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**FORM FOUR TRIAL 2, 2019**

**Kenya Certificate of Secondary Education**

**121/2 MATHEMATICS**

**PAPER TWO**

**TIME: 2½HRS**

**Instruction:** Attempt **ALL** Questions in Section **I** and any **FIVE** in section **II**

**INSTRUCTIONS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | TotalGRAND TOTAL |
|  |  |  |  |  |  |  |  |  |

**SECTION I (50Mks)**

**Attempt ALL Questions from this section**

1. Make x the subject of the formula 3mks

P = x + 2w

 4x + 3R

1. P varies partly as the square of v and partly as the cube of v. when V=2, P = -20 and when v = -3, P=135. Find the relationship between P and v. 3mks
2. Expand (1 + 2x)7 up to x³, hence use the expansion to estimate the value of (1.02)7 correct to four decimal places. 3mks
3. Simplify the following by rationalizing the denominator. 3mks

 2 – 1

4 2– 3

1. The diagram below represents a field ABC.

A

 B C

(a) Draw the locus of points equidistant from sides AB and AC 2mks

(b) Draw the locus of points equidistant from points A and C. 2mks

C) A coin is lost within a region which is nearer to point A than to point C and closer to side AC than to side AB. Shade the region where the coin can be located. 2mks

1. Given x = 13.4cm and y=4.3cm. calculate the percentage error inx/y correct to 4 d.p

3mks

1. If matrix A = $(\begin{matrix}1&2\\4&3\end{matrix}$) Find B given that A² = (A +B). 3mks
2. In the figure below QT is a tangent to a circle at Q. PXRT and QXS are straight lines. PX = 6cm, RT = 8cm, QX= 4.8CM



X

Find the length of

1. XR 2mks
2. QT 2mks
3. A circle whose equation is (x -1)² + (y – k)² = 10 passed through point (2,5). Find the coordinates of the two possible centresof the circle. 3mks

1. A blender mixes two brands of juice A and B to obtain 70mls of the mixture worth Ksh. 165 per litre. If brand A is valued at Kshs. 168 per litre and brand B at Ksh. 153 per litre bottle, calculate the ration in which the brands A and B are mixed. (2mks)
2. Without using logarithm tables solve the equation log

(5x – 4) = log(x + 2) + 1/3 log 27. 3mks

1. a) Use reciprocal tables to find the value of = 1 / 0.325 1mk

b) Hence, evaluate $\frac{\sqrt[3]{0.000125}}{0.325}$ 1mk

1. The G.C.D of three numbers is 45 and the LCM is 18900. Two of the numbers are 675 and 540. Find the other possible numbers. 3mks
2. solve for $θ$ given that $θ$ is acute and sin (3$θ$ - 50⁰) – Cos (20 + 10⁰) = 0 3mks
3. A container of height 90cm has a capacity of 4.5L. What is the height of a similar container of volume 9cm³. 3mks
4. A point R divides a line PQ internally in the ration 3:4. Another point S, divides the line PR externally in the ratio 5:2. Given that PQ = 8cm, calculate the length of RS, correct to 2 decimal places. 3mks

**SECTION II (50mrks)**

**Attempt any FIVE questions from this section**

1. Complete the table below for the function
2. y=x² + 12/x – 15 for 0.5≤ x ≤4

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
| y | 9.25 |  |  | -5 | -4 |  |  |  |

1. Draw the graph of y=x² + 12/x – 15 for 0.5≤x≤4. using a scale of 2cm rep 1 unit on the x – axis and 2cm for 5 units on the y – axis. 3mks
2. (i) from your graph, state the range of values of x for which y=x² + 12/x ≤ 18 3mks

(ii) By adding a suitable straight line to your graph, solve the equation y = x² + 12/x – 5x + 20 3mks

1. The product of the first three terms of a geometric progression is 64. If the first term is a and the common ratio is r.
2. Express r in terms of a 3mks
3. Given that the sum of the three terms is 14,
4. Calculate the values of a and r and hence write down two possible sequences each up to the 4th term. 5mks
5. Find the product of the 50th terms of the two sequences 2mks
6. The table below shows income tax rates for certain year.

|  |  |
| --- | --- |
| **Monthly income in Kenya Shillings (Kshs)** | **Tax rate in each shillings** |
| 0 – 10164 | 10% |
| 10165 – 19740 | 15% |
| 19740 – 29316 | 20% |
| 29317 – 38892 | 25% |
| Over 38892 | 30% |

A tax relief of Kshs. 1162 per month was allowed. In a certain month of the year, an employee’s taxable income in the fifth band was Ksh. 2108.

1. Calculate
2. Employees total income in that month 2mks
3. The tax payable by the employee in that month. 5mks
4. The employee’s income includes a house allowance of Ksh. 15,000 per month. The employees contributed 5% basic salary to a cooperative. Calculate the employee net pay for that month. 3mks
5. The following table shows the distribution of marks obtained by 50 students in a test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 |
| No. of Students | 3 | 9 | 13 | 15 | 5 | 4 | 1 |

By using an assumed mean of 62, calculate

1. The mean 5mks
2. The variance 3mks
3. The standard deviation 2mks
4. A red and black dice are rolled and the events x, y and z are defined as follows.

X = the red die shows a 4

Y = the sum of the scores of the two dice is 6

Z = the black dice shows a 3

1. Find the probability of event x 2mks
2. The probability of events x and y 3mks
3. Which event is mutually exclusive to x 1mk
4. Which event is independent of x 2mks
5. The probability of event Y 2mks
6. a) Complete the table below 2mks

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 30⁰ | 60⁰ | 90⁰ | 120⁰ | 150⁰ | 180⁰ | 210⁰ | 240⁰ | 270⁰ | 300⁰ | 330⁰ | 360⁰ |
| - Cos x | -1 |  | -0.5 |  | 0.5 | 0.87 |  | 0.87 |  |  | -0.5 | 0.87 |  |
| Sin(x-30⁰) |  | 0.0 | 0.5 |  |  | 0.87 | 0.5 |  | -0.5 |  |  | -0.87 | -0.5 |

b) Draw the graphs of y=sin(x-30) and y=-Cos x on the same axes, for 0⁰≤x≤360⁰

(5mks

Grid square

c) Use your graph to solve the equation sin(x - 30⁰) + Cos x = 0 (3mks)

1. in the figure below, O is the centre of the circle, PQR is the tangent to the circle at Q, Angle PQS=28⁰, angle UTV = 54⁰ and UT = TQ



Giving reasons, determine the size of

1. Angle STR 2mks
2. Angle TQU 2mks
3. Reflex angle TQS 2mks
4. Reflex angle UOQ 2mks
5. Angle TQR 2mks
6. The cost c of producing n items varies directly as n and partly as the inverse of n to produce two items it costs Ksh. 135 and to produce three items it costs Ksh. 140. Calculate
7. The constant of proportionality and hence write the equation connecting c and n. 5mks
8. The cost of producing 10 items 2mks
9. The number of items produced at a cost of Ksh. 756. 3mks