

000175933

Name Index Number /

121/1
 MATHEMATICS ALTA
 Paper 1
 Oct./Nov. 2013
 2½ hours

Candidate's Signature

Date

THE KENYA NATIONAL EXAMINATIONS COUNCIL
 Kenya Certificate of Secondary Education
 MATHEMATICS ALTA
 Paper 1
 2½ hours

Instructions to candidates

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of the examination in the spaces provided above.
- (c) This paper consists of **TWO** sections: **Section I** and **Section II**.
- (d) Answer **ALL** the questions in **Section I** and only **five** questions from **Section II**.
- (e) Show **all** the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- (f) Marks may be given for correct working even if the answer is wrong.
- (g) **Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used, except where stated otherwise.
- (h) This paper consists of 18 printed pages.
- (i) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
- (j) Candidates should answer the questions in English.

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

--



KNEC 00310001 KCSE

SECTION I (50 marks)

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

1 Evaluate $\frac{22 - 14}{6 \times 2} - \frac{4^2 \times 6 - 12}{72 \div 8 \times 3} = \frac{36}{-12} - \frac{-108}{-27}$ (2 marks)

$$= -3 - 4$$

$$= -7$$

- 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; = 22 (1 mark)

(b) the median. (2 marks)

15, 15, 16, 19, 19, 20, 20, 21, 22, 22, 22, 26, 27, 28

$$\text{Median} = \frac{20 + 21}{2} = 20.5$$

- 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)



KNEC 00310001 KCSE

- 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)

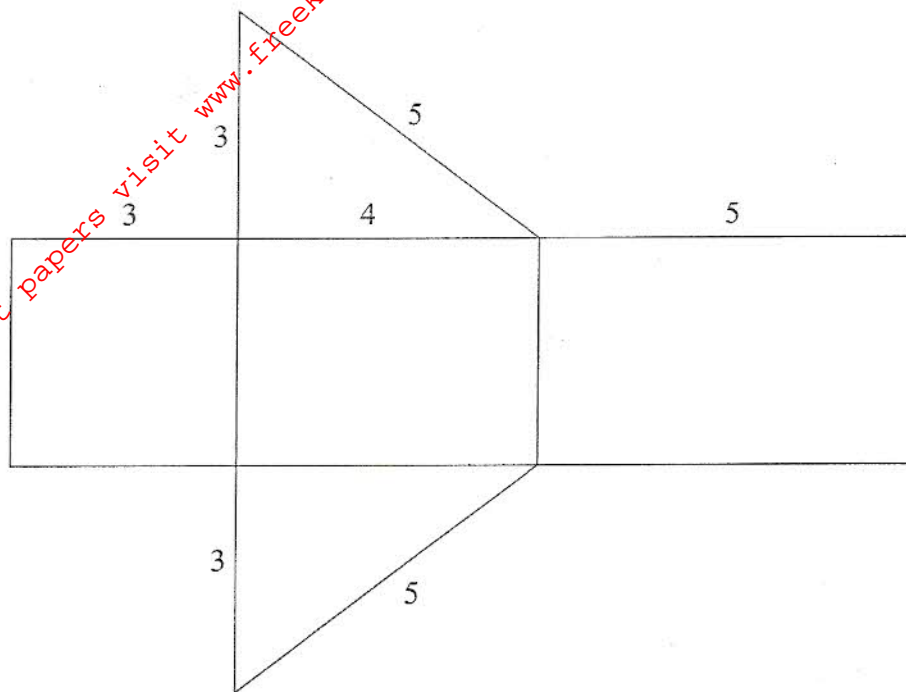
- 9 A number m is formed by writing all the prime numbers between 0 and 10 in an ascending order. Another number n is formed by writing all the square numbers between 0 and 10 in a descending order.

