**Name: ……..…….. Index No: ….……/…..…**

**School……**

**121/1** **Candidates Signature ……**

**MATHEMATICS ALT A** **Date: ……...…….**

**PAPER 1**

**Time: 2 ½ Hours**

# *Kenya Certificate of Secondary Education (K.C.S.E)*

**Instructions to Candidates**

***(a)*** *Write your **name, Index number, Admission Number, Sign and write the date of examination** in the spaces provided above.*

***(b)*** *The paper consists of two sections: **Section A** and **Section B.***

***(c)*** *Answer **ALL** the questions in **Section A** and only any **FIVE** questions in **Section B**.*

***(d)*** *Show all the **STEPS** in your working, giving your answer at each stage in the spaces below each question.*

***(e)*** *Marks may be given for correct working even if the answer is wrong*

***(f)*** ***Non-programmable** silent electronic calculators and KNEC Mathematical tables may be used, except stated otherwise.*

***(g)*** *This paper **consists of 14 printed pages**.*

***(h)*** *Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.*

**For Examiners Use Only**

**Section A**

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

**Section B**

| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**Grand Total**

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

## SECTION A (50 Marks)

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

**1.** Use logarithm tables to evaluate **(4 marks)**

$$5\sqrt{\frac{3.172\times(0.008367)^{2}}{log9}}$$

**2.** Solve for $x$ and $y$ **(3 marks)**

$3^{2x-y}= 27$

$4^{x} \div 16^{y} = 1$

**3.** Evaluate without using mathematical tables or calculator **(3 marks)**

$$\frac{¾ + {}^{2}/_{5} \div {}^{3}/_{5} \text{ of } 1{}^{2}/_{3}}{(1\ ¾ - {}^{5}/_{8}) \times {}^{2}/_{9}}$$

**4.** A line $y = mx + 8$ makes an angle of $75.97^{0}$ with the $x$-axis, find the co-ordinates of the point where the line cuts the $x$-axis. **(3 marks)**

**5.** Find the integral values of x which satisfy the inequalities. **(3 marks)**

$3x - 2 < 10 + x < 2 + 5x$

**6.** A camera which is marked at Ksh 2400 is sold to a consumer after allowing him a 10% discount. By so doing the trader still makes a profit of 20% on the cost of the camera. Determine the cost price of the camera. **(3 marks)**

**7.** Solve for θ given that θ is acute and $sin\ (3\theta - 50^0) - cos\ (2\theta + 10^0) = 0$. **(2 marks)**

**8.** The cost of the car outside Kenya is US $ 4,800. You intend to buy one such car through an agent who deals in Japanese yen. The agent will charge 15% commission on the price of the car and further 72,220 Japanese yens for shipment of the car. How many Kenya shillings will you need to send to the agent to obtain the car, given that;

1 US $ = 117.20 Japanese yen
1 US $ = Ksh. 72.34 **(3 marks)**

**9.** Simplify $\frac{p^2 - 2pq + q^2}{P^3 - pq^3 + p^2q - q^3}$

**(3 marks)**

**10.** Given that $a = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$ $b = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$ ,evaluate

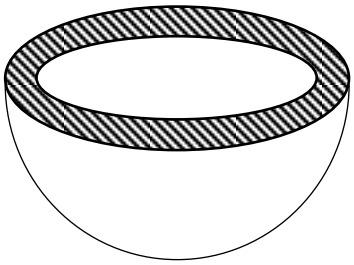
$|\frac{1}{2}a + 2b|$ **(3 marks)**

**11.** Kamau is now four times as old as his son.Five years ago,Kamau was exactly 1 ½ times as old as his son will be in ten years from now.Determine Kamau's present age.

