NAME	INDEX NO
121/1 MATHEMATICS	CANDIDATE'S SIGN

DATE.....

121/1 MATHEMATICS PAPER 1 JULY/AUGUST, 2016 TIME: 2<sup>1</sup>/<sub>2</sub> HOURS

# KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY JOINT EXAMINATION – 2016

Kenya Certificate of Secondary Education MATHEMATICS PAPER 1 TIME: 2<sup>1</sup>/<sub>2</sub> HOURS

### **INSTRUCTION TO CANDIDATE'S:**

- 1. Write your **name**, **index number** and **school** in the spaces provided at the top of this page.
- 2. Sign and write the date of examination in spaces provided above.
- 3. This paper consists of two Sections; Section I and Section II.
- 4. Answer all the questions in Section I and any FIVE questions from Section II.
- 5. All answers and working must be written on the question paper in the spaces provided **below** each question.
- 6. Show all the steps in your calculation, giving your answer at each stage in the spaces provided **below** each question.
- 7. Marks may be given for correct working even if the answer is wrong.
- 8. Non-programmable silent electronic calculators and **KNEC** Mathematical tables **may be** used, except where stated otherwise.
- 9. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

### FOR EXAMINER'S USE ONLY:

#### **SECTION I**

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

#### **SECTION II**

17	18	19	20	21	22	23	24	TOTAL

### GRAND TOTAL

### **SECTION I: (50 MARKS)**

## Answer all the questions in the section.

1. Evaluate: 
$$\frac{28 - (-18)}{-2} - \frac{15 - (-2)(-6)}{-3}$$
. (3mks)

John spent  $^{2}/_{3}$  of his salary on food  $^{1}/_{3}$  of the remainder on rent and saved the rest. 2. What fraction of his salary did he save? If he spent Sh.1200 on food, how much did he spend on rent. (3mks)

- Given that  $\sin \theta = \frac{1}{\sqrt{5}}$  where  $\theta$  is an acute angle, find without using Mathematical 3. tables or 'a calculator'.  $\cos \theta$  in the form  $a\sqrt{b}$ . (a)

(b) Tan (90 - θ). (1mk)

- 4. Use tables 1 and table 2 below to find the average speed that the Nairobi-Mombasa passenger train uses to travel between Konza and Masongaleni. (3mks) Table 1: Shows the rail distance in km between selected stations from Mombasa
  - Table 2: Shows the departure and arrival time between selected stations from Mombasa to Nairobi.

w.e.f. 15/10/2001	Passenger train			
Station	ARR	DEP		
Nairobi Yard		1900		
Athi River	1952	1954		
Konza	2055	2057		
Sultan Hamad	2234	2236		
Makindu	2354	2356		
Kibwezi	0025	0027		
Masongaleni	0057	0059		
Mtito Andei	0158	0213		
Voi	0423	<i>0438</i>		
Mariakani	0718	0720		
Mazeras	0740	0742		
Mombasa	0825			

Table 1 – is a travel table for a passenger train from Nairobi to Mombasa

to Nairobi.

ARR –	Arrival	time at	station

DEP – Departure time from station

Nairobi	River										
29.6	Athi	za	amuc								
73.7	44.1	Kon	tan H	П							
130	100.4	56.3	Sult	sindı							
193.4	163.8	119.7	63.4	Mał	vezi	ıleni					
215.3	185.7	141.6	85.3	21.9	Kibv	songa	ndei				
233.1	203.5	159.4	103.1	39.7	17.8	Mas	to Ar				
266.6	237	192.9	136.6	73.2	51.3	33.5	Mti		·=		
365.9	336.3	292.2	235.9	172.5	150.6	132.8	99.3	Voi	iakan		
492	462.4	418.3	362	298.6	276.7	258.9	225.4	126.7	Mar	zeras	_
506.4	476.8	432.7	376.4	313	291.1	273.3	239.8	140.5	14.4	Ma:	basa
530.3	500.7	456.6	400.3	336.9	315	297.2	263.7	164.4	38.3	23.9	Mom

Table 2

Table 1

(3mks)

5. Solve the following simultaneous equations.  $\chi^2 + y^2 = 26$ 

 $\chi + y = 4$ 

6. A Kenyan company received US Dollars 100,000. The money were converted into Kenya shillings in a bank which buys and sells foreign currencies as follows.

	Buying (Ksh)	Selling (Ksh)
l US Dollar	77.24	77.44
l Sterling Pound	121.93	122.27

(a) Calculate the amount of money, in Kenya shillings, the company received.

(2mks)

(b) The company 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 pond. (2mks)



In the figure above O is the centre of the circle. Given that PR = QR and  $\angle PQR = 69^{\circ}$ . Find  $\angle RQO$ .

8. Find the smallest number which leaves a reminder of 4 when divided by either 8 or 12 or 14. (2mks) 9. Find the integral value of  $\chi$  which satisfy the inequality.  $3 + 2\chi < 3\chi - 1 \le 2\chi + 7$ (3mks)

A line L is perpendicular to  $2\chi + y = 3$  and passes through point (4, -1). Determine 10. (2 marks) the equation of line L. (i)

(ii) the acute angle that line L makes with the  $\chi$ -axis.

for free past papers visit: www.freekcsepastpapers.com or call 0720502479 The angle of elevation of the top of a storey building from point P is 23.61°. From another point Q six metres nearer to the base of the building, the angle of depression from the top of the building is 35°. Calculate to 1 decimal place the height of the (4mks)

building.

