**SUNRISE ONE TERM 1 EXAMINATIONS 2023**

**Kenya Certificate of Secondary Education**

**FORM FOUR**

**Form 4 MATHEMATICS Term 1**

**PAPER 2 APRIL 2023 – 2½ Hours**

**Name**: ………………………………………………… **Adm** **No**: ………**Index No**.……

**Class**: ………………**Candidate’s** **Signature**: ……. **Date**: …..……………..

**Instructions to Candidates STUDENT’S TARGET …………**

1. Write your name, admission number and class in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consists of **two** sections**; Section I** and **Section II.**
4. Answer **all** the questions in **Section I** and any **five** questions from **Section II**
5. **Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question**
6. Marks may be given for correct working even if the answer is wrong.
7. Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.
8. **This paper consists of 16 printed pages.**
9. **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

**For Examiner’s Use Only**

**Section I**

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

**Section II**

**Grand**

**Total**

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

1. Make L the subject given that H = (3marks)
2. Expandup to the term x3 hence use your expansion to find the estimate value of 100(1.05)9 correct to 4 significant figures. (4marks)
3. In the figure below it shows a triangle ABC not drawn to scale. Calculate the value of b given that AB =240m (3marks) ****
4. Without using a mathematical tables or calculators, simplify (3marks)
5. Show that 4y2 + 4x2 = 12x – 12y + 7 is the equation of a circle, hence find the co-ordinates of the centre and the radius. (3marks)

1. The dimensions of a rectangle are given as 4.1cm by 2.8cm. Calculate the relative error in the area. (3marks)
2. The seventh term of an arithmetic sequence is 17, three times the third term is 3. Calculate the first term and the common difference of the sequence. (3marks)
3. At the start of the 1st year, Mr Cheruiyot, deposited Ksh. 180,000 in a bank which gives an interest of 12% p.a, compounded quarterly. Find the interest earn by Mr. Cheruiyot at the start of the 4rd year. (3marks)
4. A quantity P varies partly as n and partly as the square of n. When P= -3, n= -1 and when P= 18, n=2. Find P when n =1 (3marks)
5. Find the inverse of hence find the point of intersection of the lines whose equations are

 (4marks)

1. Evaluate the following expression without using mathematical tables or a calculator

3 log104 + log 10125 – 3log102. (3marks)

1. The area of triangle ABC is 7cm2. Find the area of the image of ABC, if its transformed using the matrix . (3marks)

1. Given that vectors a =3i-j=2k, b= 4i+2j-k and p= 2a-b.
2. Express p in terms of i, j and k. (2marks)
3. Hence calculate /p/ correct to 3 significant figures. (1mark)
4. In what ratio must Murang’a coffee costing sh.25g per 100g be mixed with Kisii coffee costing sh.17.50 per 100g, so that by selling the mixture at sh.25 per 100g, a profit of 25% is made. (3marks)

1. Calculate the mean absolute deviation in the following 9,2,3,4,5,5,7,8,1. (3marks)

1. Solve for x in the equation 2 sin (x-300)= - for the range 0 ≤ x ≤ 3600. (3marks)

 **SECTION II (50MKS)**

1. In the cuboid below, AB = 8cm, BC = 6cm, AE = 4cm



Calculate,

1. The length BD (2marks)
2. The angle which BH makes with the plane ABCD. (2marks)
3. The angle between EC and the plane ADHE (2marks)
4. The angle between EA and AG (2marks)

 e) The angle between planes ABCD and EBCH (2marks)

1. Use a pair of compass and ruler only in this question

a) Construct a parallelogram ABCD in which AB = 6cm, AD = 4cm and angle BAD = 60o

 (3marks)

b) Measure the length AC (1mark)

 c) Show the locus of point P which moves so that it is equidistant from A and C (3marks)

 d) The locus of point Q which moves so that angle BQD = 90o (3marks)

1. In the figure below AB and AC are tangents to the circle center O at B and C respectively, the angle AOC = 600, radius of the circle 5cm.

•

**600**

**B**

**A**

**C**

**O**

 Calculate;

 a) The length of AC (2marks)

 b) The area of triangle OAC (2marks)

 c) The area of minor sector COD (2marks)

 d) The area of the shaded region (4marks)

1. a) Complete the table below for the equation y= x3 – 5x2 + 2x + 7 in the range -2 ≤ x ≤ 5. (2marks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| **x3** |  | -1 |  |  |  |  |  | 125 |
| **-5x2** |  |  |  |  |  |  |  |  |
| **2x** |  |  | 0 |  |  |  |  |  |
| **7** | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| **y** |  | -1 |  |  |  | -5 |  |  |

b) Draw the graph of y= x3-5x2+2x+7. (3marks)

c) Use your graph to solve the equation x3-5x2+2x+7=0. (2marks)

d) By drawing a suitable straight line, use your graph to solve the equation x3-5x2+x+4=0. (3marks)



1. Mungai, Koskei and Kendie are participating in an athletic competition. The probability that Mungai, Koskei and Kendie complete the race in respectively. Find the probability that in a competition;
2. Only one of them completes the race. (3marks)
3. All the three completes the race. (1mark)
4. None of them completes the race. (1mark)
5. Two of them complete the race. (3marks)
6. At least one completes the race. (2marks)
7. A businessman obtained a loan of sh.450,000 from a bank to buy a matatu valued at the same amount. The bank charges interest at 24% per annum compounded quarterly
8. Calculate the total amount of money the businessman paid to clear the loan in 1 years to the nearest shillings (3marks)
9. The average income realized from the matatu per day was sh.1500. The matatu worked for 3 years at an average of 280 days per year. Calculate the total income from the matatu (3marks)
10. During the three years the value of the matatu depreciated at the rate of 16% per annum. If the businessman sold the matatu at its new value, calculate the total profit he realized by the end of the 3 years (To the nearest shillings) (4marks)
11. A church has a sitting capacity of 468 people with the members sitting in rows which have 3 long benches and 2 short ones. The long bench takes 2 people more than the short bench. Let the number of people sitting on the short bench be .
12. Form an expression in for the number of rows of benches. (2marks)
13. A new pastor finds this arrangement crowded and decides that by having one more person on each long bench, he can take out some rows and still sit the same number of people. Find an expression in x for the new number of rows of benches. (2marks)
14. If one row of benches was taken out, find the original number of people per row. (6marks)
15. a) Fill in the table below giving the values correct to 2 decimal places. (3marks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | 0 | 300 | 600 | 900 | 1200 | 1500 | 1800 | 2100 | 2400 | 2700 | 3000 | 3300 | 3600 |
| Sin 2x |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3cos x-2 |  |  |  |  |  |  |  |  |  |  |  |  |  |

b) On the grid provided draw the graphs of y=sin2x and y=3cosx – 2 of 00 ≤ x ≤ 3600 on the same axis. Use the scale of 1cm to represent 300 on the x axis and 1cm to represent 1 unit on the y axis. (5marks)

c) Use the graph in (b) above to solve the equation 3 cos x – sin 2x= 2. (2marks)