(a) Find $m - n$; (2 marks)

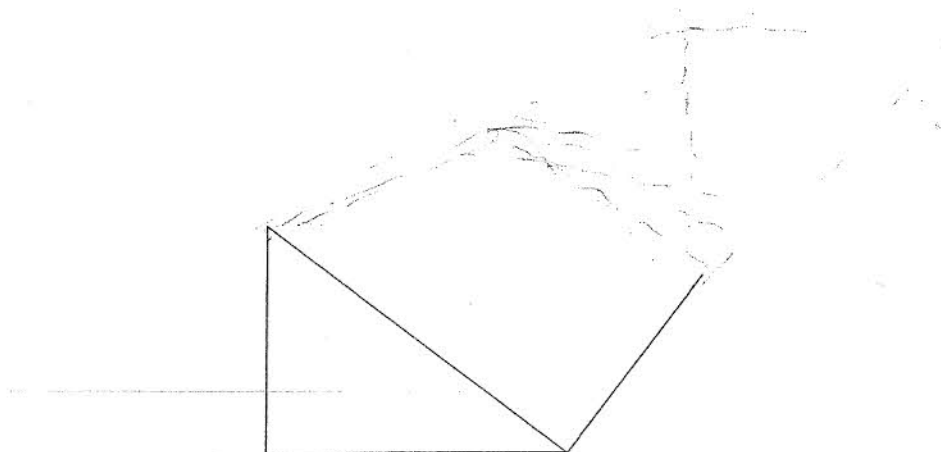
(b) Express $(m - n)$ as a product of its prime factors. (1 mark)



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.

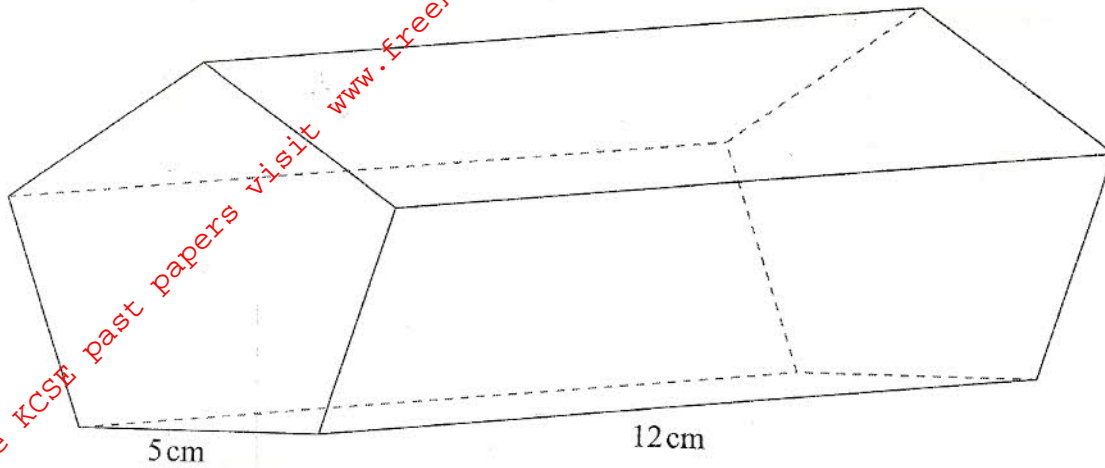
(a) Calculate the size of angle ACB, correct to 2 decimal places. (2 marks)

(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 m^2 .

(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 m^2 . 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 10.21 am. 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:

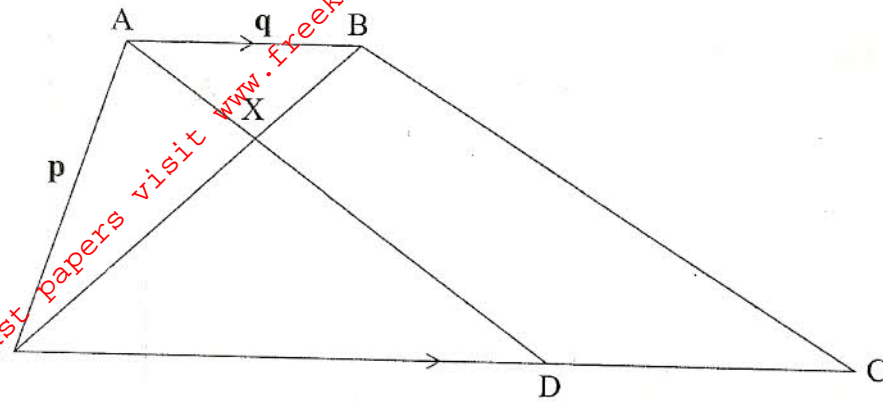
(i) the velocity of the particle when $t = 5$ seconds; (3 marks)

(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 $OD:DC = 3:2$.



Given that $OA = p$ and $AB = q$, express in terms of p and q :

(i) OB ;

(1 mark)

(ii) AD ;

(2 marks)

(iii) CB .

