**NAME……………………………..………….INDEX NUMBER………………………..**

**121/1**

 **MATHEMATICS PAPER 1.**

**PRE-MOCK 2022.**

**Hours**

**SUKELLEMO**

 **Instructions to Candidates**

1. Write your name and index number in the spaces provided below
2. Sign and write the date of examination in the spaces provided above.
3. The paper consists of **TWO** sections: **Section I** and **Section II**.
4. Answer **ALL** questions in **Section I** and **ONLY** five from **Section II**.
5. All answers and working must be written on the question paper in the spaces provided below each question.

 **(f)Show all the steps in your calculations, giving your answers at each stage in the spaces below each question**

1. Marks may be given for correct working even if the answer is wrong.

 **(g) Non – programmable** silent calculators and KNEC Mathematical tables may be used except where stated otherwise.

1. **The paper consists 14 printed pages.**

 **For Examiner’s use only**

 **Section I**

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

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|  |

 **Section II GRANT TOTAL**

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

**SECTION 1 (50 MARKS)**

***Answer all the questions in the space provided below each question***

1. Find the equation of a straight line passing through the points A (1,-3) and B (-2, 5).Express your answer in the form ax + by = c where a, b and c are integers. (3marks)

2. Evaluate without using mathematical tables or calculator $\frac{-10÷2+6×4-8×5}{-5+(-12)÷3×2}$ (3marks)

3. Solve for $x $in the equation $\frac{Cos(2x-30)°}{Sin(3x+10)°}= tan45°$ (3marks)

4. Two taps P and Q together can fill a water tank in 6 minutes. Tap P alone takes 5 minutes longer than tap Q. How many minutes does it take tap P alone to fill the tank? (3marks)

5. Given that,$ 27^{5x-2y}=243 and 81^{2x-y}=3$, Calculate the values of x and y. (3marks)

6. A point P is mapped onto P’ by a negative quarter turn about the origin. P’ is mapped onto P’’ by a translation represented by the vector $\left(\begin{matrix}-2\\3\end{matrix}\right)$ . If P’’ has coordinates (11,-5) determine the coordinates of p. (3marks)

7. A metallic pipe which is 21 meters long has an internal radius of 13 cm and an external radius of 15 cm. if the density of the metal is 8620 kg/ m3, find its mass. (3marks)

8. Using logarithms evaluate $\sqrt[3]{\frac{82.73×0.2943^{2}}{613.5}}$ (3marks)

9. A proper fraction is such that the denominator exceeds the numerator by 3. If 2 is subtracted from both the numerator and denominator, the fraction formed is $\frac{1}{8}$ less. Determine the original fraction. (3 marks)

10. Given that OM = 2i +3j -6k and ON = -3i + 5j +k.Find the magnitude of MN to 2 decimal places. (3marks)

11. Find the range of the integral values of x in the inequality $10<3(x+2)<35$ , giving your answer in the form $a\leq x\leq b$ (3marks)

12. Simplify completely $\frac{2-2x}{6x^{2}-x-12}÷\frac{x-1}{2x-3}$ (3marks)

13. The marked price of a recliner sofa set in a furniture store was ksh 400,000.A customer bought the recliner at 10% discount. The dealer still made a profit of 20%, Calculate the amount of money the dealer paid for the recliner. (3marks)

14. Draw a line AB of length 9 cm. On one side of line AB construct the locus of a point P such that the area of triangle ABC is 13.5 cm2.On this locus locate two positions of a point P1 and P2 such that 

15. Given that the area of an image is four times the area of the object under a transformation whose matrix is$\left(\begin{matrix}x&x-4\\x+8&x\end{matrix}\right)$, find the possible value of $x$ . (3 marks)

16. Construct a triangle ABC in which AB = 5cm and AC = 8cm and $∠ABC=105°.$ Using line AC, locate point x on AB produced such that AX: XB =3: -2. (4marks)

