

Name: CLASSADM NO.....

END OF TERM 1 2020

FORM 4 MATHEMATICS PAPER 1

TIME: 2 ½ HOURS

SECTION I (50 MARKS)

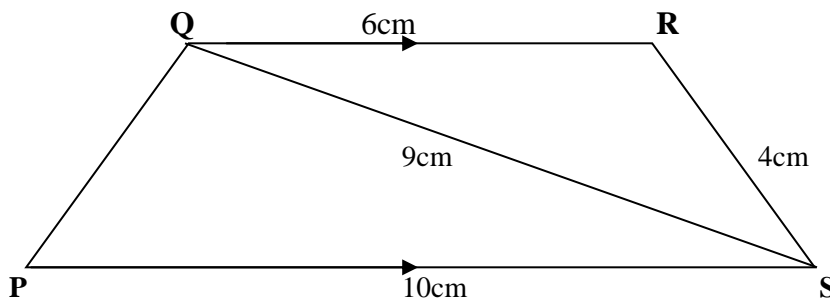
Answer all the questions in this section in the space provided

1. A boy cycles a certain distance from **X** to **Y** at 10km/hr, he returns at 12km/hr. The total time taken is 1hr 50min. find the distance **XY**. (3mrks)

2. Simplify $\frac{p^2 - 2pq + q^2}{2p^2 - 3pq + q^2}$ (3mrks)

3. Solve for X in the equation. (3mrks)
 $\frac{1}{2} \log_2 81 + \log_2 (x^2 - \frac{x}{3}) = 1$

4. In the figure below **PQRS** is a trapezium with **QR** parallel to **PS**. **QR**=6cm, **RS**=4cm, **QS**=9cm and **PS**=10cm



Calculate

(a). The size of angle **SQR** (2marks)

(b). The area of triangle **PQS** (2marks)

5. Find the value of x in the equation. (3marks)

$$\cos(3x - 180^\circ) = \frac{\sqrt{3}}{2} \text{ in the range } 0^\circ \leq x \leq 180^\circ$$

6. A farmer has a piece of land measuring 840m by 396m. He divides it into square plots of equal sizes. Find the maximum area of one plot. (3marks)

7. A liquid spray of 384g is packed in a cylindrical container of internal radius 3.2cm. Given that the density of the liquid is 0.6g/cm^3 , calculate to 2 decimal places the height of the liquid in the container. (3marks)

8. (a) Find the inverse of the matrix. (1mark)

$$\begin{bmatrix} 4 & 3 \\ 3 & 5 \end{bmatrix}$$

(b) Hence solve the simultaneous equation using the matrix method.

(2marks)

$$4x + 3y = 6$$

$$3x + 5y = 5$$

9. Two pipes **A** and **B** can fill an empty tank in 3hrs and 5hrs respectively. Pipe **C** can empty the tank in 4hrs. If the three pipes **A**, **B** and **C** are opened at the same time find how long it will take for the tank to be full.
(3marks)

10. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh.51790 while in Kenya and converted the rest of the money into US dollars. Calculate the amount he received in US dollars. The. Exchange rates were as follows. (4marks)

	<u>Buying</u>	<u>Selling</u>
US dollars \$	65.20	69.10
Sterling pounds £	123.40	131.80

11. The gradient of a straight line L_1 , passing through the point **P** (3, 4) and **Q** (a, b) is $-\frac{3}{2}$. A line L_2 is perpendicular to L_1 through **Q** and **R** (2, -1). Determine the values of a and b. (3marks)

12. Find the number of sides of a regular polygon whose interior angle is 5 times the exterior angle. (3marks)
13. The points A, B and C lie on a straight line. The position vectors of A and C are $2\mathbf{i} + 3\mathbf{j} + 9\mathbf{k}$ and $5\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$ respectively; B divides AC internally in the ratio 2:1 Find the:
- (a) Position vector of B (2marks)
- (b) distance of B from the Origin (1mark)
14. The sum of digits in a two digit number is 16. When the number is subtracted from the number formed by reversing the digits the difference is 18. Find the number. (3marks)
15. In Blessed Church Choir the ratio of males to females is 2:3. On one Sunday service ten male members were absent and six new female members joined the choir as guests for the day. If on this day the ratio of males to females was 1:3, how many regular members does the choir have? (3marks)
16. A businessman makes a profit of 20% when he sells a carpet for Ksh. 36000. In a trade fair he sold one such carpet for Ksh. 33600. Calculate the percentage profit made on the sale of the carpet during the trade fair. (3marks)

SECTION B: ANSWER ANY 5 QUESTIONS

17. A Matatu and a Nissan left town A for town B 240km away at 8.00am travelling at a speed of 90km/hr and 120 km/h respectively. After 20minutes the Nissan had a puncture which took 30minutes to mend.

