

Name: ..... Adm no.....

School: .....Signature .....

Date: .....

**MATHEMATICS  
PAPER 1  
2018  
TIME: 2 ½ HOURS.**

***Form 3*  
Mathematics  
Paper 1**

**INSTRUCTIONS TO STUDENTS:**

- Write your name, index number, admission number and class in the spaces provided above.
- Sign and write the date of examination in the spaces provided above.
- The paper contains **TWO** sections: **Section I** and **Section II**.
- Answer **ALL** the questions in **Section I** and any **five** questions from **Section II**
- All answers and working must be written on the question paper in the spaces provided below each question.
- **Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.**
- Non – programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

**For Examiner's Use Only:**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	16
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17	18	19	20	21	22	23
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GRAND TOTAL

*This paper consists of 13 printed pages. Students should check to ascertain that all pages are printed as indicated.*

**SECTION I: (50 MARKS)**

**Answer all the question in this section in the spaces provided**

1. Evaluate:

$$\frac{\sqrt{\frac{1}{4}} \text{ of } 3\frac{1}{2} + \frac{3}{2}\left(\frac{5}{2} - \frac{2}{3}\right)}{\frac{3}{4} \text{ of } 2\frac{1}{2} \div \frac{1}{4}}$$

(3marks)

2. The average lap time for 3 cars in racing competition is 36 seconds, 40 seconds and 48 seconds respectively. If they all start the race at the same time, find the number of times the slowest car will have been overlapped by the fastest at the time they all cross the starting point together. (3marks)

3. Kamau toured Switerland from Germany. In Switzerland he bought his wife a present worth 72 Deutsche marks. Find the value of the present in

- (a) Swiss Francs.
- (b) Kenya shillings correct to the nearest sh, if  
1 Swiss Franc = 1.25 Deutsche marks

1 Swiss Franc = 48.2 Kenya shillings (3marks)

4. Solve the following inequalities and represent the solution on a number line and hence state the integral values of x

$$7x - 4 \leq 9x + 2 < 3x + 14 \quad (4 \text{ marks})$$

5. Marwa bought 8 pairs of trousers and six shirts at Sh. 4160. Had he bought twice as many shirts and half as many trousers, he would have saved Sh. 160. Find the cost of each item. (3 marks)

6. A motorist 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**. (3marks)

7. The interior angle of a regular polygon is  $108^\circ$  larger than the exterior angle. How many sides have the polygon? (3 marks)
8. The gradient of a straight line  $L_1$  passing through the points  $P(3, 4)$  and  $Q(a, b)$  is  $-\frac{3}{2}$ . A line  $L_2$  is perpendicular to line  $L_1$  and passes through the points  $Q$  and  $R(2, -1)$ . Determine the values of  $a$  and  $b$ . (4marks)
9. A mother is now  $2\frac{1}{2}$  times as old as her daughter Mary. Four years ago the ratio of their ages was 3:1. Find the present age of the mother. (3 marks)
10. Use the tables of squares, square roots and reciprocals only to find the value of  $(0.0546)^{\frac{1}{2}} + \left(\frac{1}{4.327}\right)^2$  (3marks)

11. Without using tables or calculators, find the value of  $t$  in

$$\log_8(t + 5) - \log_8(t - 3) = \frac{2}{3}$$

(3marks)

12. The mass of a mixture A of beans and maize is 72kg. The ratio of beans to maize is 3: 5 respectively. Find the mass of maize in the mixture. (3 marks)

13. A solid metal cylinder with radius 7cm and height 5cm is melted down and recast into a spherical ball. Calculate to 1 decimal place the surface area of this ball. (4marks)

14. Reduce the following expression onto a single fraction. (3 marks)

$$\frac{4x - 5}{2} - \frac{2x - 1}{6}$$

15. The volume of two similar solid spheres are  $4752\text{cm}^3$  and  $1408\text{cm}^3$ . If the surface area of the small sphere is  $352\text{cm}^2$ , find the surface area of the larger sphere. (3marks)

16. The currency exchange rates of a given bank in Kenya are as follows.

Currency	Buying	Selling
1 Sterling pound	135.50	135.97
1 US pound	72.23	72.65

A tourist arrived in Kenya with 5000US dollars which he converted to Kenya shillings upon arrival. He spent Ksh.214,500 and converted the remaining to sterling pounds. How many pounds did he receive? (3 marks)

**SECTION II: (50 MARKS)**

*Answer any FIVE questions from this section in the spaces provided.*

17. The table **below** shows the income tax rates for a certain year.

Taxable pay per month (Ksh)	Tax rates
1 – 9,680	10%
9,681 – 18,800	15%
18,801 – 27,920	20%
27,921 – 37,040	25%
37,040 and above	30%

That year Leonard paid net tax of Ksh.5,512 per month. His total monthly taxable allowances amounted to Ksh.15,220 and he was entitled to a monthly personal relief of Ksh.1,162.