 **SECTION II (50 MARKS)**

**Answer only five questions in this section**

 17. The table below shows the weekly salary (k$£)$ paid to workers in a school.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Salary (k$£)$ | $$50\leq x\leq 100$$ | $$100\leq x\leq 150$$ | $$150\leq x\leq 250$$ | $$250\leq x\leq 350$$ | $$350\leq x\leq 500$$ |
| No. of Workers | 25 | 27 | 30 | 26 | 24 |

a) Calculate the differences between the mean and the median. (6 marks)

b) Draw a frequency polygon to illustrate the above information. (4marks)



18. a) Complete the table of values for the equation, $ y=-2x^{2 }+x+8$. (2marks)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| y |  |  |  |  |  |  |  |  |

 b) Use the values above to draw the graph of$ y=-2x^{2 }+x+8$ . (3marks) 

c) Using the graph drawn above Solve the equations:-

(i) $2x^{2}=x+8$ (2marks)

(ii) $-2x^{2}+4x+12=0$ (3marks)

 19. Three towns P, Q and R are such that Q is 16 km north of P and the distance of R is 12 km from P and on a bearing of 60 o from Q.

a).Using a scale of 1cm to represent 4km, Make a scale drawing showing the relative positions of the three towns. (3marks)

b) Using the scale drawing above, find the

i) Distance of R from Q. (1mark)

ii) Bearing of P from Q. (1mark)

iii) How far town R is east of Q (1mark)

c) A Passenger in an aero plane after take-off from town R spotted town P at an angle of depression of 48o, by means of a scale drawing determine the vertical height of the plane at town R. (3marks)

20. a) The equation of a straight line $L\_{1}$ is of the form $3y+2x=5. L\_{1}$ is perpendicular to $L\_{2} $and meets it at the point where $ X=-2,$ determine the equation of $L\_{2}$ in the form y = mx+c where m and c are constants. (5marks)

b) $L\_{3}$ is parallel to the line $L\_{2}$ and passes through the point (-3,2).,find the equation of $L\_{3},$ leaving your answer in its double intercept form. (3marks)

c) Determine the angle of inclination of $L\_{2}$ to the Y-axis. (2marks)

21. The points **P, Q, R** and **S**, have position vectors **2p, 3p, r** and **3r** respectively, relative to an origin O. A point **T** divides **PS** internally in the ratio 1:6.

a) Find, in its simplest form **OT, QT** and **TR** in terms of **p** and **r**. (6 marks)

b) Show that the points **Q, T** and **R**, are collinear. (3marks)

C) Determine the ratio in which **T** divides **QR**. (1mark)

22. In the figure below, O1 and O2 are the centers of the circles whose radii are 5 cm and 8 cm respectively. The circles intersect at A and B and angle AO1O2 = 64˚.

Calculate the area of the:-

 a) Sector

O2

O1

A

B

8cm

5cm

i) AO1B (2marks)

ii) AO2B (3 marks)

b) Intersecting region. (3marks)

c) The shaded region. (2marks)

23. a) Find the x –intercept of the curve y = (x+2) (x-1)2. (1mark).

b) Find the gradient function of the curve y = (x+2) (x-1)2  (2marks)

c) Find the co-ordinates of the turning point. Hence sketch the curve y= (x+2) (x-1)2. (4 marks)

d) Calculate the exact area enclosed by the curve and the x - axis (3marks)

24. P and Q are two points on latitude 40$°$N.Their longitudes are 30$°$E and 150$°$W respectively. Find to one decimal place :( Take the radius of the earth = 6370km and$π=\frac{22}{7}$)

a) The distance in km between P and Q along the parallel of latitudes. (2marks)

b) The shortest distance along the earth’s surface between P and Q in km. (3marks)

c) A weather forecaster reports that the center of a cyclone at (40$°$N, 60$°$W) is moving due north at 24 knots. How long will it take to reach a point (45$°$N, 60$°$W). (2marks)

d) A plane leaves P at 2.15 pm at a speed of 350 knots to town R (40oN, 65oE). Determine the time at R when the plane arrived. (3marks)