quadrilateral PQRS.


Given that $2 R S=R Q$ and that $P Q R S$ is a cyclic quadrilateral, complete the diagram.
(3mks)
13. A poultry farmer has twenty times as many hens as turkeys and three quarters as many ducks as turkeys.
a) If there are $t$, turkeys, write down a simplified expression in terms of $t$ for the total number of birds on the farm.
b) Given that he has 72 ducks, calculate as a percentage the sum of turkeys and ducks to the number of hens on the farm.
14. The sum of angles of a triangle is given by the expression (2a+b) ${ }^{0}$ while that of a quadrilateral is given by (13a-ba $)^{\gamma}$. Calculate the values of a and b . (3mks)
15. The table ${ }^{\circ}$ below represents the marks scored by form 4 students in an end term exanination.

| Alarks | 6-10 | 11-20 | 21-35 | 36-55 | 56-65 | 66-70 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 3 | 5 | 8 | 10 | 8 | 6 |

Calculate the upper quartile.
(2mks)
16. Determine the inequalities that represent and satisfy the unshaded region below.

GRAPH
(3mks)

## SECTION II (50MARKS)

Attempt only FIVE questions from this section.
17. The figure below shows a perrtable Kennel.

a) Calculate
i) The total surface area of the walls and the floor.
ii) The total area of the roof.
b) The cost of roofing is Ksh 500 per square meter and that of making walls and floor is Ksh 600 per $\mathrm{m}^{2}$.Find the cost of making the Kennel.
c) Find the cost of roofing another Kennel whose dimensions are $50 \%$ more than those of the given Kennel.
18. Given the cotrordinates of the points $\mathrm{A}, \mathrm{B}$ and C as $(3,-2) ;(6,4)$ and $(9,3)$ respectively.
a) Express the following vectors in terms of $i$ and $j$
i) $A B$
ii) $C B$
b) Calculate the magnitude from A to C through B .
c) Determine the coordinates of the mid point of AC.
d) If $R$ divides $A C$ externally in the ratio $3: 1$, determine the coordinates of $R$.
19. A flag post 12 m long is fixed on tog a tower. From a point on horizontal ground, the angles of elevation of the top and bottom of the flag post are $46^{\circ}$ and $33^{\circ}$ respectively.

Calculate
a) The deorizizontal distance from the point on the ground to the base of the tower.
b) The total height of the tower and the flag.
c) The shortest distances from the point on the ground to
i) The top of the flag post.
ii) The top of the tower.
20. Four towns $\mathrm{P}, \mathrm{Q}, \mathrm{R}$ and S are such th hat town Q is 120 km due east of town P . Town R is 160 km due north of town $\mathrm{Q}_{\text {, }}$ town S is on a bearing of $330^{\circ}$ from P and on a bearing of $300^{\circ}$ from R.
a) Using ruler and compasses only, show the relative positions of towns $\mathrm{P}, \mathrm{Q}, \mathrm{R}$ and S . Take scale of 1 cm rep 50 km .
b) Determine
i) The distance SP in km
ii) The bearing of $S$ from $Q$
iii) How far north, S is, from line QP produced.
21.The figure below shows two intersecting circles of centres C and D radii 16 cm and 20 cm respectively. The two circtes subtend angles $\theta_{1}$ and $\theta_{2}$ at their centres respectively and intersect $\frac{\text { at }}{\mathrm{t}} \mathrm{P}$ and Q as shown.

a) Given that the area of triangle PCQ is $80.14 \mathrm{~cm}^{2}$,calculate the size of
i) The angle marked $\theta_{1}$
ii) The angle marked $\theta_{2}$
b) Calculate the area of the shaded region.
22.A private farmer in Mwea produced $14,400 \mathrm{bags}$ of rice in 2008. This was a decrease of $20 \%$ over the production in $2 \mathscr{5} 7$. In 2009 he increased production by $30 \%$. In 2010 , he managed to produce 12 d 00 bags of rice.
a) Find the number of bags of rice he produced in;
i) 2007

גii) 2009
b) What was the percentage decrease in production in 2010 over that of previous year?
c) Calculate the percentage decrease in production in 2010 over that in 2007
d) The price per bag of rice was Ksh 3500 in 2010 , how much did he get if he sold $65 \%$ of the produce in that year.
23. The diagram below (not drawn to scale) shows the position of a harbor H and three islands A,B and C. C is due Nowth of H. The bearing of A from H is $062^{\circ}$ and angle


a) Calculate the distance HB
b) Find the bearing of B from A
c) Given that the bearing of A from C is $133^{\circ}$, calculate AC
d) A light ship L is positioned due North of H and equidistant from A and H .

Calculate HL.
24. The table below gives some of the in the interval $0 \leq x \leq 6$.

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| y | 1 | $\sim^{*}$ | 7 |  |  | 23.5 |  |

a) Complete the values in the table above.
(b) Use the values in the table to draw the graph of the function on the grid provided below.

## GRAPH

c) Using the graph and the mid- ordinate rule with 6 strips, estimate the area bounded by the curve, the $\mathrm{x}_{5}$-axis, the y -axis and the line $\mathrm{x}=6$

4d) Using integration, calculate the exact area and hence find the percentage error made when mid-ordinate rule is used. Give your answer correct to 2d.p.

