NAME...INDEX NO...

SCHOOL...SIGNATURE ....DATE....................

121/2

MATHEMATICS

PAPER 2

JULY/AUGUST 2012

2 ½ HOURS

BUNGOMA JOINT INTERSCHOOLS EVALUATION TEST (JISET)

Kenya Certificate of Secondary Education 2012

MATHEMATICS

PAPER 2

2 ½ HOURS

Instructions to candidates

1. Write your name and index 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 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

1

SECTION I (50Marks)

Answer all questions in this section

1. A form four mathematics teacher originally worked out the mean mark of her fourty students to be fourty one. After correction of the quiz. She added some marks to Timina, Chobola and Cheloti in the ration of 5:2:3 respectively. If the new mean marks for the students increased by 1.5 determine how many marks Cheloti was added than Chobola.

    (3mks)

2. Simplify completely.

    $$\frac{2x^2 + x - 3}{4x^2 - 9}$$

    (3mks)

3. Use logarithms to evaluate

    $$\frac{2347 \, x0.4666^2}{\sqrt[3]{0.0924}}$$

    (4mks)

121/2

4. In 100m race there are three main competitors namely Simiyu, Ondiek and Kamau. Simiyu is three times likely to win as Ondiek, while Ondiek is twice as likely to win as Kamau. Find the probability that

    a) Ondiek wins the race   (2mks)

    b) Either Simiyu or Kamau   (1mk)

5. PQR is an equilateral triangle of sides 3cm. S is a variable point on the same side of PQ as R and on the same plane such that <PSQ=30^0. Locate by construction the possible location of S (use a ruler and a pair of compasses only)   (3mks)

6. A point P divides AB in the ratio 7: -5 where A (2,-3, 4) and B (-4, 7,-2). Find the coordinates of P.   (2mks)

7. Make Q the subject of the formula

$$T = P\sqrt{\frac{Q^2}{Q^2 - 1}}$$ (3mks)

3

8. The 2nd, 4th and 7th terms of an AP are the first 3 consecutive terms of a GP. If the common difference of the AP is 2 ,find

    a) The common ratio   (2mks)

    b) The sum of the first eight terms of the G.P.   (3mks)

9. Given that $Tan75^0 = 2 + \sqrt{3}$, hence determine Tan 15^0 leaving your answer in the form $a + b\sqrt{c}$ (3mks)

10. a) Find the expansion in ascending powers of x of $\left(1 - \dfrac{x}{3}\right)^7$ up to the term in x^2

                                                           (1mk)

    b) Hence evaluate $(0.99)^7$ to four significant figures.   (2mks)

11. A field is 10m longer than its width. The area is 7200m². What is the width? (4mks)

4

12. The matrix $\begin{pmatrix} x & -3 \\ 0 & x-1 \end{pmatrix}$ is a singular matrix, find the values of x   (3mks)

13. Water flows from a tap of diameter 7cm at a speed of 5m/s into a rectangular tank of length 5.5m by 3m and height 4.2m. If the tank was initially half full at 6.00pm.Find at what time the tank was full if no water was running out of the tank.   (3mks)

14. Solve the equation for $0^0 \leq \theta \leq 360^0$. $10Cos^2\theta + Sin\theta = -1$ (3mks)

5

15. The overall grade (A) attained by a student is directly proportional to the teacher's effort (t), square of students effort (s) and the general discipline level (d) of the school. A student doubled his effort; teacher went further by 5% but the school discipline dropped by 40%. Find the percentage change in the overall grade. (3mks)

16. Find the gradient of $y = x^2 - 3x$ at x=1 (2mks)

121/2

**SECTION II 50 Marks**

Answer **ONLY** five questions in this section.

17. The table below shows income Tax rates

Monthly taxable pay in Ksh	Rate of tax Ksh per k£
1-17,400	2
17,401-34,600	3
34,601-51,800	4
51,801- 69,000	5
69,001 and above	6

Faith earns a monthly basic salary of Ksh 45,000 and she is also given taxable allowances amounting to Ksh 20480 per month.

a) Calculate Faiths' gross income tax per month.   (4mks)

b) Faith is entitled to a personal tax relief of Ksh 1162. Determine her net income per month.   (2mks)

c) Faith received 50% increase in her total income; calculate the corresponding percentage increase on the net income tax.   (4mks)

7

18. The figure below shows points on the earth's surface.
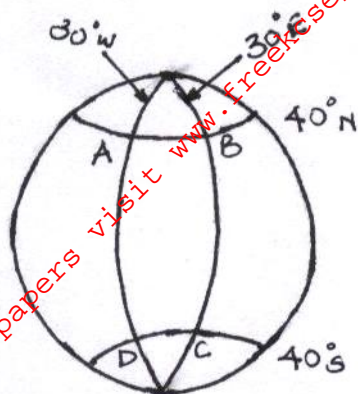
a) State the positions of A, B, C and D in coordinate form. (2mks)

b) An aircraft flies from A to B along latitude 40^0N, B to C. along longitude 30^0E, C to D along latitude 40^0S. Calculate to 4 S.f the total distance it covered .(Take radius of the earth =6371km) (5mks)

c) If the aircraft leaves A at 8.00am at a speed of 720km/h to B. At what local time is it expected at B? (3mks)