(a) How far from town A did the Nissan catch up with the Matatu? (6marks)

(b) At what time did the Nissan catch up with the Matatu? (1mark)

(c) At what time did the Matatu reach town B (3marks)

18. The displacement, S metres of a moving particle from point O , after t seconds is given by:

$$S = t^3 - 5t^2 + 3t + 10$$

a) Find S when $t = 2$ (2marks)

b) Determine:

i) The velocity of the particle when $t = 5$ sec (3marks)

ii) The value of t when the particles is momentarily at rest . (3 marks)

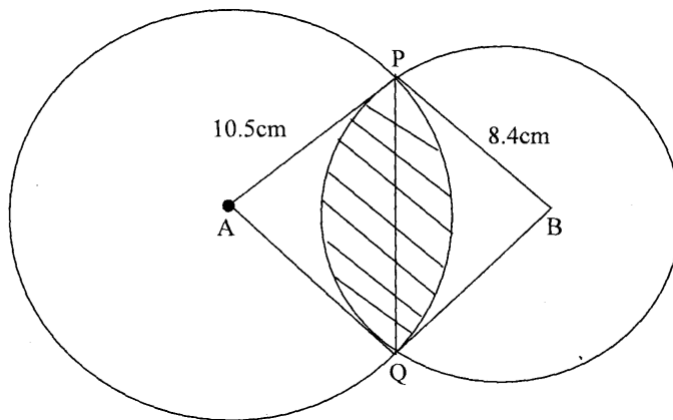
c) Find the time, when the velocity of the particle is maximum. (2 marks)

19. Four towns P, R, T and S are such that R is 80km directly to the north of P and T is on a bearing of 290° from P at a distance of 65km. S is on a bearing of 330° from T and a distance of 30 km. Using a scale of 1 cm to represent 10km, make an accurate scale drawing to show the relative position of the towns. (4mks)

Find:

- (a) The distance and the bearing of R from T (3mks)
- (b) The distance and the bearing of S from R (2mks)
- (c) The bearing of P from S (1mk)

20. The figure below shows two circles of radii 10.5 and 8.4cm and with centres A and B respectively. The common chord PQ 9cm.



- (a) Calculate angle PAQ. (2 mks)

(b) Calculate angle PBQ. (2 mks)

(c) Calculate the area of the shaded part. (6 mks)

21. The following measurement were recorded in a field book using XY as the baseline. XY = 400m.

	Y	
C60	340	
	300	1200
	240	160E
	220	160F
B100	140	
A120	80	
	X	

a) Using a scale of 1:4000 draw an accurate 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 sh.80,000 per hectare find how much the farm costs.
(2 marks)

22. The length and breadth of a rectangle are given as $(6x - 1)$ and $(x - 2)$ metres respectively. If the length and breadth are each increased by 4 metres, the new area is three times that of original rectangle.

i) Form an equation in x and solve it. (4 marks)

ii) Find the dimensions of the original triangle (2 marks)

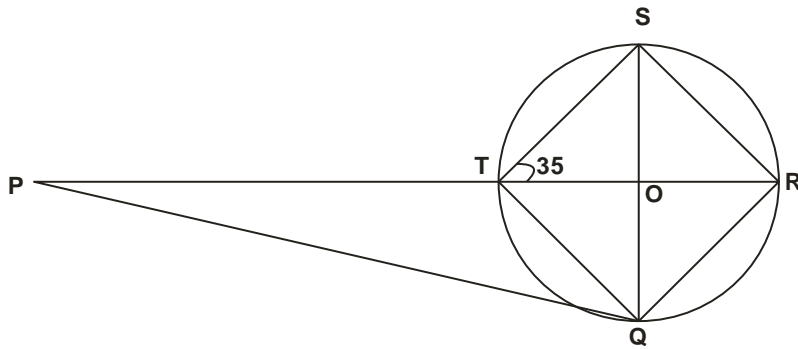
iii) Express the increase in area as a percentage of the original area. (4 marks)

23. X, Y and Z are three quantities such that X varies directly as the square of Y and inversely as the square root of Z.

a) Given that $X = 18$ when $Y = 3$ and $Z = 4$, find X when $Y = 6$ and $Z = 16$. {5 marks}

b) If Y increases by 10% and Z decreases by 19%, find the percentage increase in X. {5 marks}

24. The diagram below a circle, centre O. PQ is a tangent to the circle at Q and PTOR is a straight line. QRST is a cyclic quadrilateral in which angle RTS = 35° and RT and QS are diameters. Giving reasons for your answer, find the size of:



- a) Acute angle ROS. (2marks)
- b) Angle RQS. (2 marks)
- c) Angle PQR. (2 marks)
- d) Angle QPT. (2 marks)
- e) Angle PQT. (2 marks)