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 **ONLY** 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]

$$\frac{(2\frac{3}{7}-1\frac{5}{6})\div\frac{5}{6}}{\frac{2}{3}of\,2\frac{1}{4}-1\frac{1}{7}}$$

2. The equation of a straight line L_1 is $3y + 4x = 12$

   i. Find the gradient of L_1 [1 Mark]

   ii. The equation of another line L_2 which is perpendicular to L_1 and passes through (1,2) [2 Marks]

3. Evaluate using mathematical tables only expressing your answer to 4 significant figures. [3 Marks]

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

4. Given that:
   $\sin(3x - 35) = \cos(x + 20)$. Find x [2 Marks]

5. The size of an interior angle of a regular polygon is $(3x)°$ while the exterior angle is $(x - 20)°$. Find the number sides of the polygon [3 Marks]

6. 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]

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

$2(2-x) < 4x - 9 < x + 11$

8. 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]

9. Find the value of x which satisfies the equation; [3 Marks]

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

10. 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]

11. Two points P and Q have coordinates (-2, 3) and (1, 3) respectively. A translation maps point P to P^1 (10,10).

a. Find the translation vector [1 Mark]

b. Find the coordinates of Q the image of Q under the translation. [1 Mark]

c. Find the values of M and N if;
$mP - nQ = \begin{pmatrix} -12 \\ 9 \end{pmatrix}$ [3 Marks]

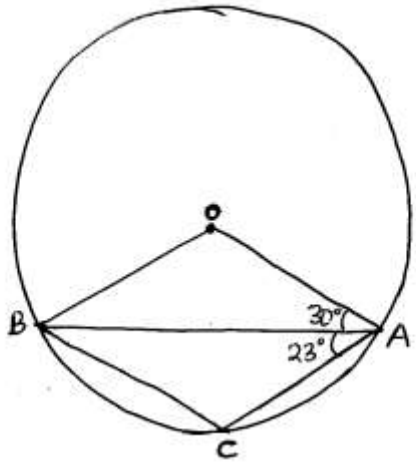
12. A Kenyan company received $100,000 US dollars. The money was converted into Kenya shillings in a bank which buys and sells foreign currencies as follows;

	Buying.	Selling
1 US Dollar ($)	77.23	78.11
1 Sterling Pound (£)	121.04	122.93

a. Calculate the amount of money, in Kenya shillings the company received[2 Marks]

b. 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]

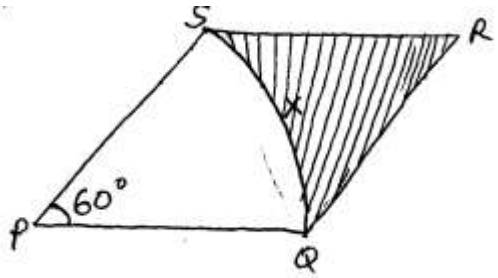
13. In the figure below, O is the centre of the circle. Angle OAB=30^0 and angle BAC = 23^0. Find angle ABC. [3 Marks]



14. 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]

15. 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]

16. The figure below shows a rhombus PQRS with PQ=9cm and $< SPQ = 60°, S \times Q$ 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)

17. 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.

a. Find the total amount he received in a year in which he sells goods worth sh. 625,000 and travels 10,000km. [4 Marks]

b. The next year he travels 12,000km and receives a total of sh. 134,000.

i. Calculate the value of goods sold. [4 Marks]

ii. Calculate the percentage increases in the value goods sold. [2 Marks]

18. The following measurements were recorded in a field book at a farm using XY=400m as the baseline.

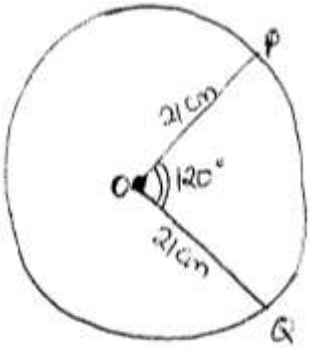
	Y	
C 60	340	
	300	120 D
	240	100 E
	200	160 F
B 100	140	
A 120	80	
	X	

a. Using the scale of 1:4000 (1cm represents 40m) draw accurately the map of the farm. [4 Marks]

b. Determine the actual area of the farm in hectares. [4 Marks]

c. If the farm is on sale at Ksh. 80,000 per hectare, how much does the farm cost? [2 Marks]

19. The minor arc PQ of a circle radius 21cm subtends an angle of 120^0 at the centre of the circle as shown below.



a. Find the area of the minor sector POQ [2 Marks]