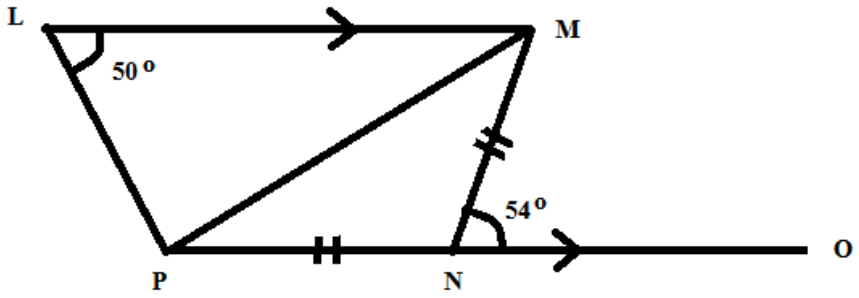
**(3 marks)**

**12.** Express $0.7\dot{3}$ as fraction. **(3 marks)**

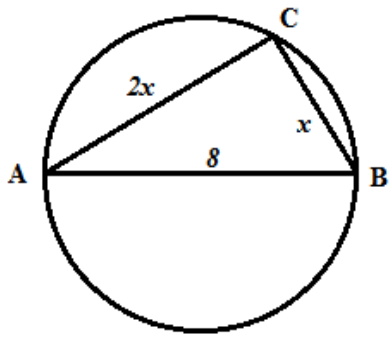
**13.** The figure below shows a hemispherical bowl of thickness 1.5cm. Given that the external surface area is 509cm$^2$. Find the volume of the bowl. (Take $\pi = 3.142$) **(3 marks)**



**14.** In the figure below $\angle$ MNO = $54^0$, and $\angle$PLM = $50^0$, PN = NM and PO is parallel to LM. Find the value of $\angle$LPM. **(3 marks)**




**15.** In the figure below, AB is a diameter of the circle and AB = 8cm, BC= $x$cm and AC= $2x$cm. Calculate the length of AC to 2 significant figures. **(3 marks)**




**16.** Use squares ,square roots and reciprocal tables only to evaluate the following,giving your answer to 2 dp (4mks) **(4 marks)**

$$\frac{2}{\sqrt{0.5283}} + \frac{0.5}{3.735^2}$$

## SECTION I1 (50 MARKS)

***Answer ONLY FIVE questions in this section***

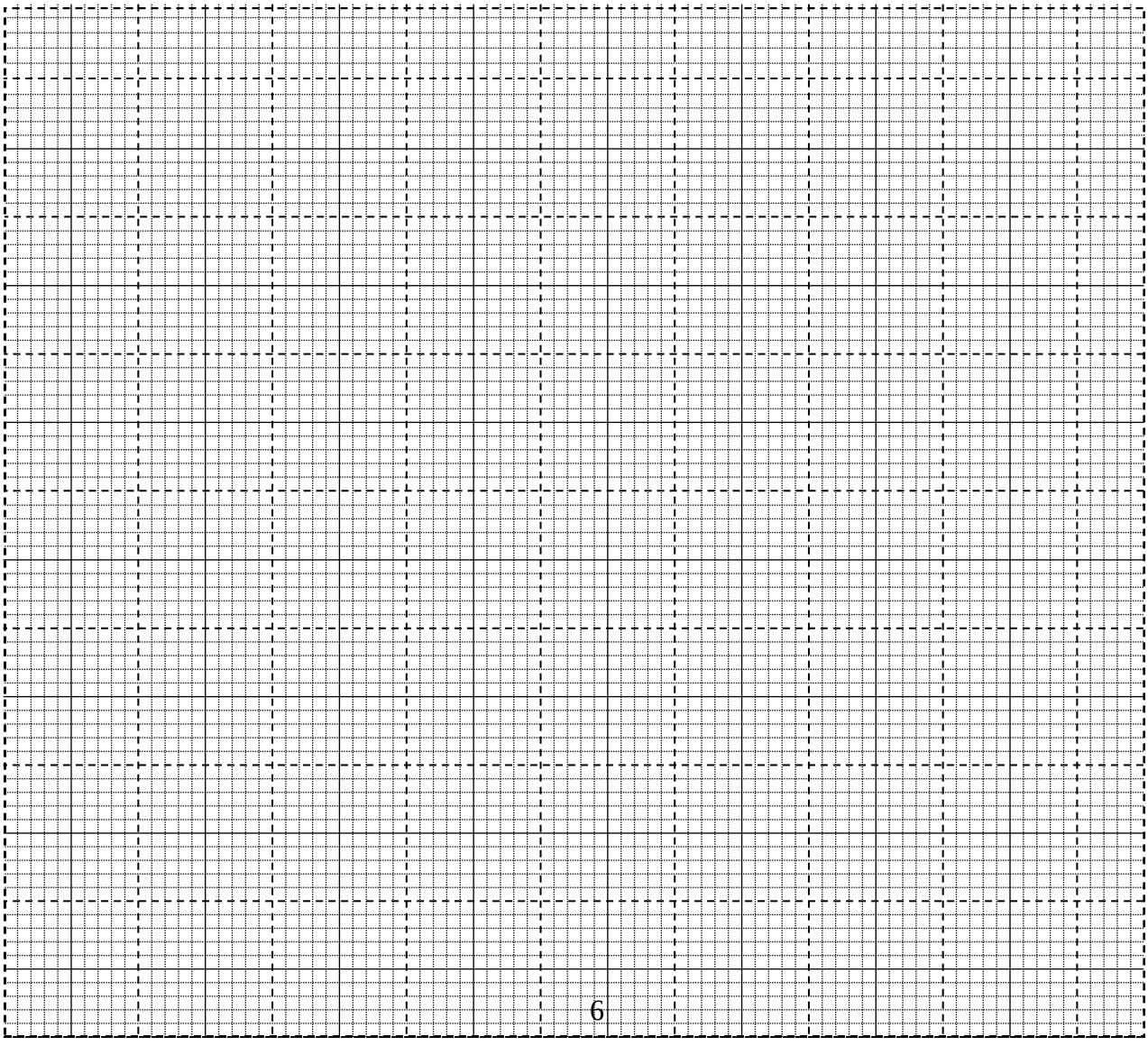
**17.** The table below shows the number of letters collected from the post office by a school messenger during a school year.

