

4.0 PART TWO: THE YEAR 2013 KCSE EXAMINATION QUESTION PAPERS

4.1 MATHEMATICS ALT. A (121)

4.1.1 Mathematics Alt. A Paper 1 (121/1)

SECTION I (50 marks)

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

1 Evaluate $\frac{22 - ^{-}14}{6 \times ^{-}2} - \frac{4^2 \times ^{-}6 - 12}{72 \div ^{-}8 \times 3}$. (2 marks)

2 The production of milk, in litres, of 14 cows on a certain day was recorded as follows: 22, 26, 15, 19, 20, 16, 27, 15, 19, 22, 21, 20, 22 and 28. Determine:

(a) the mode; (1 mark)

(b) the median. (2 marks)

3 Use logarithms, correct to 4 decimal places, to evaluate:

$$\sqrt[3]{\frac{1.794 \times 0.038}{1.243}}$$

(4 marks)

4 Simplify the expression:

$$\frac{16m^2 - 9n^2}{4m^2 - mn - 3n^2}$$

(3 marks)

5 A wholesaler sold a radio to a retailer making a profit of 20%. The retailer later sold the radio for Ksh 1 560 making a profit of 30%. Calculate the amount of money the wholesaler had paid for the radio. (3 marks)

6 A point P on the line AB shown below is such that $AP = \frac{2}{7} AB$. By construction locate P. (3 marks)



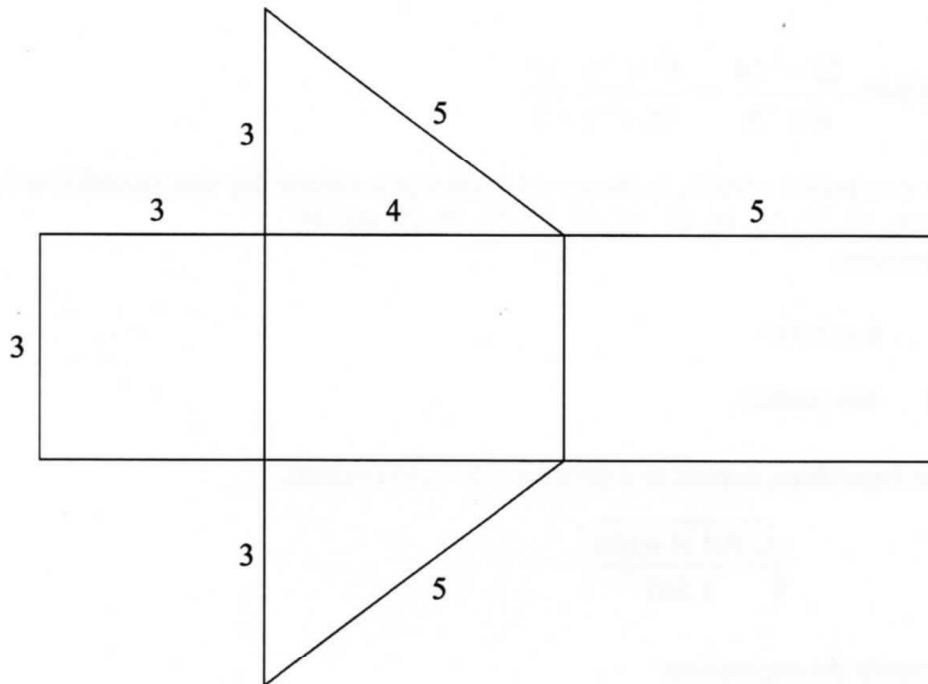
7 Chelimo's clock loses 15 seconds every hour. She sets the correct time on the clock at 0700h on a Monday. Determine the time shown on the clock when the correct time was 1900h on Wednesday the same week. (3 marks)

8 Given that $\sin(x + 20)^\circ = -0.7660$, find x , to the nearest degree, for $0^\circ \leq x \leq 360^\circ$. (3 marks)

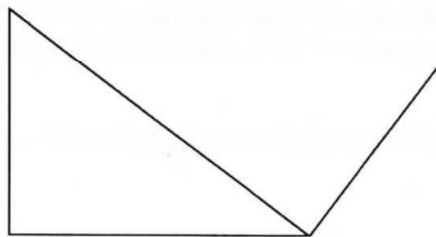
- 9 A number m is formed by writing all the prime numbers between 0 and 10 in an ascending order. Another number n is formed by writing all the square numbers between 0 and 10 in a descending order.

- (a) Find $m - n$; (2 marks)
 (b) Express $(m - n)$ as a product of its prime factors. (1 mark)

- 10 The figure below shows a net of a solid. (Measurements are in centimetres).

