**NAME ---------------------------------------------------------CLASS --------------------------- ADM NO ----------**

**GATITU MIXED SECONDARY SCHOOL**

**MATHEMATICS 121/1**

**FORM 3 TERM 3 2013 TIME: 2 ½ HRS**

**SECTION 1 (50 MKS)**

**ANSWER ALL THE QUESTIONS IN THIS SECTION**

1. Simplify 3mks

5/6 of (4 1/3 -3 5/6)

5/12 × 3/25 + 1 5/9 ÷2 1/3

1. Evaluate 2mks

6(2+9) – 33 ÷ 9 -4

-4(1 +5)2 ÷ 6 – (42 +5)

1. Evaluate using of tables of reciprocals, squares and square roots. 4mks

3 √ 0.008 - 10

0.375 37.52

1. If Tan ø =3 /15 , find without using calculators or mathematical tables the value of 3mks

sinø –cos ø

cos ø + sin ø

1. simplify completely 3mks

(6a +b) (a+b) – 7b (a+b)

 2a2 -2b2

1. solve for x in 32X +1 – 4(3X+1) + 9 =0 3mks

1. A line passes through point (x,2) and is perpendicular to the line 5y – 2x =10 at

 125 108

 29 29

 determine the equation of the line in the form ax +bx + c =0 3mks

8. In the diagram below triangle ABE is similar to triangle ACD and BE is parallel to CD.Determine the values of p and q 3mks



9. Given that the position vectors of P,Q and R are **p,q** and **r** respectively and that R is the mid – point of PQ write down a vector equation that relates **p,q** and **r**.If **p** is (5,8), Q (7,4) find **r** hence state the coordinates of R. 4mks

10. solve the following simultaneous inequalities and represent your solution on a number line 3mks

3 -2x < 5

4 -3x > -8

11. The surface area of a sphere is give by 4^r2 if there is an error of 0.03% in ^ and an error of 0.4% in the radius. What would be the error in calculation of area? 3mks

12. James bought a suit for 1,200 and marked it at a price such that after allowing his customer a 10% discount, he would make a profit of 20%. Calculate the selling price of the suit. 3mks

13. In an agricultural research centre, the length of sample of 50 maize cobs were measured and recorded as shown.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Length (cm) | 8 -10  | 11 -13 | 14 -16 | 17 -19  | 20 22 | 23 -25 |
| No of cobs | 4 | 7 | 11 | 15 | 8 | 5 |

calculate the median 3mks

14. In the figure below.W,X,Y and Z lie on the circumference. WY is the diameter. Determine the values of angle XWY and wvz giving reasons. 3mks

15. Expand 3 +1/8x 4, in ascending powers of X. Hence use your expansion to estimate 3.0254 giving your answer correct to 3 decimal places. 4mks

16. An investor deposited 40,000 in a bank compounded at the rate of R p.a semi annually for 2 years and realized ksh. 50,499. Find the rate of compound interest. Give your answer correctly to 4 significant figures. 3mks

**SE CTION 2( 50MKS)**

**ANSWER ANY FIVE QUESTIONS FROM THIS SECTION**

17. The heights of a seedling in a nursery were measured and recorded as in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Xcm | 0≤×<5 | 5≤×<15 | 15≤×<25 | 25≤×<45 | 45≤×<75 |
| No. of seedling | 7 | 46 | 72 | 64 | 11 |

1. estimate the mean height of the tree seedlings in the nursery 4mks
2. Using a scale of 1 cm to represent 10 units along the horizontal axis, and a scale of 1 cm to represent 1 unit along the vertical axis, draw a histogram and a frequency polygon to represent the distribution. 6mks

18.

1. James walks to school every morning 10 km away from his home. His average speed in the return journey is reduced by 1 km/h and therefore takes 30 minutes more on the return journey. Determine his average speed on his journey to school from home. 4mks
2. i) complete the table below for the function y =2x2 +3x -6 2mk

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| 2x2 | 32 |  |  | 2 | 0 |  |  |
| 3x |  | -9 |  | -3 | 0 |  |  |
| -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 |
| y |  |  |  |  | -6 |  |  |

ii) Draw the graph of y = 2x2 + 3x -6 for values -4 ≤ x ≤ 2 3mks

iii) By drawing a suitable line on the same axes, solve the equation 2x2  + x -7 =0 1mk

19.

1. The points p(2, -1),Q(0, -3),R(2, -4) and S(4, -2) and join them to form a quadrilateral PQRS and give the name of the quadrilateral. 3mks
2. P’Q’R’S’ are the image points of the quadrilateral PQRS under a reflection on the line y =x. Draw the quadrilateral P’Q’R’S’ and give its coordinates. 3mks
3. Given that P’Q’R’S’ is rotated through =90 about the origin plot the new image P”Q”R”S” and give its coordinates 3mks
4. Determine a single transformation that maps P’’Q’’R’’S’’ on to PQRS 1mk

20. Two towns, A and B are 80 km apart. Juma started cycling from town A to town B at 10.00am at an average speed of 40km/h. Mutuku started his journey from town B to town A at 10.30 am and travelled by car at an average speed of 60km/h.

1. calculate
2. the distance town A when Juma and Matuku met; 5mks
3. the time of the day when the two met. 2mks
4. Kamau started cycling from town A to town B at 10.21 am. He met Matuku at the same time as Juma did. . Determine Kamau’s average speed. 3mks

21. a. Three towns A,B and C are such that B is 150 km from A on a bearing of 060. The bearing of C from A is 125. The bearing of C from B is 160. Draw a sketch toshow the relative positions of A,B and C. Calculate the distance of C from S and from B. 4mks

 b. An airplane flies from town A on a bearing of 345 at 300kmh-1. After 40 minutes of flying the pilot decides to fly directly to C. Determine the time it would take to reach C and bearing on which it would fly ( town A and C are as far as in (a) above 6mks

22. Two circles of radii 3.5 cm and 4.2 cm with centres O1 and O2 respectively intersect at points A and B as shown in the figure below. The distance of the centres is 6cm.



calculate

1. < AO1B to the nearest degree 3mks
2. <AO2B to the nearest degree 3mks
3. Area of the quadrilateral O1AO~~2~~B, correct to 2 decimal places. 3mks
4. the shaded area correct to two significant figures (take II =22/7) 1mk

23. In the triangle OAB below, **OA** =a **OB** =b and **OC** =3/2 OA.M divides OB in the ratio3:2



a) Express in terms of a and b only, the vectors. 1mk

1. AB
2. MC 1mk

b. Given that MN =h C and BN =kBA, express vector MN in two different ways and hence, show that points M,N and C are collinear. 8mks

24. The figure below represents cone of height 12 cm and base radius of 9cm from which a similar smaller ne is removed, leaving a conical hole of height 4 cm.



1. calculate:
2. the base radius of the conical hole; 2mks
3. the volume, in terms of II, of the smaller cone that was removed 2mks
4. Determine the slant height of the original cone 1mk
5. Calculate, in terms of II, the surface area of the remaining solid after the smaller cone is removed. 5mks