| Letters per day | 6 – 10 | 11 – 15 | 16 – 20 | 21 – 25 | 26 – 30 | 31 – 35 | 36 – 40 | 41 – 45 | 46 – 50 | 51 – 55 |
|---|---|---|---|---|---|---|---|---|---|---|
| Frequency | 5 | 19 | 21 | 23 | 25 | 27 | 20 | 25 | 13 | 12 |

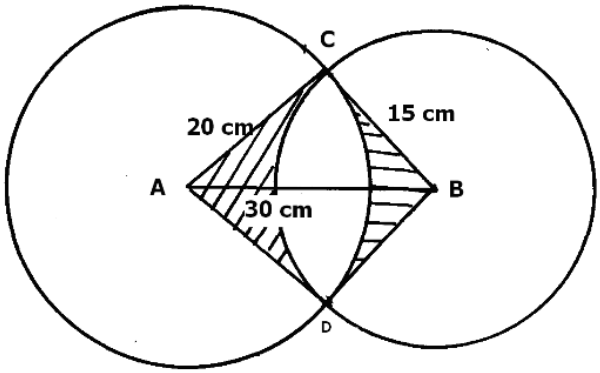
**(i)** Estimate the median of this data. **(3marks)**

**(ii)** Estimate the mean of this data. **(4 marks)**

**(iii)** On the grid provided, draw a histogram and a frequency polygon to represent this data. **(4 marks)**



**18.** The diagram shows two intersecting circles of radii 20 cm and 15 cm such that their centres A and B are 30 cm apart.




Calculate to 2 decimal places.

**a)** The area of sector ACD **(3marks)**

**b)** The area of sector BCD **(3marks)**

**c)** The length of the common CD. **(2marks)**

**d)** The area of quadrilateral ACBD **(1mark)**

**e)** The shaded area. **(1mark)**

**19.** A certain number of people agreed to contribute equally to buy books worth sh.12000 for a school library. Five people pulled out so that others agreed to contribute an extra sh. 100 each. Their contribution enabled them to buy books worth sh 2000 more than they originally expected.