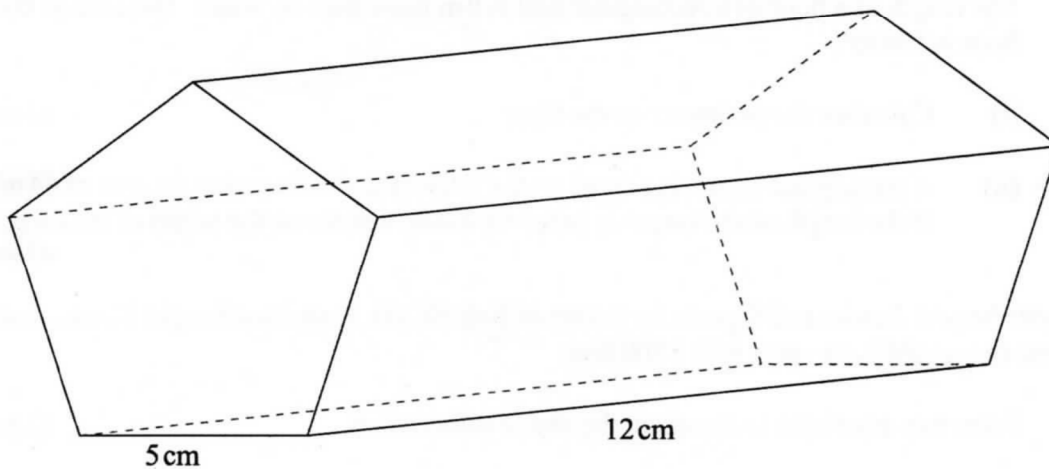


- Below is a part of the sketch of the solid whose net is shown above. Complete the sketch of the solid, showing the hidden edges with broken lines. (3 marks)



- 11 The interior angles of an octagon are $2x$, $\frac{1}{2}x$, $(x + 40)^\circ$, 110° , 135° , 160° , $(2x + 10)^\circ$ and 185° . Find the value of x . (2 marks)
- 12 A straight line passes through points $(-2, 1)$ and $(6, 3)$. Find:
- (a) the equation of the line in the form $y = mx + c$; (2 marks)
 (b) the gradient of a line perpendicular to the line in (a). (1 mark)

- 13 A triangle ABC is such that $AB = 5$ cm, $BC = 6$ cm and $AC = 7$ cm.
- (a) Calculate the size of angle ACB, correct to 2 decimal places. (2 marks)
- (b) A perpendicular drawn from A meets BC at N. Calculate the length AN correct to one decimal place. (2 marks)
- 14 A cylindrical pipe $2\frac{1}{2}$ metres long has an internal diameter of 21 millimetres and an external diameter of 35 millimetres. The density of the material that makes the pipe is 1.25 g/cm³. Calculate the mass of the pipe in kilograms. (Take $\pi = \frac{22}{7}$). (4 marks)
- 15 The figure below represents a pentagonal prism of length 12 cm. The cross-section is a regular pentagon of side 5 cm.



- Calculate the surface area of the prism correct to 4 significant figures. (4 marks)
- 16 Given the inequalities $x - 5 \leq 3x - 8 < 2x - 3$.
- (a) Solve the inequalities; (2 marks)
- (b) represent the solution on a number line. (1 mark)

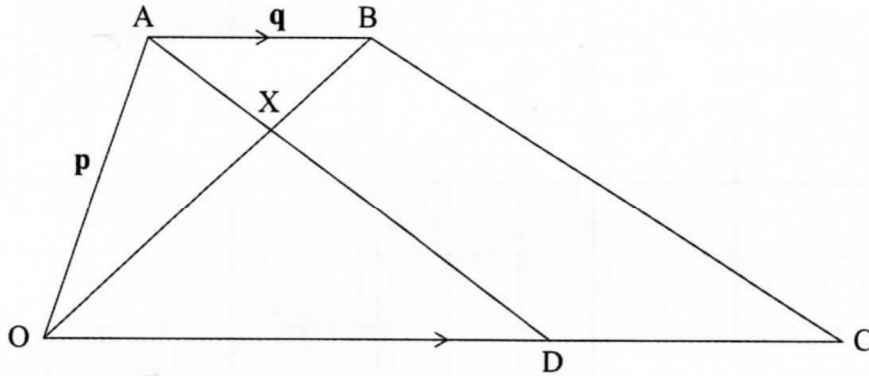
SECTION II (50 marks)

Answer only five questions in this section in the spaces provided.

