**Name ……………………………………………………………………………………Adm. No. ………………………**

**Class …………………………………….**

**121/1**

**MATHEMATICS ALT 1**

**FORM 3**

**2½ HRS**

***Instructions***

*(a) Write your name, class and admission number.*

*(b) Answer all the questions in* ***section I*** *and* ***ONL****Y Five in* ***section II.***

*(c) Show all the calculations in the spaces provided*

*(d) KNEC mathematical tables and non-programmable calculators may be used.*

***For Examiners Use***

**Section 1**

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

**Section 11**

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

|  |
| --- |
| Grand total |
|  |

**SECTION I**

1. Evaluate without using a calculator. [1 Mark]

 $\frac{(2\frac{3}{7}-1\frac{5}{6})÷\frac{5}{6}}{\frac{2}{3}of2\frac{1}{4}-1\frac{1}{7}}$

1. The equation of a straight line L1 is $3y+4x=12$
	* 1. Find the gradient of L1 [1 Mark]
		2. The equation of another line L2 which is perpendicular to L1 and passes through (1,2) [2 Marks]
2. Evaluate using mathematical tables only expressing your answer to 4 significant figures. [3 Marks]

 $\frac{3}{0.2311}+(0.7918)^{2}$

1. Given that:

 $\sin(\left(3x-35\right)=\cos((x+20)))$. Find $x$ [2 Marks]

1. The size of an interior angle of a regular polygon is (3$x)°$ while the exterior angle is ($x-20)°$. Find the number sides of the polygon [3 Marks]
2. Three bells ring at intervals of 9 minutes, 15 minutes and 21 minutes. The bells will next ring together at 11.00pm. Find the time the bells had last rung together.

[3 Marks]

1. Find all the integral values of $x$ which satisfy the following inequalities [3 Marks]

 $2\left(2-x\right)<4x-9<x+11$

1. At a party, every two people shared a plate of Ugali between them. Every 3 people shared a plate of soup and every 4 people shared a plate of meat. If 65 plates were used in total. How many people were there? [3 Marks]
2. Find the value of $x$ which satisfies the equation; [3 Marks]

 $16^{x^{2}}=8^{4x-3}$

1. Mary and John live 140km apart. Mary starts from her home at 7.00am and drives towards John’s home at 80km/hr. John starts at 7.30am and drives towards Mary’s home at 100km/hr. at what tome did they meet? [3 Marks]
2. Two points P and Q have coordinates (-2, 3) and (1, 3) respectively. A translation maps point P to P1 (10,10).
	1. Find the translation vector [1 Mark]
	2. Find the coordinates of Q the image of Q under the translation. [1 Mark]
	3. Find the values of M and N if;

 $mP-nQ=\left(\genfrac{}{}{0pt}{}{-12}{9}\right)$ [3 Marks]

1. A Kenyan company received $100,000 US dollars. The money was converted into Kenya shillings in a bank which buys and sells foreign currencies as follows;

**Buying.** **Selling**

 1 US Dollar ($) 77.23 78.11

 1 Sterling Pound (£) 121.04 122.93

* 1. Calculate the amount of money, in Kenya shillings the company received[2 Marks]
	2. The company exchanged the Kenya-shilling calculated in (a) above into sterling pounds to buy a car from Britain. Calculate the cost of the car to the nearest sterling pound. [2 Marks]
1. In the figure below, O is the centre of the circle. Angle OAB=300 and angle BAC = 230. Find angle ABC. [3 Marks]



1. A number n is such that when it is divided by 27, 30 or 45, the remainder is always 3. Find the smallest value of n. [2 Marks]
2. A particle accelerates uniformly from rest and attains a maximum velocity of 30m/s. after 16 seconds. It travels at this constant velocity for 20 seconds before decelerating to rest after another 8 seconds.

