Name ..... Index No. .....

School .....Candidates signature .....

121/1 Date .....

**MATHEMATICS**
Paper 1

**October/November 2016**

Time 2½ hours

# KANDARA SUB-COUNTY FORM 3 JOINT EVALUATION

## Kenya Certificate of Secondary Education

## MATHEMATICS

Paper - 121/1

**October/November 2016**

**Time:** 2½ hours

## INSTRUCTIONS TO CANDIDATES

1. Write your name and Index number in the spaces above.
2. Sign and write the date of the examination in the spaces provided above.
3. This paper contains two sections. Section I and II.
4. Answer all questions in section I and ONLY five in 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 calculations giving your answer at each stage in the spaces provided below each question.
7. Marks may be awarded for correct working even if the answer is wrong.
8. Non-programmable silent calculators may be used and KNEC Mathematical tables may be used, except where stated otherwise.
9. Candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing.



**EXAMINER'S USE ONLY**

**Section I**

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

**Section II**

| Question | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Marks | | | | | | | | | |

***This paper consists of 16 printed pages***
***Candidates should check the question paper to ensure that all the printed pages are printed as indicated and no questions are missing.***

**Grand Total**

**SECTION 1 (50 MARKS)**

**Answer all the questions in this section in the spaces provided.**

1. Evaluate without using a calculator. $\dfrac{\frac{2}{3}\times\left(1\frac{3}{7}-\frac{5}{8}\right)}{\frac{3}{4}+1\frac{5}{7}\div\frac{4}{7}\ of\ 2\frac{1}{3}}$ (3 marks)

2. A line passes through the points A(5, -4) B(9, 6). Find the equation of the perpendicular bisector of AB in form of y = mx + c (3 marks)



3. Give that $\dfrac{2x+3y}{3x+4y}=5$ find the ratio x : y (3 marks)

4. At 90km/hr a car takes 2 hours to cover a distance from A to B. How long would i take to cover the same distance if the car was travelling at 120km/hr. (3 marks)

5. A square room is covered by a number of whole rectangular slabs of sides60cm by 42cm. Calculate the least possible area o the room in square metres. (3 marks)



6. A Kenyan business lady left South Africa for Kenya through Tanzania. While in Tanzania she bought Jewellery worth 1200 Rands. Find the value of the jewellery in:

a) Tanzania shillings. (2 marks)

b) Kenya shillings (2 marks)

Use the exchange rate below.
1 South African Rand = 13.45 Kenya shillings.
1 Kenya shillings = 26.74 Tanzania shillings.

7. Solve the inequalities $x + 5 < 3x + 2 \leq x + 11$ and state the integral values satisfying it. (3 marks)

8. Given that A(-6, 5) B(2, 9) and C(10, 13) show that A, B and C are collinear. (3 marks)



9. Given that $\text{Cos}(3x + 30)° = \text{Sin}\ (x - 20)°$ find the value of $x$. (3 marks)

**10.** A cylinder of radius 14cm contains water. A metal solid hemisphere of radius 6.8cm is submerged into the water in the cylinder. Find the change in height of the water in the cylinder. (4 marks)

**11.** Two similar solids has surface areas of $48cm^2$ and $108cm^2$ respectively. Find the volume of the smaller solid if the bigger one has a volume of $162cm^3$. (3 marks)



