**Name :…………………………………………………….…… Adm.no ………..........................................**

**School :…………………………………………………..……… Class…………………………….………..**

**Candidate’s sign……………………………..… Date :…………………………………**

**121/2**

**MATHEMATICS**

**PAPER 2**

**TIME: 2 ½ HOURS**

**SET 5**

FORM 3

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

**INSTRUCTIONS TO CANDIDATES:**

* *Write your* ***name*** *and* ***index number*** *in the spaces provided above.*
* ***Sign*** *and* ***write*** *the date in the space provided above.*
* *The paper contains* ***two*** *sections: Section* ***I*** *and* ***II.***
* *Answer* ***all*** *the questions in* ***Section 1*** *and* ***only******five*** *questions from* ***Section II.***
* *All working and answers* ***must*** *be written on the question paper in the spaces provided below each question.*
* *Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.*
* *Non-programmable silent electronic calculators and**KNEC mathematical tables may be used, except where stated otherwise.*
* *Marks may be given for correct working even if the answer is wrong.*

**For Examiners’ Use Only**

**Section I**

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

**Section II**

**GRAND**

**TOTAL**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Questions** | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | **Total** |
| **Marks** |  |  |  |  |  |  |  |  |  |

*This paper consists of 16 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**SECTION I (50MARKS)**

***Answer ALL questions from this section***

1. Find the **GCD** of 60, 100 and 840 (2mks)

2. Evaluate $1\frac{3}{4}x4\frac{1}{2}-\frac{1}{2}÷2\frac{3}{5}+\frac{2}{5}$ (3mks)

3. Find the 10th term and the sum of the first ten terms of the GP (4mks)

4. Five people can build 3 huts in 21 days. Find the number of people working at the same rate that can build 6 similar huts in 15 days. (2mks)

5. The distance covered by a rolling object at an interval of 1 second were recorded as 4cm, 16cm, 28cm, 40cm etc. After how long will the object be 22.6M from the starting point? (4mks)

6. A bus service number 4 leaves a terminus every 15 minutes. Services 8 and 3 leaves every 20 and 30 minutes respectively. If all the three services leave together at 06.00 am, at what other times during

 day time do they leave together ? (3mks)

7. The length and breadth of a rectangle are measured and given as 2.5cm and 1.2cm respectively. Determine the maximum possible error in the area calculated using these values. (4mks)

8. Find the eighth term and the sum of the first 15 terms of the **AP**. (4mks)

 -7 + -4+-1+……………

9. An arc of a circle, radius 10cm, subtends an angle of 80o at the centre of the circle. Find the length of the arc. (2mks)

10. In a trapezium of area 40cm2 the ratio of the lengths of the parallel sides is 2 : 3. Find the lengths of the parallel sides if they are 5cm apart. (3mks)

11. Find the volume of a prism 20cm long and whose cross-section is an equilateral triangle of side 9cm.

12. The equations of a line **L1** is $ 4y-3x+8=0$. Find the equation of line **L2** which is perpendicular to **L1** and passes through (2, 7) (3mks)

13. Solve for x in $3^{2x+1}+5\left(3^{x}\right)- 2=0$ (3mks)

14. Express $\frac{2 - √3}{2+√3}$ + $\frac{4- √3}{2- √3}$ in the form a + b$√c$ (3mks)

15. Expand (1 + ½ x)7 up to the first four terms. Hence, use your expansion to find the value of (1.02)7 (4mks)

16. **Y** varies directly as the square of ***x*** and inversely as ***z***. If x is increased by 10% and ***z*** is decreased by 20%, find the percentage change in **Y** (4mks

**SECTION B**

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

17. Given that y is inversely proportional to ***xn*** and ***k*** is the constant of proportionality

 (a) (i) Write down a formula connecting ***y****,* ***x****,* ***n*** and ***k***  (1mk)

 (ii) If ***x*** *= 2* when ***y*** *= 12* and ***x*** *= 4* when ***y*** *= 3,* write down two expressions for ***k*** in terms of **n**. Hence find the value of **n** and **k** (7mks)

 (b) Using the value of ***n*** obtained in **(a) (ii)** above find ***y*** when ***x*** = 5 $\frac{1}{3}$ (2mks)

18. (a) After getting 10% discount, a man pays Ksh. 450 for a sweater. Find the marked price of the sweater.

