

Name ..... File Number ..... Class .....

121/1

**MATHEMATICS**

**Paper 1**

**2½ Hours**

**TOP NOTCH EXAM MERIT TWO (PRE-MOCK) 2016  
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 %**

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**This booklet contains 17 printed pages. Please confirm that all the pages exist and are properly printed before starting the exam.**

**Section I(50 marks)**

**Answer all the questions in this section**

1. Simplify  $\frac{2}{5}$  of  $1\frac{2}{3} - \frac{1}{2} \sqrt{\frac{1\frac{1}{2} - 2\frac{1}{3}}{\frac{1}{3} - \frac{19}{27}}} + \frac{2}{3}$  (3 marks)

2. Four machines give out signals at intervals of 24, 27, 30 and 50 seconds respectively. At 5.00pm all the four machines give out a signal simultaneously. Find the time this will happen again. (3marks)

3. Magufulibought three cups and four spoons for Kshs 193. Mwapombe bought five cups and two spoons of the same type as those bought by Magufuli. If Mwapombe paid Kshs 233, find the price of each cup and each spoon. (3marks)

4. Find the equation of a line perpendicular to  $2x + 4y = 8$ , which cross the line at its y - Intercept. (3 marks)

5. Masaa paid Ksh 180 for a wrist watch after getting a discount of 10%. The shopkeeper made a profit of 20% on the sale of this wrist watch. What percentage profit would the shopkeeper have made if no discount was allowed? (3marks)

6. Two similar containers have base areas  $25\text{cm}^2$  and  $324\text{cm}^2$  respectively. Calculate the Capacity of the larger container correct to one decimal place if the capacity of the smaller one is  $8\text{cm}^3$ . (3marks)

7. Quail Traders Ltd received US Dollars 100,000 from the sale of quail eggs. The money was converted into Kenya Shillings in a bank which buys and sells foreign currencies as follows:

	Buying (In Kenya shillings)	Selling (In Kenya shillings)
1 US Dollar	101.70	101.90
1 Sterling pound	146.21	147.04

- (a) Calculate the amount of money in Kenya shillings, the business received. (2marks)
- (b) The business exchanged the Kenya shillings calculated in (a) above, into Sterling pounds to buy a car from Britain. Calculate the cost of the car to the nearest Sterling pound. (2marks)
8. A man standing 20m away from the foot of a vertical pole observes the top of the pole at an angle of elevation  $30^\circ$ . He begins to walk along a straight line on level ground towards the pole. Calculate how far he walked before the angle of elevation of the top of the pole becomes  $80^\circ$ . (3 marks)

9. The length and breadth of a rectangular card were measured to the nearest millimetre and found to be 14.5 cm and 10.6 cm respectively. Find the percentage error in the perimeter. (3marks)
10. One interior angle of a certain polygon is  $84^\circ$ . If each of the other angles is  $147^\circ$ , how many sides does this polygon have? (3 marks)
11. The lengths of the adjacent sides of a parallelogram are 12cm and 15cm. If the area of the parallelogram is  $72\text{cm}^2$ , find the angle between these two sides. (3marks)

12. Simplify:  $\frac{2x^2 + x - 6}{x^2 - 4} + \frac{1}{x - 2}$

(3marks)

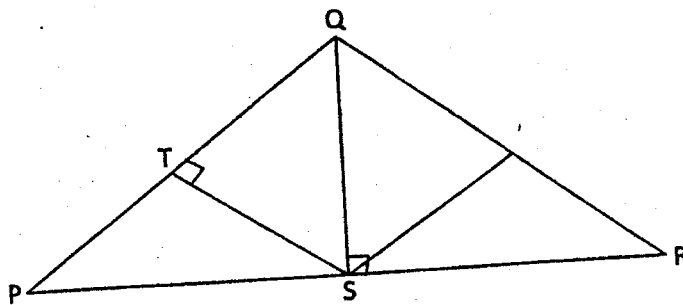
13. Use reciprocal tables to find the value of  $\frac{1}{9} \left( \frac{2}{0.6638} + \frac{5}{0.833} \right)$  correct to 4 significant figures. (3marks)

14. The position vectors of points A and B are  $\mathbf{a}$  and  $\mathbf{b}$  respectively. Determine the length of AB if  $\mathbf{a} = 2\mathbf{i} + 4\mathbf{j} + 3\mathbf{k}$  and  $\mathbf{b} = 2\mathbf{i} + 3\mathbf{j}$  (correct to 4 significant figures) (2marks)

15. Find the value of  $x$  if  $\left(\frac{27}{8}\right)^{x+7} = \left(\frac{4}{9}\right)^{-3x}$

(3 marks)

16. The figure below represents a roof truss which is symmetrical about  $QS$ . Beam  $PQ$  is 5m long and strut  $TS$  is 2.4m long. The distance  $TQ$  is 1.8m.



- Calculate:-  
(i) the height  $QS$ .

(2 marks)

- (ii) hence, find the span  $PR$  of the roof.