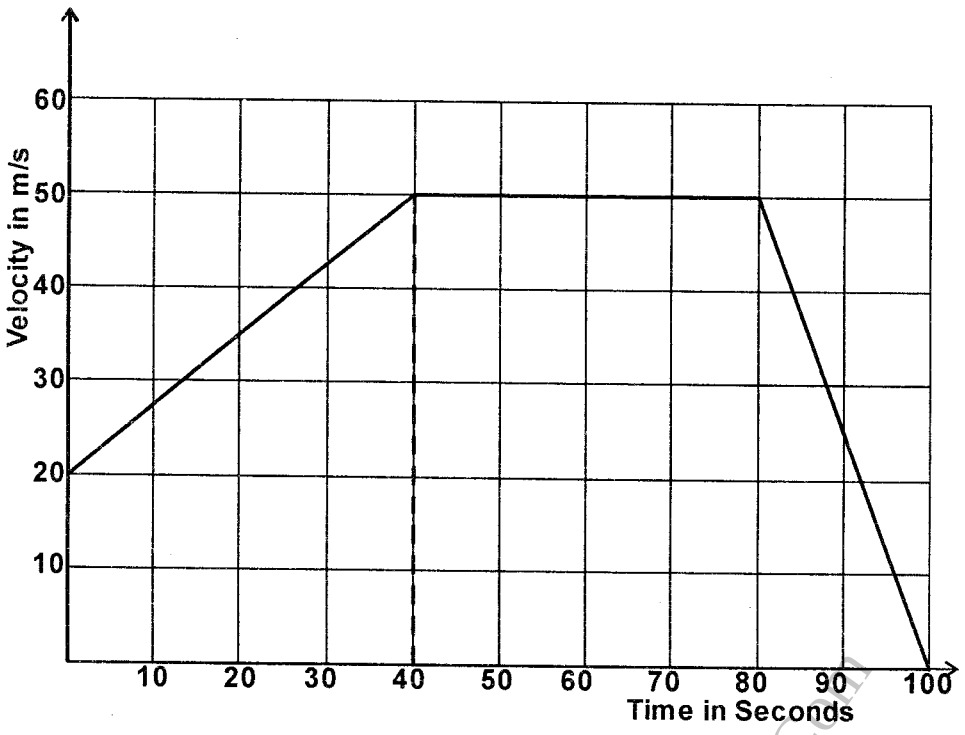
**12.** The size of an interior angle of a regular polygon is 14 times that its exterior angle. Determine the number of sides of the polygon. (3 marks)

**13.** Without using table or calculator. $\dfrac{-10+(-4)\times(-8)-(-6)}{3-(-5)\text{ of }6\div 9+(-2)\div(-3)}$ (3 marks)



**14.** Peter a prominent businessman shared his profit among his children as follows. A daughter got $^1/_3$ one son $^1/_3$ of the remainder and the other son $^1/_6$ of what was left. If he still had Kshs 24000 left, how much was the profit. (3 marks)

**15.** The table below gives the motion of a car for some distance. Determine the total distance travelled. (3 marks)

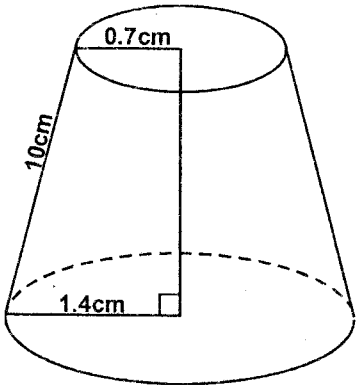





**16.** Tap P can fill a tank in 2 hours and tap Q can fill the same tank in 4 hours. Tap R can empty the tank in 3 hours. If the three taps are left running how long would it take to fill the tank. (3 marks)

**SECTION II (50 marks)**
**Answer any FIVE questions in this section**

**17.** The figure below shows a solid frustrum cut off from a cone. The radii of the circular ends are 1.4cm and 0.7cm. The slanting height of the frustum is 10cm.




Calculate

a) The volume of the frustum (4 marks)

b) The surface are of the frustrum (3 marks)

c) The frustum is method down and recast into a solid cube. Calculate the length of each side of the cube. (3 marks)

**18.** Fifty seedlings were uprooted from a nursery and their heights measured to the nearest centimetre and recorded in the given table.

| Height | Frequency |
|---|---|
| 13 - 15 | 4 |
| 16 - 18 | 7 |
| 19 - 21 | 11 |
| 22 - 24 | 15 |
| 25 - 27 | 6 |
| 28 - 30 | 5 |
| 31 - 33 | 2 |

Calculate

a) The mean height. (3 marks)

b) The median height (3 marks)

c) Draw a histogram and hence a frequency polygon to represent the above information. (4 marks)

