**Name ……………………………………………… Index Number ……………………………**

**Candidate’s signature …………………………. Date ………………………………………**

**121/1**

**MATHEMATICS**

**Paper 1**

**21/2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

* Write your name and index number in the spaces provided above
* Sign and write the date of examination in the spaces provided above.
* Mathematical tables and silent electronic calculators may be used.
* All working MUST be clearly shown where necessary.

**For Examiner’s Use Only**

Section

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |
|  |  |  |  |  |  |  |  |  |

***This paper consists of 14 printed pages, candidates should check to ensure that all pages are printed and no page is missing***

**SECTION A (50MRKS)**

**Answer ALL questions in this section**

1. Solve the equation (2x + 4) (2x – 1) =6 (3mks)
2. Simplify completely (3mks)

3a2 + 5ab -2b2

a2 - 4b2

1. Two similarly shaped cans hold 2000cm3 and 6.75 liters respectively. If the smaller can is 16cm in diameter, what is the diameter of the larger one? (2mks)
2. The length of the rectangular flower garden is 7m greater than its width. Its diagonal is 2m greater than its length. Find
3. The perimeter 2(mks)
4. The area of the garden (1mark)
5. Evaluate without using tables (2mks)

2log 2-log 3+ log 75

1. Calculate the volume of a prism whose length is 25cm and whose cross section is an equilateral triangle of side 3cm. (3mks)
2. Water flows from a circular pipe of diameter 3.5cm into a rectangular tank 66cm long, 35cm wide and 45 cm high. If it takes 18 minutes to fill the tank completely, determine the flow rate of the water in the pipe. (Use II = 22/7) (3mks)
3. Construct two tangents from point P to the given circle. (3mks)
4. Find the expansion of (x –y) 5. Hence find an approximation fro 1.025 to 4 sig. figures (3mks)
5. Y varies as X and inversely as square root of Z. What is the percentage change in Y when X is increased by 8% and Z reduced by 19%. (4mks)
6. Find the equation of the image of the line y= 3x +5 after reflection in the line y=x. (3mks)
7. Make t the subject

S = ut +1/2 at2

1. The length and breadth of a rectangular room are 15m and 12m respectively. If each of these measurements is liable to a 2cm error, calculate the absolute error in the area calculated from these values. (3mks)
2. Find in terms of and r an expression for the area of a minor segment cut off by a chord subtending and angle O at the centre of the circle of radius r. (2mks)
3. A car was valued at Kshs. 300,000 in January 1997. Each year its value depreciated by 12% of its value at the beginning of the year. What was the value of the car in January1999 (4mks)
4. Find the value of the angle X in the figure below. (2mks)

23

x

67

**SECTION II (50 Marks)**

Answer any five questions.

1. At Buhemba airport a building 20m high is 200m from the end of the main runway and in line with it. Assuming that the plane takes off at the end of the runway and climbs in a straight line.
2. Determine the minimum angle of ascent (3mks)
3. If the angle of ascent is 10 and the plane leaves the ground 40 m before the end of the runway, by how much will it clear the top of the bulding (4mks)
4. Determine the least possible distance from the end runway when the angle of ascent is 4 (3mks)
5. In the figure below AB = c and BC = 2a. D is the mid- point of BC, while P divides AD in the ratio 2:1

C

a

E

P

D

a

A

c

1. Express in terms of a and c

B

1. AD (1mark)
2. AP (1 mark)
3. BP (1 mark)
4. Given that BE = mBP and AE = Nac

Find two expressions of AE in terms of a, c and the parameters m and n ( 4 marks)

1. Find the values of m and n, hence state the ratio in which E divides AC
2. In a car that averages 10km/Lt, my petrol bill is Kshs. 60,000 per annum.
3. How much less would my bill be if the car averaged 12 km per litre? (3mks)
4. Given that 1 litre of petrol costs Kshs. 30 and that the consumption down to 1 litre per 10 km with average speed 60km/hr, how many hours per annum do I spend? (4mks)
5. To achieve 12 km per litre, I drop my average speed to 50 km/hr. How much longer do I spend driving? (3 mks)
6. Draw a graph of y = x2 – 5x + 6 for values of x from 0 to 5. (5 mks)
7. Use your graph to find
8. The minimum value of the function x2 -5x + 6 ( I mark)
9. The roots of x2 – 5x + 6 ( 2mks)
10. x2 – 5x + 6 ≥ 0 ( 2mks)
11. In the figure below ( not drawn to scale) DC is a tangent to the circle centre O. AOBC is a straight line.

D

6 cm

A

C

4 cm

B

O

1. Show that ADC is similar to DBC (4mks)
2. Given that BC = 4 cm and DC = 6 cm, calculate
3. The length of AB (3mks)
4. The size of angle ACD ( 3mks)
5. Ten cards are numbered 1 2 3 4 5 6 7 8 9 10 and then shuffled. Three cards are chosen without replacement.
6. Draw a tree diagram showing the various ways of choosing the three cards (2mks)
7. What is the probability
8. That only one of the cards has an odd number on it (2mks)
9. That all the cards have odd numbers on them (3mks)
10. That one of the cards has an odd number on it (2mks)
11. complete the table below (2mks)
12. x -180 -120 -90 -60 0 60 90 120 180

sin ½ x -1 0 1

cos 2x 1 1 1

1. using the same axes, draw the graph of y=Sin 1/2x and y = Cos 2x (5mks)
2. use your graph to solve the equation Sin ½ x = Cos 2x (2mks)
3. determine the amplitude of your graphs (2mks)
4. the figure below shows a pyramid VPQRS with a rectangular base PQRS and vertex V vertically above O which is the centre of the base. M is a point on OV such that OM= 1/3 OV. If VP= VQ = VR = VS, PQ = 8cm and QR = 6cm, calculate

V

M

R

S

O

F

Q

1. The length PO (2Mks)
2. The height VO (2mks)
3. The angle between the triangular plane MQR and the base (3mks)
4. The angle between the planes VQR and VPS (3mks)