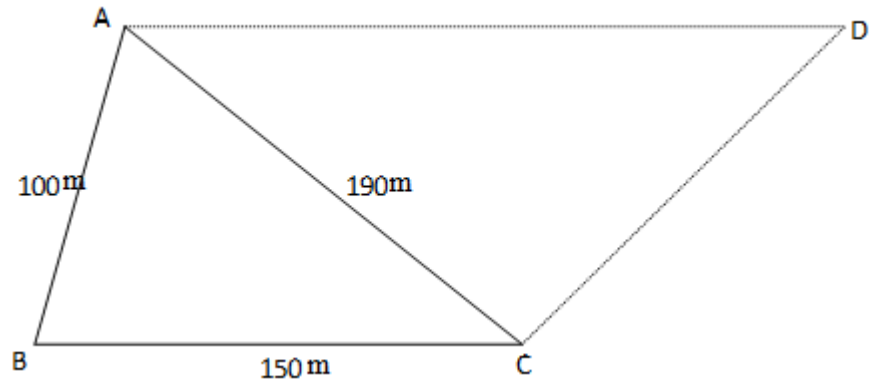
b. Find the perimeter of the minor sector POQ [3 Marks]

c. The minor sector POQ is folded to form a right circular cone.
Calculate:

i. The radius of the cone. [3 Marks]

ii. The height of the cone. [2 Marks]

20. A triangular piece of land ABC has sides AB=100m, BC=150m and AC=190m.



a) Calculate the area of the triangular piece of land ABC [2 Marks]

b) Calculate the value of angle ACB. [3 Marks]

c) 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]

21. 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.

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

Calculate:

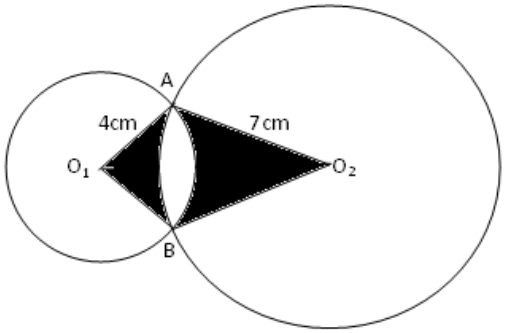
b) The amount of money retained for running the business at the end of the year.

[1 Mark]

c) The difference between the amounts received by Trinity and Bela. [6 Marks]

d) Express Joan's share as percentage of the total amount of money shared between the three partners. [3 Marks]

22. In the figure below, O_1 and O_2 are the centres of the circles whose radii are 4 cm and 7 cm respectively. The circles intersect at A and B and angle $AO_1O_2 = 60^\circ$



Find by calculation; take $\pi = 3.142$

a. The angle AO_2O_1 [1 Mark]

b. The area of the quadrilateral AO_1BO_2 [4 Marks]

c. The shaded area [5 Marks]

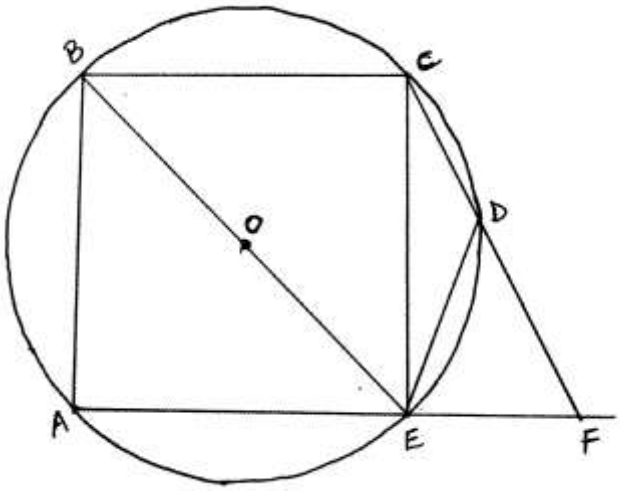
23. Members of a certain group decided to raise sh. 225,000 to buy a plot of land, with each contributing the same amount. Before the due date for collection of the contribution, ten of the members withdrew from the project.

a. Letting n represent the original membership of the group, show that the increase in contribution per member was $\frac{2250000}{n(n-10)}$ [4 Marks]

b. If the increase in contribution per person was sh. 1125, what was the original number of members in the group? [4 Marks]

c. Calculate the percentage increase in the contribution per person caused by the withdrawal of the members. [2 Marks]

24. In the figure below, O is the center of the circle. $<AEB=50^0$, $<EBC=80^0$ and $<ECD=30^0$



Giving reasons calculate

i. $<CDE$ [2 Marks]

ii. $<DFE$ [2 Marks]

iii. Obtuse $<COE$ [2 Marks]

iv. $<ADE$ [2 Marks]

v. $<CAE$ [2 Marks]