 (b) After how long will Kshs. 1, 000 grow to Kshs. 2, 000 at18% p.a. simple interest ?

 (c) Find the compound interest on Kshs. 10, 000 for 2 years at 12 % p.a.

 (d) A man invests Kshs. 10, 000 in an account which pays 16% interest p.a. The interest is compounded quarterly. Find the amount in the account after 1 ½ years.

19. A water vendor has a tank of capacity 18900 liters. The tank is being filled with water from two pipes A and B which are closed immediately the tank is full. Water flows at the rate of 150000cm3/minute through pipe A and 120000cm3/minute through pipe B.

 (a) If the tank is empty and the two pipes are opened at the same time. Calculate the time it takes to

 fill the tank. (3mks)

 (b) On a certain day the vendor opened two pipes A and B to fill the empty tank. After 25minutes he

 opened the outlet pipe to supply water to the consumers at an average rate of 20 litres per minute.

 (i) Calculate the time it took to fill the tank on that day. (4mks)

 (ii) The vendor supplied a total of 542 jericans each containing 25 liters of water on that day. If the

 water that remained in the tank was 6300 liters calculate in litres the amount of water that was

 wasted. (3mks)

20. The frequency distribution table shows marks obtained by 40 pupils in a mathematics test.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Marks | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90-99 |
| Number of pupils | 2 | 3 | 10 | 12 | 8 | 3 | 2 |

1. Sate the modal class (1mk)

 b)calculate the mean mark (5mks)

c)Calculate the median mark (4mks)

21. Kisumu boys High School hall has 200 seats. During the District Drama festivals, tickets were sold at Ksh. 150 for adults and kshs. 75 for students.

 (a) On day one of the festival 80% of the seats in the hall were occupied and twenty of the seats were occupied by students. Calculate the total money collected from the sale of trickets this day. (3mks)

 (b) On the last day of the festival, x students occupied the seats and all seats were occupied. The money collected from the sales was sh. 25, 350.

 (i) Write down an equation of ***x***. (2mks)

 (ii) Calculate the value of ***x***. (2mks)

 (c) The money collected from the sale of tickets during the festivals was divided among cost of hosting, allowances for adjudicators and electricity bill in the ratio of 7 : 3 : 2, If the allowances amounted to 126, 000, calculate the:-

 (i) Amount collected during the festival (3mks)

 (ii) The cost of electricity bill during the festival (1mk)

22. Triangle **PQR** has vertices at **P**(3 ,-1), **Q**(5, 2) and **R**(2, 3). Plot and draw **PQR** on the grid provided (1mk)

(b) Given that triangle **P’Q’R’** is the image of **PQR** under positive quarter turn about the origin, plot and draw **P’Q’R’** on the same axis as **PQR** (3mks)

 (c) **P’’Q’’R’’** is the image of **PQR** after a reflection in the line ***y + x = 0***. Plot and draw **P’’Q’’R’’** on the same axes as **PQR** and **P’Q’R’** above. (3mks)

 (d) State the pairs of triangles above that are:

 (i) Oppositely congruent (2mks)

 (ii) Directly congruent (1mk)

23. The figure below represents a rectangle **PQRS** inscribed in circle centre **O** and radius 17cm **PQ** = 16cm.

**R**

•

**16cm**

**17cm**

**S**

 **D**

 **O**

 **Q**

 Calculate

 (a) the length **PS** of the rectangle (3mks)

 (b) the angle **POS** (3mks)

 (c) the area of the shaded region (4mks)

24. Data collected from an experiment involving two variables ***x*** and ***y*** was recorded as shown in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **X** | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
| **Y** | -0.3 | 0.5 | 1.4 | 2.5 | 3.8 | 5.2 |

 The variables are known to satisfy a relation of the form ***y = ax3 + b*** where ***a*** and ***b*** are constants

 (a) For each value of ***x*** in the table above write down the value of ***x3*** (2mks)

 (b) (i) By drawing a suitable straight line graph estimate the value of ***a*** and ***b***. (7mks)

 (ii) Write down the relationship between ***y*** and ***x*** (1mk)