

FORM 4 TERM 1 2021
MATHEMATICS

SECTION I (30MKS)

(Answer all questions in this section)

1. Using tables of reciprocals, square roots and cube roots only, evaluate:

$$\left[\frac{4}{\sqrt{0.08213}} \right]^{1/3} \quad (3\text{mks})$$

2. A and B are two points whose co-ordinates are (1, -2) and (3, 6) respectively. Find the equation of a line through the midpoint of AB and perpendicular to line AB. (3mks)

3. Find the distance between points K(0⁰, 30⁰E) and L(0⁰, 50⁰E) in:
a) Nautical miles. (2mks)

- b) Kilometers. (2mks)

4. The cost (**c**) of hiring a matatu is partly constant and partly varies as the distance (**d**) covered by the matatu. If sh. 4500 is charged for hiring the matatu for a distance of 100 km and sh. 4000 for a distance of 60 km, find;

a) An equation connecting **c** and **d** (4mks)

b) The cost of hiring the matatu for 200 km. (2mks)

5. Joy is twice as old as her sister Naomi, who is not less than five years old. The sum of their ages is not more than 30 years. Given that Naomi is x years old, form all the inequalities in x to represent the above information. Hence find the range of values satisfying these inequalities. (4mks)

6. Solve for x for $0^\circ \leq x \leq 360^\circ$ in;

$$4 \cos 2x^\circ = -2 \quad (4\text{mks})$$

7. The sum of the first three terms of a geometric series is 26. If the common ratio is 3, find the sum of the first six terms (3mks)

8. The equation of a circle is given by $2x^2 + 2y^2 - 2 = -8x + 2y$. Determine the radius and the centre. (3mks)

SECTION II (20MKS)

(Answer any two questions from this section)

9. The probability that team A wins a game against team B is $\frac{2}{5}$. The two teams play 3 matches in succession.

a) Draw a tree diagram to present this information (2mks)

b) Find the probability that;

i. Team B wins all the games (2mks)

ii. Team A wins only one game (2mks)

iii. Team A wins at least 1 match (2mks)

iv. Team B wins more races than team A (2mks)

10. A bus travelling at 99 km/hr passes a checkpoint at 9.00 am. A police patrol car travelling at 132 km/hr in the same direction passes through the police checkpoint at 9.15 am. The bus and the police patrol car continue at their uniform speeds.

a) Calculate,

i. The distance from the police check point to the point where the police car catches up with the bus (4mks)

ii. The time the police car will overtake the bus. (2mks)

b) Two passenger trains A and B are 240 m apart and travelling at 164 km/h and 88 km/h respectively approach one another on a straight railway line. Train A is 150 m long and train B is 100 m long. Determine the time in seconds that elapses before the two trains completely pass each other. (4mks)

11. A right pyramid $VABCD$ has a square base $ABCD$ of length 6 cm and a height VO whose length is half the length of AC .

a) Sketch the pyramid (1mk)

b) Determine:

i. The slant height CV of the pyramid. (3mks)

ii. The surface area of the pyramid. (3mks)

c) Find the angle between the planes VBC and $ABCD$ (3mks)

12. The table below shows the rates at which income tax is charged for income earned

Income in Ksh/month	Tax Rates %
1-9680	10
9681-18800	15
18801-27920	20
27921-37040	25
37041 and above	30

In the month of August, Mr. Kioko paid a net tax of sh. 5 512. He got a house allowance of sh. 10 000, medical allowance of sh. 2 400 and acting allowance of sh. 2 820 per month. He was entitled to a monthly personal relief of sh. 1 162. He has a life insurance policy for which he pays a monthly premium of sh. 1 500 and claims a relief at the rate of 10% of the premium paid per month. The following deductions are also made from his income every month:

- i. NHIF Ksh. 320
- ii. Cooperative society shares Ksh. 6 000
- iii. Union dues Ksh. 200

a) Calculate Mr. Kioko's monthly basic salary. (7mks)

b) Calculate his net monthly salary (3mks)