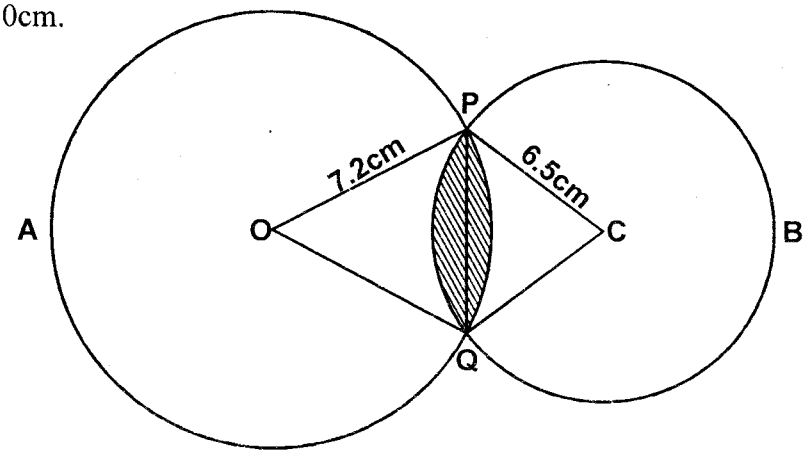
**19.** A ship leaves port P and sails to port Q which is 80km away on a bearing of 040°. The ship then sails from Q to R on a bearing of 160° and is 150km from Q. From R the ship returns directly to P at a speed of 25 km/hr.

a) Using a scale of 1cm to rep 20 km. Show the relative positions of P, Q and R. (4 marks)

b) i) The bearing of R and P. (2 marks)

ii) The distance travelled from R and the taken to arrive at P from R. (4 marks)

**20.** Two circles centres O and C have radii 7.2cm and 6.5cm respectively. The two circles intersect at P and Q. PQ = 10cm.




Find

a) <POQ (2 marks)

b) <PCQ (2 marks)

c) The area of the shaded region. (4 marks)

d) The length of major arc PAQ (2 marks)

**21.** A business woman imported motor vehicle spare parts from Dubai valued at £9670 at a shipping cost of £150. At the port of Mombasa she paid an import duty at the rate of 23% of the value of the goods. She transported the spare parts to her shop in Nakuru by train at a cost of £35.

a) Calculate the import duty paid.

(2 marks)

b) The total cost of the spare parts by the time they reach Nakuru.

(3 marks)

c) The spare parts are of two types A and B. If she is to make a profit of 17% on type A and 19% on B and the quantities imported of each type are in the ration 7 : 3. Find the selling price of

i) type A

(3 marks)

ii) type B.

(2 marks)

**22.** A flag post 12m long is fixed on top of a tower. From a point on horizontal ground the angles of elevation of the top and bottom of the flag post are 46° and 33° respectively. Calculate

a) The horizontal distance from the point on the ground to the base of the tower. (4 marks)

b) The total height of the tower and the flag. (2 marks)

c) The shortest distance from the point on the ground to the top of the flat post. (2 marks)

d) The shortest distance from the point on the ground to the top of the tower. (2 marks)