11.

12. State the amplitude and the period of the function  $y = \frac{3}{2} \cos(2\chi + 30^{\circ})$ . (2mks)

13. In a fund raising committee of 45 people, the ratio of men to women is 7: 2. Find the number of women required to join the existing committee so that the ratio of men to women is changed to 5: 4. (3mks)

14. The figure below is a semi-cylindrical solid of length 18cm and radius 3.5cm are shown.



Draw a labelled net of the sold.

(3mks)

15. Find the radius of the circle whose major segment is given below if CM = AB = 8cm. (3mks)



16. Given that  $P = 3^{y}$  express the equation  $3^{2y-1} + 2 \ge 3^{y-1}$  in terms of P. Hence or otherwise find the value of y in the equation  $3^{2y-1} + 2 \ge 3^{y-1} = 1$ . (3mks)

### **SECTION II: (50 MARKS)**

## Answer only ANY FIVE questions in this section.

- 17. Mutwapa Primary School is 30km on a bearing of 015° from a tourist hotel. The nearest town is 45km from the school on a bearing of 120°.
  - (a) Using a scale of 1cm to represent 15km, make a scale drawing of the positions of the school the tourist hotel and the town. (4mks)

How far is the tourist hotel from the town?						
Wha (i)	t is the bearing of the town from the tourist hotel?	(2mks)				
(ii)	the school from the town?	(2mks)				
	How Wha (i) (ii)	<ul><li>How far is the tourist hotel from the town?</li><li>What is the bearing of <ul><li>(i) the town from the tourist hotel?</li></ul></li><li>(ii) the school from the town?</li></ul>				

(3mks)

18. The diagram below (not drawn to scale) represents the cross-section of a solid prism to 8.0cm.



(a) Calculate the volume of the prism.

(b) Given that the density of the prism is 5.75g/cm<sup>3</sup>, calculate it's mass in grams. (2mks)

- (c) A second prism is similar to the first one but is made of a different material. The volume of the second prism is 246.24cm<sup>3</sup>.
  - (i) Calculate the area of the cross-section of the second prism. (3mks)

(ii) Given that the ratio of the mass of the first prism to that of the second is 2:
 5, find the density of the second prism. (2mks)

10

19. The distance between two towns A and B is 760km. A minibus left town A at 8: 15am and traveled towards B at an average speed of 90km/h. A matatu left B at 10:35am and on the same day and travelled towards A at an average speed of 110km/h.
(a) (i) How far from A did they meet? (4mks)

(ii) At what time did they meet?

(b) A motorist starts from his home at 10:30am on the same day and travelled at an average speed of 100km/h. He arrived at B at the same time as the minibus. Calculate the distance from B to his home. (4mks)

(2mks)

- 20. A jet flies from town Q (60°S, 24°E) to town R (60°S, 10°W) and then due north for 1200 nautical miles to town S.
  - (a) Obtain the latitude of S.

(3mks)



(ii) km

(2mks)

(3mks)

(c) Find the total flight time if the jet flies at an average speed of 800 knots. (2mks)

Mathematics Paper 1

(5mks)

21. The figure below shows a triangle inscribed in a circle. AB = 6cm, BC = 9cm and AC = 10cm.



Calculate (a) the interior angles of  $\triangle ABC$ .

the radius of the circle. (2mks)

(c) the area of the shaded part. (3mks)

(b)



A triangle has vertices A (1, 2), B (4, 4) and C (6, 2).

22.

- (b)Construct the image triangle  $A^1B^1C^1$  image of triangle ABC under a<br/>rotation of 90° clockwise about the origin.(2mks)(c)Draw triangle  $A^{11}B^{11}C^{11}$  the image of triangle  $A^1B^1C^1$  under a reflection<br/>in line  $y = \chi$ , state the coordinates of  $A^{11}B^{11}C^{11}$ (3mks)(d)Draw triangle  $A^{111}B^{111}C^{111}$  the image of triangle  $A^{11}B^{11}C^{11}$  under a<br/>reflection in the line y = 0 and state the coordinates of its vertices.(2mks)
- (e) Describe a single transformation that maps triangle A<sup>11</sup>B<sup>11</sup>C<sup>11</sup> onto triangle ABC.
   (2mks)

Mathematics Paper 1

14

- 23. In triangle OAB, OA = a and OB = b. Points P and T divide OB and AB in the ratio 2:3 and 1:3 respectively. Lines OT and AP intersect at Q.
  - (a) Draw the diagram to represent the above information. (1mk)

(b) Express OP and AP in term of  $\underline{a}$  and  $\underline{b}$ . (2mks)

- (c) Express  $O_{\underline{x}}^{\underline{x}}$  in terms of  $\underline{a}$  and  $\underline{b}$ . (1mk)
- (d) Given further that OQ = tOT and AQ = sAP, express OQ in two ways and hence find the values of s and t. (6mks)

(2mks)

24. The velocity of a particle, Vm/s, moving in a straight line after t seconds is given by  $V = 3t^2 - 3t - 6$ 

Find:-

(i) The acceleration of the particle after 2 seconds.

(ii) The distance covered by the particle between t = 1 and t = 4 seconds. (3mks)

(iii) The time when the particle is momentarily at rest. (2mks)

(iv) The minimum velocity attained by the particle. (3mks)