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

Class ………………………

121/1
MATHEMATICS
FORM 3
Paper 1
2½ Hours
TRIAL 6

2018
FORM THREE
Kenya Certificate of Secondary Education

Instructions to candidates
1. Write your name, admission number and class in the spaces provided above.
2. The paper contains two sections: **Section I** and **Section II**.
3. Answer **ALL** the questions in **Section I** and **ANY FIVE** questions from **Section II**.
4. All working and answers must be written on the question paper in the spaces provided below each question.
5. Marks may be awarded for correct working even if the answer is wrong.
6. Negligent and slovenly work will be penalized.
7. Non-programmable silent electronic calculators and mathematical tables are allowed for use.

For Examiner's use only
Section I

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

17	18	19	20	21	22	23	24	Total

Grand Total %

This booklet contains 16 printed pages. Please confirm that all the pages exist and are properly printed before starting the exam.

SECTION I

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

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

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]

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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]
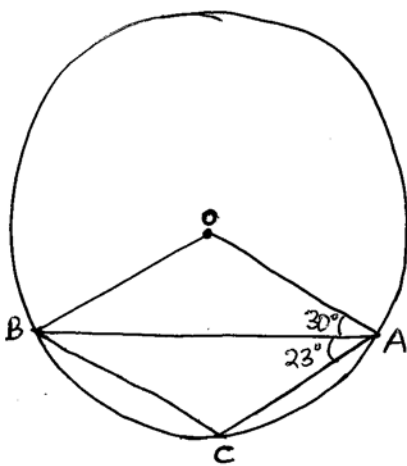
14. A number n is such that when it is divided by 27, 30 or 45, the remainder is always 3. Find the smallest value of n. [2 Marks]

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 × Q is a circular arc center P.
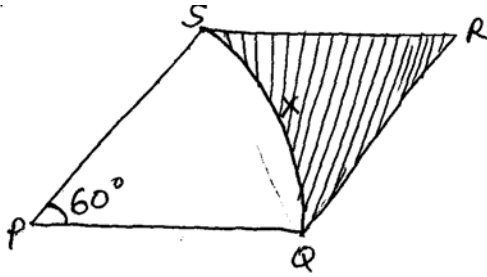
Calculate the area of the shaded region correct to 2 decimal places.   [3 Marks]

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]

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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 120⁰ at the centre of the circle as shown below.
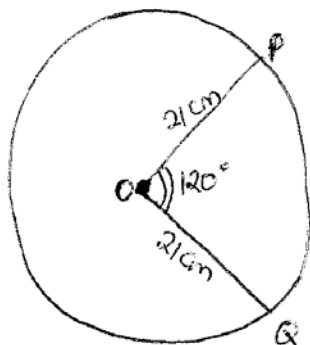
a. Find the area of the minor sector POQ [2 Marks]

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

c. The minor sector POQ is folded to form a right circular cone.
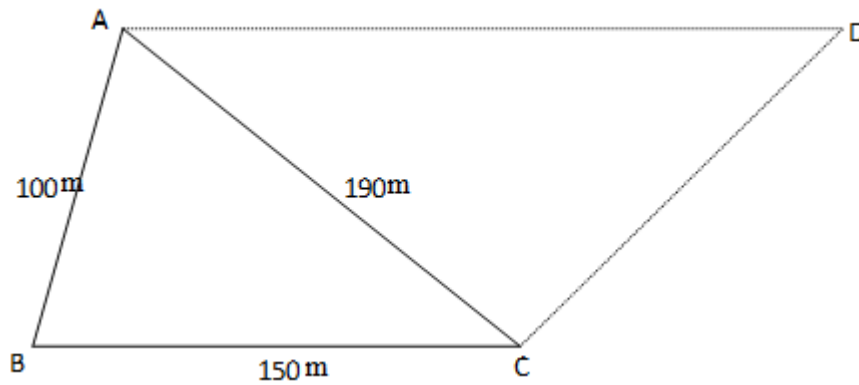**Calculate:**
i. The radius of the cone. [3 Marks]

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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]

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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
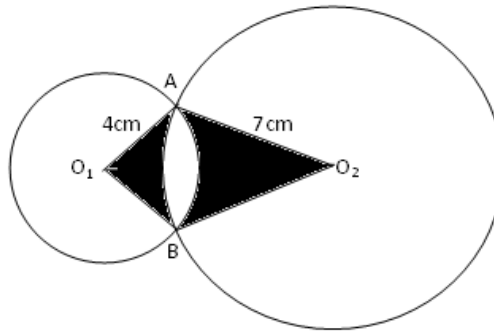
Calculate:

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

[1 Mark]

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

iii) 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 $AO_1O_2 = 60°$

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]

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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 $\dfrac{2250000}{n(n-10)}$ [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 = 50⁰, <EBC = 80⁰ and <ECD = 30⁰
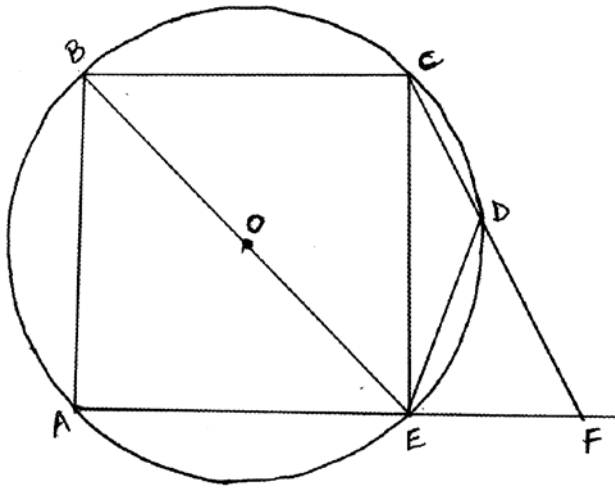
Giving reasons calculate
  i. <CDE   [2 Marks]

  ii. <DFE   [2 Marks]

  iii. Obtuse <COE   [2 Marks]

  iv. <ADE   [2 Marks]

  v. <CAE   [2 Marks]