Every month the following deductions were made:

- NHIF – Ksh. 320
- Union dues – Ksh.200
- Co-operative shares – Ksh.7,500

- (a) Calculate Leonard's monthly basic salary in Ksh. (7marks)

- (b) Calculate his monthly net salary. (3marks)

18. Three partners Jared, James and Jack contributed Sh. 600,000, Sh. 400,000 and Sh. 800,000 respectively to start a business of a matatu plying Mautano-Embu route. The matatu carries 14 passengers with each paying Sh. 250. The matatu makes two round trips each day and ever full. Each day Sh. 6000 is used to cover running costs and wages.

(a) Calculate their net profit per day. (2 marks)

(b) The matatu works for 25 days per month and is serviced every month at a cost of KSh.10,000. Calculate their monthly profit in June. (1 mark)

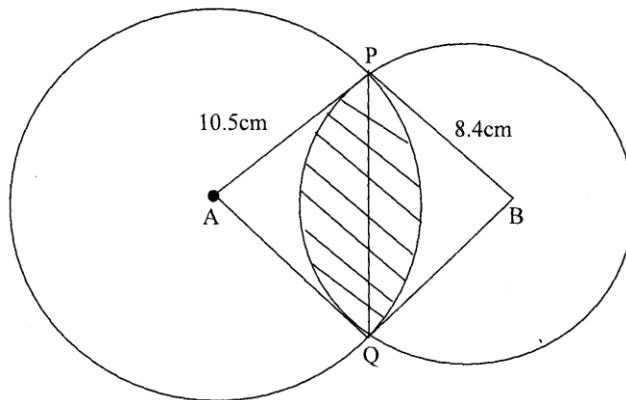
(c) The three partners agreed to save 40% of the profit, 24% to be shared in the ratio of their contribution. Calculate James's share in the month of July (4 marks)

(d) The matatu developed mechanical problems and they decided to sell it through an agent who charged a commission of 5% on selling price. Each partner received KSh. 475,000 from the



agent after he had taken his commission. Determine the price at which the agent sold the matatu. (3 marks)

19. 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.

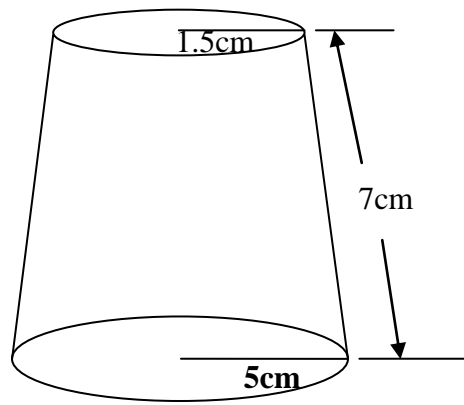


(a) Calculate angle PAQ. (2 marks)

(b) Calculate angle PBQ. (2 marks)

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

20. The diagram below shows a frustum of a right circular cone. The radii of the circle at the top and the bottom are 1.5cm and 5cm respectively. The slant edge of the frustum is 7cm long.



Calculate:

- (a) The height of the frustum. (4marks)

- (b) The total surface area of the frustum. (6marks)

21. The following measurements were recorded in a field book using XY as the base line. XY = 400m.

		Y		
C	60	340		
		300	120	D
		240	160	E
		220	160	F
B	100	140		
A	120	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.80000 per hectare, find how much the farm costs. (2 marks)

22. Using a ruler and a pair of compasses only:

(i) Construct a triangle ABC such that  $AB = 6.5$  cm, angle  $CAB = 60^\circ$  and angle  $ABC = 75^\circ$ .  
(3 marks)

(ii) Construct a perpendicular of line AC at C and the perpendicular bisector of line BC and let them meet at point O.  
(2 marks)

(iii) Draw a circle radius OB and centre O. The line AB extended meets the circle at point O.  
(1 mark)

(iv) Construct a line parallel to line AC and passing through point D. This line meets the circle at point E.  
(1 mark)

23. (a) A hot water tap can fill a bath in 7 minutes while a cold water tap can fill the same bath in 5 minutes. The drain pipe can empty the full bath in  $4\frac{1}{3}$  minutes. The two taps and the drain pipe are fully open for  $2\frac{1}{2}$  minutes after which the drain pipe is closed. How much longer will it take to fill the bath (6marks)

(b) Three grades A, B and C of rice were mixed in the ratio 4:3:5. The cost per kg of each of the grades A, B and C were Kshs. 90, kshs. 120 and kshs. 60 respectively. Calculate.

i. The cost of one kilogram of the mixture (2marks)

ii. The selling price of 5kg of the mixture given that the mixture was sold at 8% profit (2marks)

(v) Measure the sizes of lines DE and BC and hence find the area of BDEC. (3 marks)