19. The table below shows the marks scored by eighty Form 4 students in a mathematics test.

8

Marks	$10 \leq x20$	$20 \leq x<30$	$30 \leq x<40$	$40 \leq x<50$	$50 \leq x60$	$60 \leq x<70$	$70 \leq x<80$	$80 \leq x<90$
Frequency	2	5	9	17	22	15	8	2

a) Calculate

   i) Mean mark   (3mks)

   ii) Lower quartile   (2mks)

b) On the grid provided draw the cumulative frequency curve to represent the above distribution.   (3mks)

   GRID

c) From the graph estimate the

9

i) 4th decile (1mk)

ii) Range of marks of the middle 70% of the students. (1mk)

20. a) Complete the table below giving your values correct to 2 decimal places.

x	0⁰	15	30	45	60	75	90	105	120	135	150	165	180
3x-30	-30	15	60	75	150		240	285	330	375	420		
Sin x													
2Sin (3x-30)													

b) Plot on the same axes the graph of y=Sin x and y= 2 sin (3x- 30) 2cm rep 150 on x-axis and 2cm to rep 0.5 unit y-axis. (5mks)
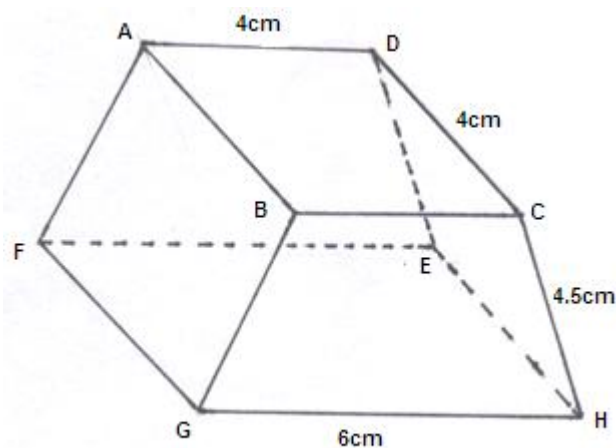
GRID

c) Describe the transformation that maps y=Sin x onto y=2Sin (3x-30) (2mks)

10

d) Use the graph of y=2Sin (3x-30) to solve the equation 2 sin (3x-30)= -0.5   (1mk)

21. The figure below shows a solid of pyramid with a square top of side 4cm and a square base of side 6cm. The slant edge of the frustrum is 4.5cm.

a) Calculate the volume of the frustrum.   (6mks)

b) Calculate the angle between
    i) Line AF and the base FGHE   (2mks)

    ii) Plane BCHG and base EFGH.   (2mks)

11

22. In a Chemistry form 4 class $\frac{1}{3}$ of the class are girls and the rest are boys, $\frac{4}{5}$ of the boys and $\frac{9}{10}$ of the girls are right handed while the rest are left handed. The probability that a right – handed student breaks a conical flask in any practical session is $\frac{3}{10}$ and the corresponding probability for a left handed student is $\frac{4}{10}$. The probabilities are independent of the students' sex.

   a) Represent the above information on a tree diagram .   (2mks)

   b) Determine the probability that a student chosen at random from the class is left handed and does not break a conical flask in simplest form.   (2mks)

   c) Determine the probability that the flask is broken in any Chemistry practical session in simplest form.   (3mks)

12

d) Determine the probability that a conical flask is not broken by a right handed
student in simplest form. (3mks)

23. In the diagram TCS is a tangent and DA is a diameter ,AB=BC and <DAC=38⁰
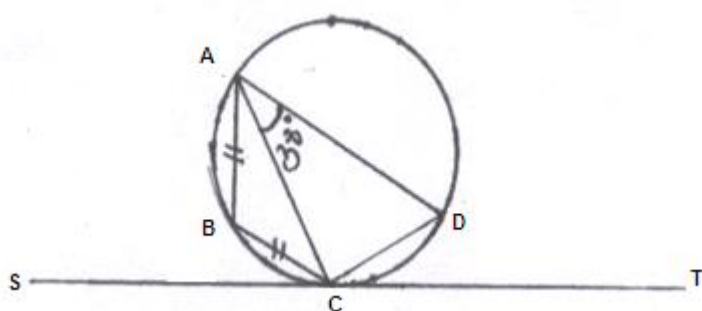
Find

a) <TCD (1mk)

b) < ACS (2mks)

c) <BCA (2mks)

d) <BCS (1mk)

The radius of the circle is 10cm

e) Find CA (2mks)

13

f) Find BC (2mks)

24. Kibabii university has two types of buses a big bus type X with a capacity of 52 passengers and a minibus type Y with a capacity of 28 passengers. Bungoma high school wishes to take 364 students for a tour. They have to use at most 10 buses. The high school should use at least each type of buses.

a) Form all the possible inequalities which will represent the above information. (3mks)

b) On the grid provided draw the inequalities and shade the unwanted region. (3mks)

GRID

14

c) The charges for hiring the vehicles are

Type x Ksh25, 000

Type y Ksh 20,000

Use your graph to determine the number of buses of each type that should be hired to maximize the income of kibabii university.   (2mks)

Determine the maximum income.   (2mks)

15

121/2