(2 marks)

**SECTION B**

*Answer ANY FIVE questions in this section.*

17. A merchant sold an article at Kshs4800 after allowing his customer a 12% discount on the marked price of the article. In so doing he made a profit of 45%.
- a) Calculate
- (i) The marked price of the article. (3 marks)
- (ii) The price at which the merchant had bought the article. (2marks)
- b) If the merchant had sold the same article without giving a discount. Calculate the percentage profit he would have made. (3 marks)
- c) To clear her stock, the merchant decided to sell the remaining articles at a loss of 12.5% calculate the price at which he sold each article. (2marks)



18. Two circles, centre A and B, have radii 4cm and 8cm respectively. If the two circles share a common chord 6cm long, (Taking  $\pi = 3.142$ ).

(a) Calculate the area of the common region. (6 marks)

(b) After constructing the two circles, each separately on a piece of paper, a student cut out a minor segment on each circle along the chord 6cm and joined the major segments along the chords. Find the perimeter of the figure made. (4 marks)

19. Four towns B, C, Q and D lie on the same latitude. Point B is 42 km due south – west of point Q. Point Q is 50km on a bearing of  $300^\circ$  from C. Point D is equidistant from B, Q and C.

a) Using the scale of 1cm represents 10 km; construct a diagram showing the positions of B, C, Q and D. (6marks)

b) Determine the:

i) distance between B and C. (1mark)

ii) bearing of D from Q. (1mark)

iii) bearing of D from B. (2marks)

20. A cattle dip is 150cm wide and 12m long. The depth of the water increases uniformly from a shallow end of 60cm to a maximum of 6m.

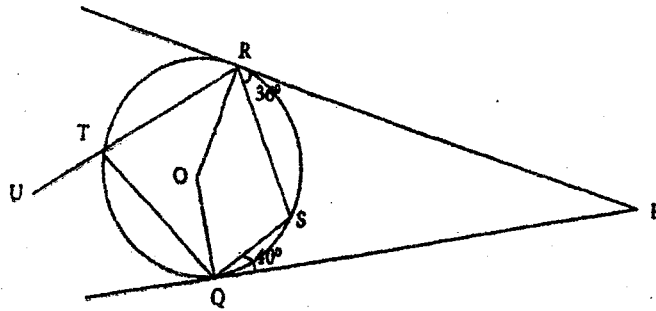
(a) Find the volume of water that can be held by the full dip in litres (5marks)

(b) If the dip is drained by a pipe of diameter 15cm at the rate of 5.6m/s, how long will it take to drain a full dip? (5marks)

21. During a charity walk to raise funds to support the Beyond Zero Campaign, Oriento, Omolon and David decided to walk from Kissy town to Kisi town a distance of 250km, at an average speed of 4 km/h. Each day they begin their walk at 6.00 a.m. and after walking 4 hours, take a break of 30 minutes then walk for the next 3 hours after which they have a lunch break for 1 ½ hours. Their final leg for the day lasts 3 hours.

- (a) Find the time:
- (i) When their first break ends. (1 mark)
- (ii) When their lunch time begins. (1 mark)
- (iii) When their day ends. (1 mark)
- (b) Find the number of days they will take to complete the journey. (3 marks)
- (c) For every hour walk, the sponsors pay sh. 50,000, sh. 30,000 and sh. 25,000 to Oriento, Omolon and David, respectively. Find the total amount of money raised by the three at the end of their charity walk. (4 marks)

22. In the figure below,  $O$  is the centre of the circle.  $PQ$  and  $PR$  are tangents to the circle at  $Q$  and  $R$  respectively. Angle  $PQS = 40^\circ$ , angle  $PRS = 30^\circ$  and  $RTU$  is a straight line. (3marks)



Find with reasons the angle

- i)  $\angle QRS$  (2marks)
- ii)  $\angle RTQ$  (2 marks)
- iii)  $\angle RPQ$  (2 marks)
- iv) Reflex angle  $\angle QOR$  (2 marks)
- v)  $\angle TRO$  given that  $TR = TQ$  (2 marks)

23.a) Complete the table below for the functions  $y = 2x^2 - 3x - 5$  for  $-2 \leq x \leq 3$  (2 marks)

x	-2	-1	0	1	2	3
y						

(b) Draw the graph of  $y = 2x^2 - 3x - 5$  from the table above. (3 marks)

(c) Use your graph to solve the equation  $y = 2x^2 - 3x - 5 = 0$  (1 mark)

(d) From your graph, find the value of x which satisfies the simultaneous equations. (2 mark)

$$y = 2x^2 - 3x - 5$$

$$y = 2x - 2$$

(e) Write down the equation which is satisfied by the values of x in (e) above in the form

$$ax^2 + bx + c = 0$$

(2 marks)  $c = 0$

24. The following data was obtained for masses of some goats at the annual Kimalel goat auction.

Mass $x$ (kg)	$1.5 < x < 5.5$	$5.5 < x < 7.5$	$7.5 < x < 13.5$	$13.5 < x < 15.5$	$15.5 < x < 20.5$
No. of goats	16	20	18	14	15

- (a) Represent the information in the table above on a histogram, on the graph paper provided. (6marks)

- (b) Use the information in the table above to estimate:

(i) the mean mass. (2marks)

(ii) the median mass. (2marks)