**a)** If the original number of people was x, write down.

i) An expression of how much each was originally to contribute. **(1mark)**

ii) Two distinct expressions of how much each contributed after the five pulled out. **(2 marks)**

**b)** Calculate the value of $x$. **(3 marks)**

**c)** Calculate how much each person was expected to contribute originally. **(2marks)**

**d)** Calculate

i) The number of people who actually made the contribution and how much per person. **(2marks)**

ii) The ratio of the supposed original contribution to new contribution. **(1mark)**

**20.** A bus left Nairobi at 7.00am and travelled towards Eldoret at an average speed of 80km/hr. At 7.45am a car left Eldoret towards Nairobi at an average speed of 120km/hr. The distance between Nairobi and Eldoret is 300km

Calculate

**a)** the time the bus arrived at Eldoret **(2 marks)**

**b)** the time of the day the two met. **(4 marks)**

**c)** the distance from Nairobi where the two met. **(2 marks)**

**d)** the distance of the bus from Eldoret when the car arrived at Nairobi. **(2 marks)**

**21.** a) Find $A - 1$ , the inverse of matrix $A = \begin{matrix} 5 & 6 \\ 7 & 9 \end{matrix}$ **( 2 marks)**

b) Okelo bought 5 physics book and six mathematics book for a total of Ksh.2440. Ali bought 7 physics book and a mathematics books for a total cost of ksh.3560. **(3 marks)**

**(i)** Form a matrix equation to represent the a book information **(1mk)**

ii) Use matrix method to find the price of a physics book and that of a mathematics books **(3 marks)**

c) A school bought 36 physics books and 50 mathematics books. A discount of 5 % was allowed on each Physics book whereas discount 8 % was allowed on each Mathematic book. Calculate the percentage discount on the cost of all the books bought. (4mks)

22.In a triangle ABC,BC = 8cm,AC = 12 cm and angle ABC = 120 $^{o}$.

**a)** Calculate the length AB correct to 1 DP.(4mks)

**b)** If BC is the base of the triangle, Calculate ,correct to one decimal place
i.The pendicular height of the triangle (2mks)

ii.The area of the triangle (2mks)

iii.The size of the triangle ACB (2mks)