Calculate the total distance travelled by the particle. [4 Marks]

1. The figure below shows a rhombus PQRS with PQ=9cm and $<SPQ=60°, S×Q$ is a circular arc center P.



Calculate the area of the shaded region correct to 2 decimal places. [3 Marks]

**SECTION II**

***Answer any 5 Questions in this Section.* (50 Marks)**

1. A salesman received a basic salary of sh. 50,000 a year together with a commission of 6% on the value of goods sold and a car allowance of sh. 2.50 per km.
	1. Find the total amount he received in a year in which he sells goods worth sh. 625,000 and travels 10,000km. [4 Marks]
	2. The next year he travels 12,000km and receives a total of sh. 134,000.
		1. Calculate the value of goods sold. [4 Marks]
		2. Calculate the percentage increases in the value goods sold. [2 Marks]
2. The following measurements were recorded in a field book at a farm using XY=400m as the baseline.

|  |  |  |
| --- | --- | --- |
|  | Y |  |
| C 60B 100A 120 | 34030024020014080 | 120 D100 E160 F |
|  | X |  |

* 1. Using the scale of 1:4000 (1cm represents 40m) draw accurately the map of the farm. [4 Marks]
	2. Determine the actual area of the farm in hectares. [4 Marks]
	3. If the farm is on sale at Ksh. 80,000 per hectare, how much does the farm cost?

[2 Marks]

1. The minor arc PQ of a circle radius 21cm subtends an angle of 1200 at the centre of the circle as shown below.



* 1. Find the area of the minor sector POQ [2 Marks]
	2. Find the perimeter of the minor sector POQ [3 Marks]
	3. The minor sector POQ is folded to form a right circular cone.

Calculate:

* + 1. The radius of the cone. [3 Marks]
		2. The height of the cone. [2 Marks]
1. A triangular piece of land ABC has sides AB=100m, BC=150m and AC=190m.



1. Calculate the area of the triangular piece of land ABC [2 Marks]
2. Calculate the value of angle ACB. [3 Marks]
3. A new piece of land ABCD is a trapezium with AD//BC whose area is three times that of triangle ABC, calculate the perimeter of ABCD. [5 Marks]
4. Three business partners, Bela, Joan and Trinity contributed Kshs. 112, 000, Kshs. 128, 000 and Kshs. 210, 000 respectively to start a business. They agreed to share their profits as follows:

 30% to be shared equally

 30% to be shared in the ratio of their contributions

 40% to be retained for the running of the business.

1. If at the end of the year, the business realised a profit of Kshs. 1. 35million

Calculate:

1. The amount of money retained for running the business at the end of the year. [1 Mark]
2. The difference between the amounts received by Trinity and Bela. [6 Marks]
3. Express Joan’s share as percentage of the total amount of money shared between the three partners. [3 Marks]
4. In the figure below, O1 and O2 are the centres of the circles whose radii are 4 cm and 7 cm respectively. The circles intersect at A and B and angle AO1O2 = 60˚



 Find by calculation; take π = 3.142

* 1. The angle AO2O1  [1 Mark]
	2. The area of the quadrilateral AO1BO2 [4 Marks]
	3. The shaded area [5 Marks]
1. Members of a certain group decided to raise sh. 225,000 to buy a plot of land, with each contributing the same amount. Before the due date for collection of the contribution, ten of the members withdrew from the project.
	1. Letting $n$ represent the original membership of the group, show that the increase in contribution per member was $\frac{2250000}{n\left(n-10\right)}$ [4 Marks]
	2. If the increase in contribution per person was sh. 1125, what was the original number of members in the group? [4 Marks]
	3. Calculate the percentage increase in the contribution per person caused by the withdrawal of the members. [2 Marks]
2. In the figure below, O is the center of the circle. <AEB=500, <EBC=800 and <ECD=300



Giving reasons calculate

* + 1. <CDE [2 Marks]
		2. <DFE [2 Marks]
		3. Obtuse <COE [2 Marks]
		4. <ADE [2 Marks]
		5. <CAE [2 Marks]