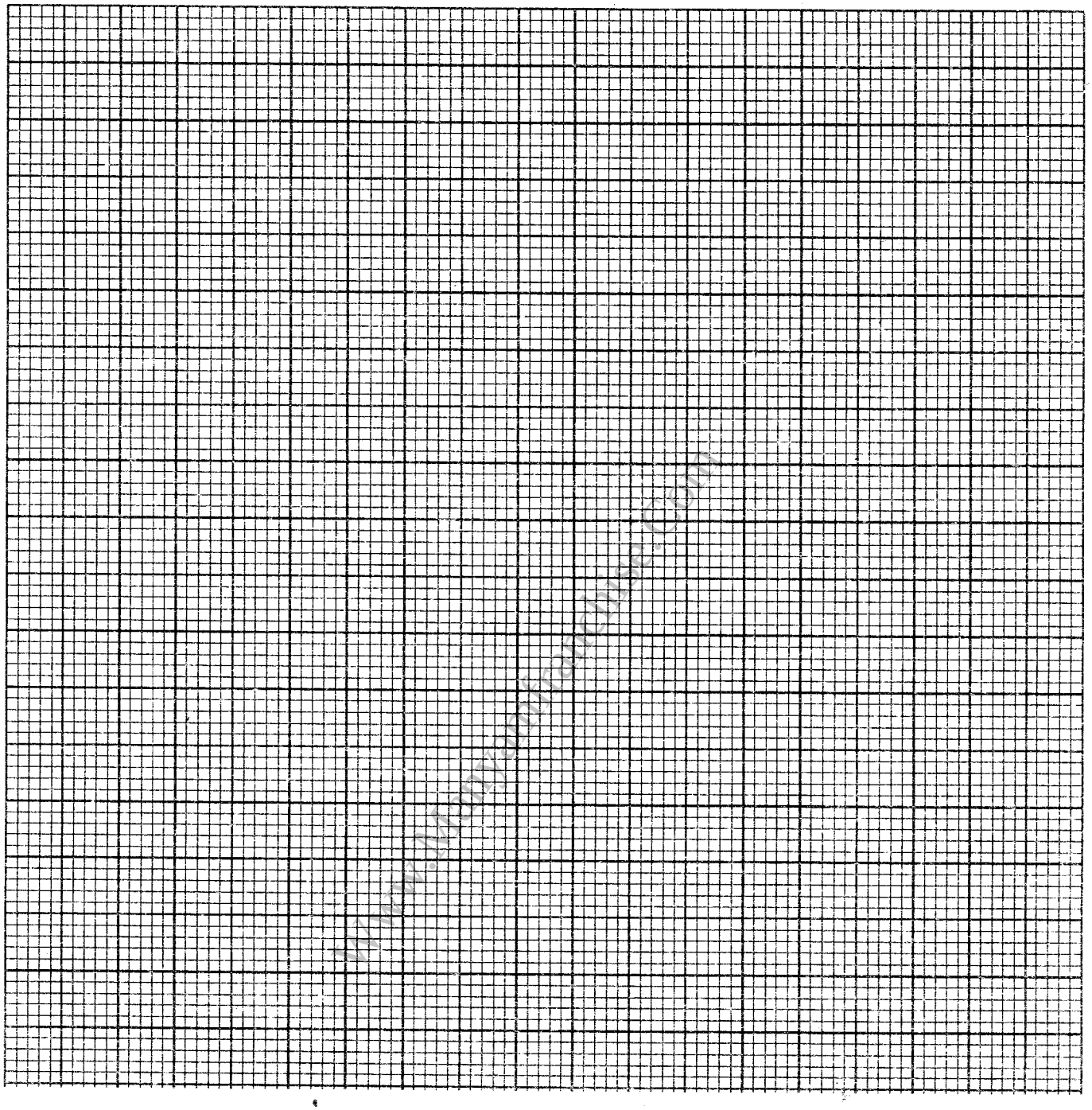
**23.** Given that P varies jointly as Q and R and that Q = 12, R = 27, when P = 18 calculate.

a) The value of P when Q = 9 and R = 30. (3 marks)

b) The value of R when P = 60 and Q = 30. (3 marks)

c) The percentage change in P if Q is decreased by 12% and R increased by 20%. (4 marks)

**24.** a) A triangle with vertices A(-4, 2) B(-6, 6) and C(-6, 2) is enlarged by a scale factor -1 and centre (-2, 6) to produce triangle $A^1B^1C^1$. Draw triangle ABC and its image on the grid provided. (3 marks)





b) Triangle $A^1B^1C^1$ in (a) above is reflected in the line y = x to give triangle $A^{11}B^{11}C^{11}$ draw it on the same grid as in (a) (3 marks)

c) Triangle $A^{11}B^{11}C^{11}$ in (b) above is mapped onto $A^{111}B^{111}C^{111}$ whose coordinates are $A^{111}$(0, -2) $B^{111}$(4, -4) $C^{111}$ (0, -4) by a rotation. Find the centre and angle of rotation. (4 marks)