- 17 A farmer had 540 bags of maize each having a mass of 112 kg. After drying the maize, the mass decreased in the ratio 15:16.
- (a) Calculate the total mass lost after the maize was dried. (3 marks)

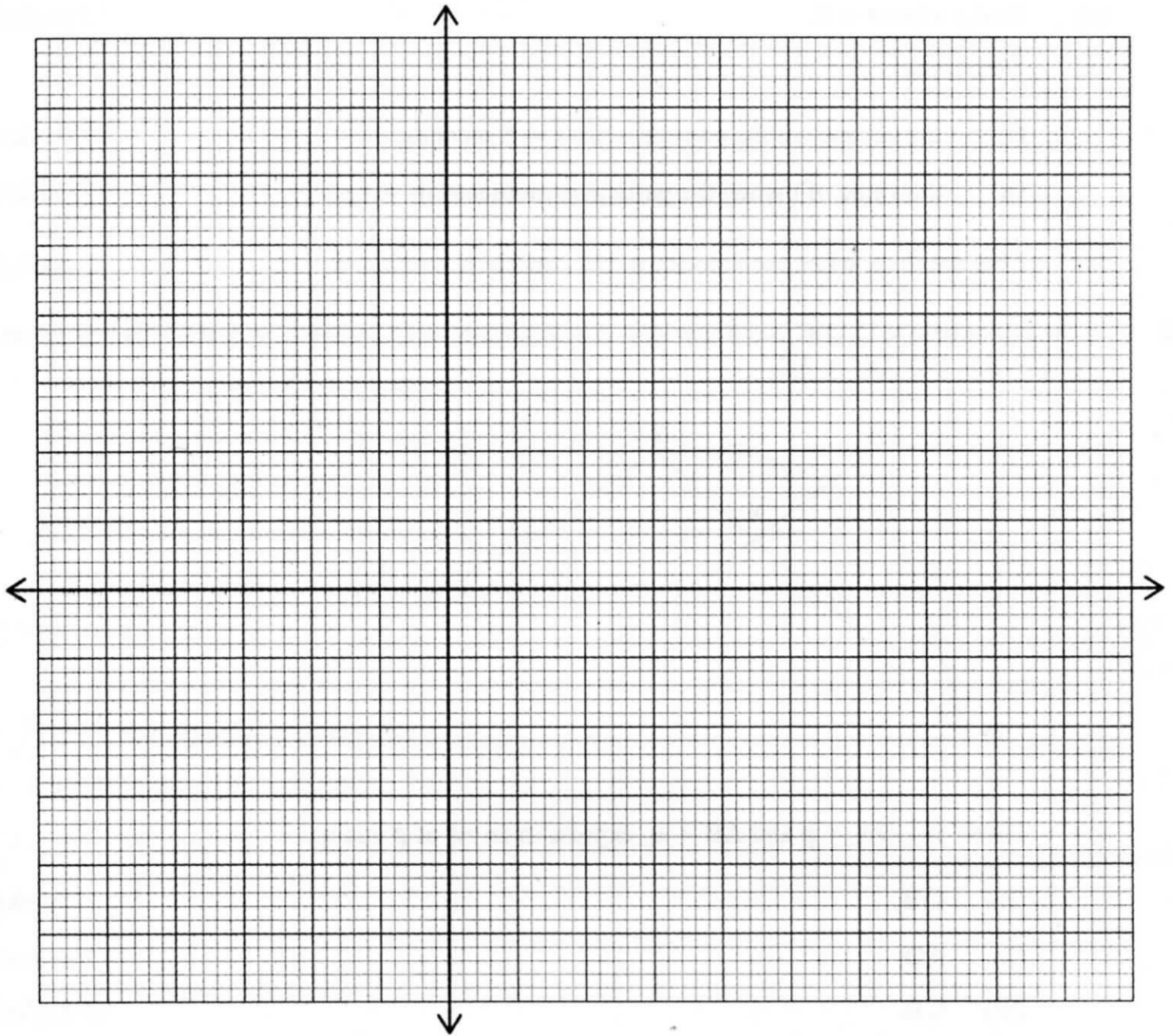
- (b) A trader bought and repacked the dried maize in 90 kg bags. He transported the maize in a lorry which could carry a maximum of 120 bags per trip.
- (i) Determine the number of trips the lorry made. (3 marks)
- (ii) The buying price of a 90 kg bag of maize was Ksh 1 500. The trader paid Ksh 2 500 per trip to transport the maize to the market. He sold the maize and made a profit of 26%. Calculate the selling price of each bag of the maize. (4 marks)
- 18** (a) Solve the equation, $\frac{x+3}{24} = \frac{1}{x-2}$. (4 marks)
- (b) The length of a floor of a rectangular hall is 9 m more than its width. The area of the floor is 136 m².
- (i) Calculate the perimeter of the floor. (4 marks)
- (ii) A rectangular carpet is placed on the floor of the hall leaving an area of 64 m². If the length of the carpet is twice its width, determine the width of the carpet. (2 marks)
- 19** A trader bought 2 cows and 9 goats for a total of Ksh 98 200. If she had bought 3 cows and 4 goats she would have spent Ksh 2 200 less.
- (a) Form two equations to represent the above information. (2 marks)
- (b) Use matrix method to determine the cost of a cow and that of a goat. (4 marks)
- (c) The trader later sold the animals she had bought making a profit of 30% per cow and 40% per goat.
- (i) Calculate the total amount of money she received. (2 marks)
- (ii) Determine, correct to 4 significant figures, the percentage profit the trader made from the sale of the animals. (2 marks)
- 20** Two towns, A and B are 80 km apart. Juma started cycling from town A to town B at 10.00 am at an average speed of 40 km/h. Mutuku started his journey from town B to town A at 10.30 am and travelled by car at an average speed of 60 km/h.
- (a) Calculate:
- (i) the distance from town A when Juma and Mutuku met; (5 marks)
- (ii) the time of the day when the two met. (2 marks)
- (b) Kamau started cycling from town A to town B at 10.21am. He met Mutuku at the same time as Juma did. Determine Kamau's average speed. (3 marks)