**c)** Name the polygon **(1 mark)**

**d)** Find the areas of a regular octagon of sides 4 cm o 5sf. **(5 marks)**

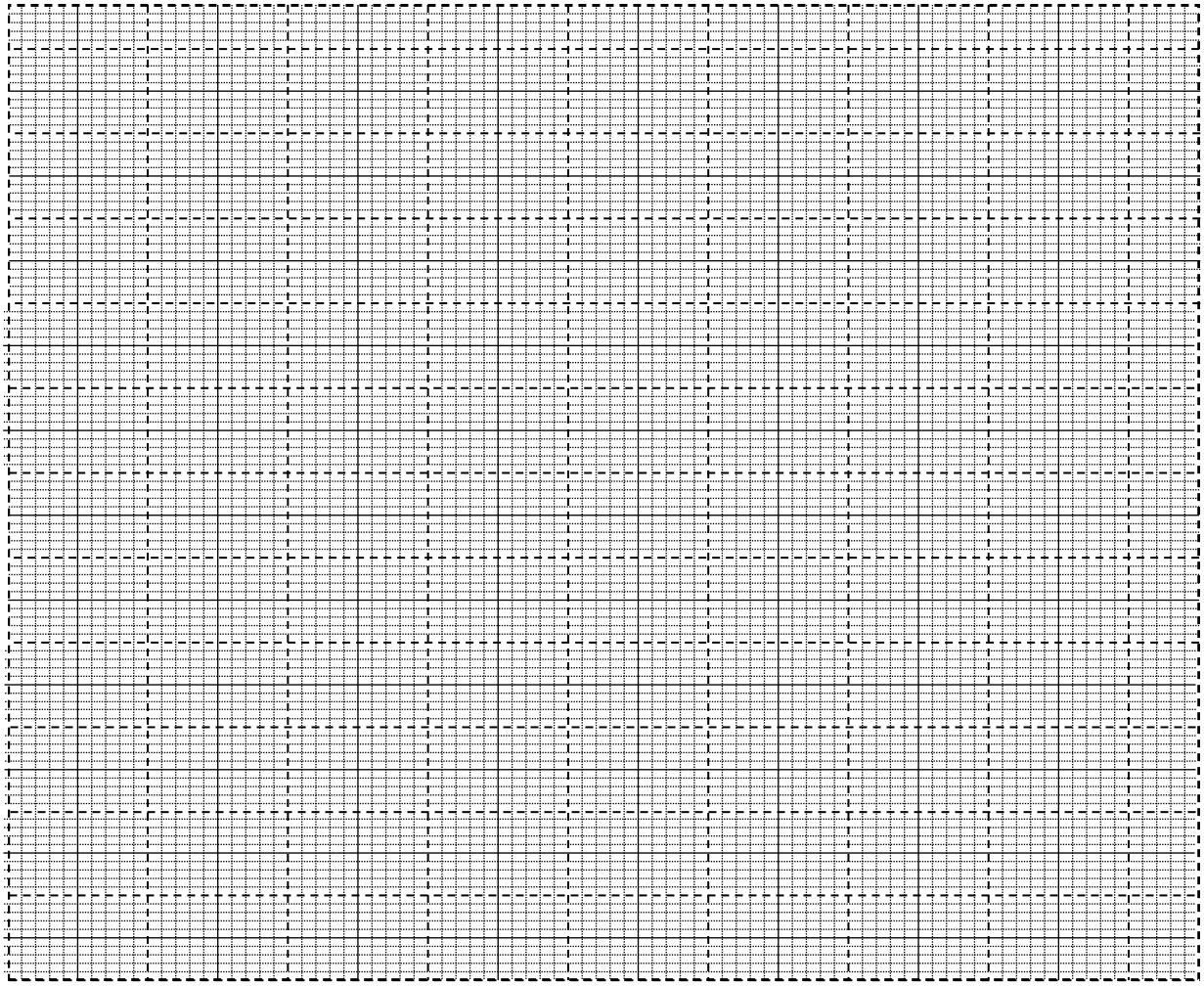
**22.** The cost C, of producing n items varies directly as n and partly as the inverse of n. to produce two items it costs Ksh. 135 and to produce three items it costs Ksh. 140

**(a)** The constant of proportionality and hence write the equation connecting C and n **(5 marks)**

**(b)** The cost of producing 10 items; **(2 marks)**

**(c)** The number of items of produced at a cost of Ksh. 756. **(3 marks)**

**23.** (a) On the grid provided draw triangle ABC such that A(6, -2), B(8, -2) and C(6, -1) **(2 marks)**



**(b)** Triangle $A^1B^1C^1$ is the image of triangle ABC under enlargement of scale factor 2 with the centre at (3, 0). Construct and label triangle $A^1B^1C^1$. State the coordinates of the triangle $A^1B^1C^1$.

**(3 marks)**

**(c)** $A^{11}B^{11}C^{11}$ is the image of $A^1B^1C^1$ under a certain rotation. If $A^{11}$ (-2, -1), $B^{11}$(-2, -5) and $C^{11}$(0, -1), by construction, find the coordinates of the centre of rotation. **(3 marks)**

**(d)** Triangle $A^{11}B^{11}C^{11}$, is reflected on the line $y = -3$. Draw the triangle $A^{111}B^{111}C^{111}$ the image of triangle $A^{11}B^{11}C^{11}$ under reflection in the line.$y = -3$ **(2 marks)**

24. The table below shows measurements of a farm in a fields book. XY=2000m

| | | |
|---|---|---|
| | Y | |
| | 1800 | G 100 |
| F 200 | 1600 | |
| | 1200 | E 300 |
| | 900 | D 100 |
| C 150 | 600 | |
| | 300 | B 200 |
| A 200 | 100 | |
| | X | |

(a) Using a scale 1cm rep 100m. Sketch the map of the farm

(2mks)

(b) Calculate the area of the farm in hectares

(8mks)