- 21 The displacement, s metres, of a moving particle from a point O , after t seconds is given by,
 $s = t^3 - 5t^2 + 3t + 10$.
- (a) Find s when $t = 2$. (2 marks)
- (b) Determine:
- (i) the velocity of the particle when $t = 5$ seconds; (3 marks)
- (ii) the value of t when the particle is momentarily at rest. (3 marks)
- (c) Find the time, when the velocity of the particle is maximum. (2 marks)
- 22 In the figure below, $OABC$ is a trapezium. AB is parallel to OC and $OC = 5AB$. D is a point on OC such that $OD:DC = 3:2$.



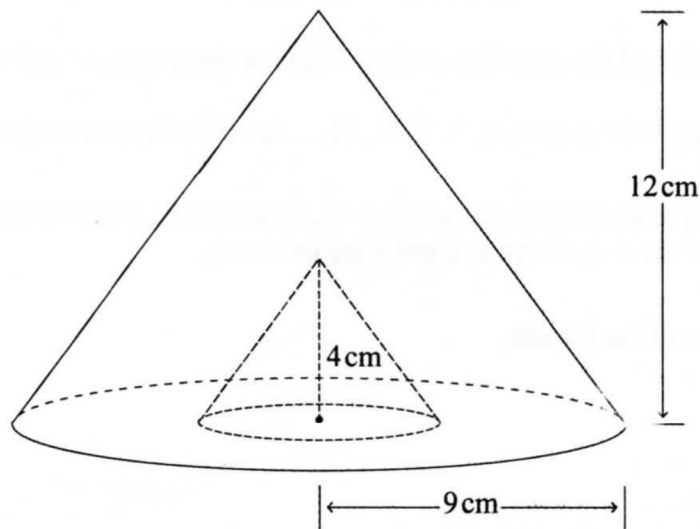
- (a) Given that $\mathbf{OA} = \mathbf{p}$ and $\mathbf{AB} = \mathbf{q}$, express in terms of \mathbf{p} and \mathbf{q} :
- (i) \mathbf{OB} ; (1 mark)
- (ii) \mathbf{AD} ; (2 marks)
- (iii) \mathbf{CB} . (2 marks)
- (b) Lines OB and AD intersect at point X such that $\mathbf{AX} = k\mathbf{AD}$ and $\mathbf{OX} = r\mathbf{OB}$, where k and r are scalars. Determine the values of k and r . (5 marks)

- 23 (a) On the grid provided, draw the square whose vertices are A (6, -2), B (7, -2), C (7, -1) and D (6, -1). (1 mark)



- (b) On the same grid, draw:
- (i) $A'B'C'D'$, the image of ABCD, under an enlargement scale factor 3, centre (9, -4); (3 marks)
 - (ii) $A''B''C''D''$, the image of $A'B'C'D'$ under a reflection in the line $x = 0$; (2 marks)
 - (iii) $A'''B'''C'''D'''$, the image of $A''B''C''D''$ under a rotation of $+90^\circ$ about (0,0). (2 marks)
- (c) Describe a single transformation that maps $A'B'C'D'$ onto $A'''B'''C'''D'''$. (2 marks)

- 24 The figure below represents a cone of height 12 cm and base radius of 9 cm from which a similar smaller cone is removed, leaving a conical hole of height 4 cm.



- (a) Calculate:
- (i) the base radius of the conical hole; (2 marks)
 - (ii) the volume, in terms of π , of the smaller cone that was removed. (2 marks)
- (b) (i) Determine the slant height of the original cone. (1 mark)
- (ii) Calculate, in terms of π , the surface area of the remaining solid after the smaller cone is removed. (5 marks)