(2 marks)

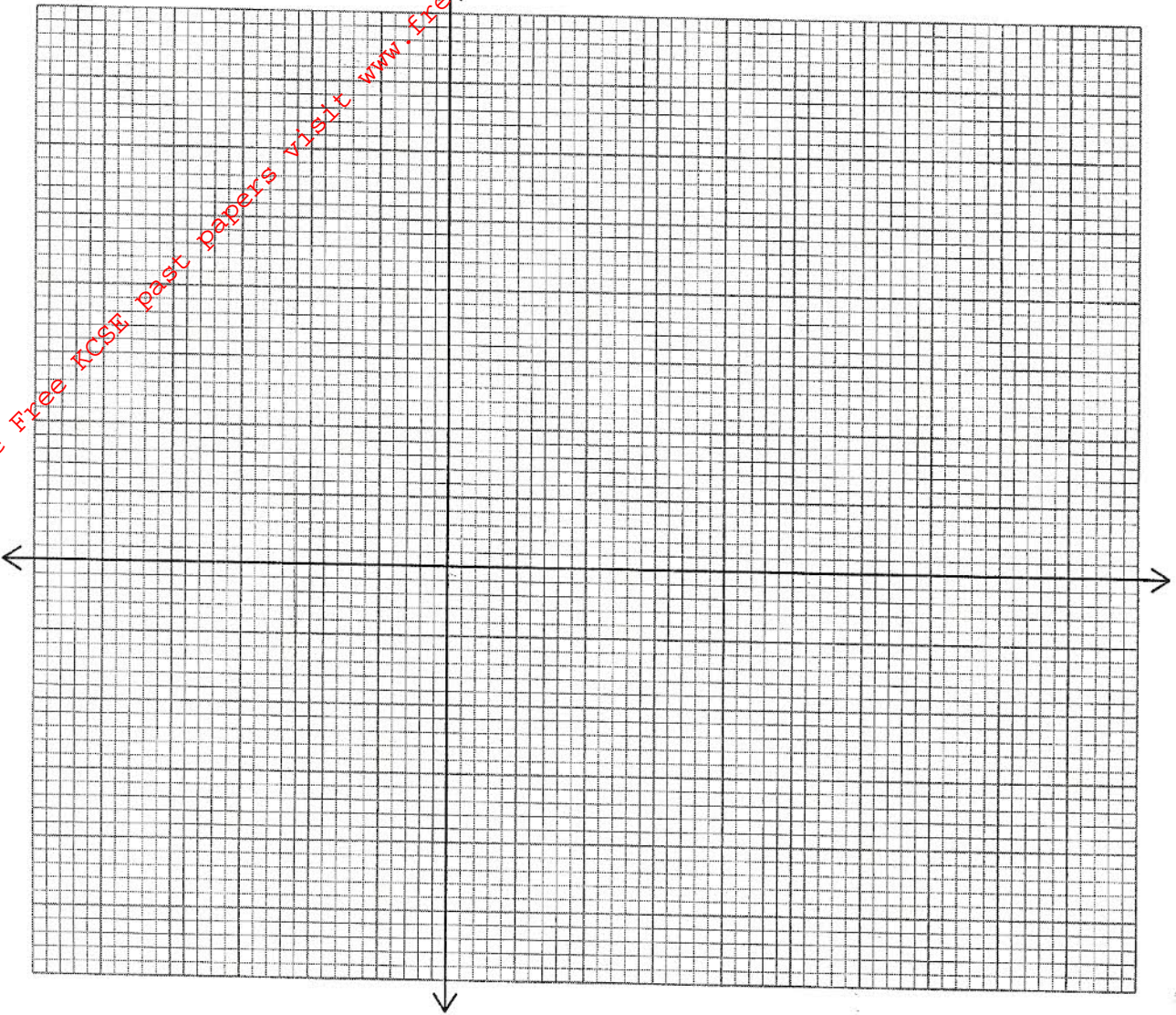


- (b) Lines OB and AD intersect at point X such that $\mathbf{AX} = k\mathbf{AD}$ and $\mathbf{OX} = r\mathbf{OB}$, where k and r are scalars. Determine the values of k and r . (5 marks)

For More Free KCSE past papers visit www.freekcsenpapers.com

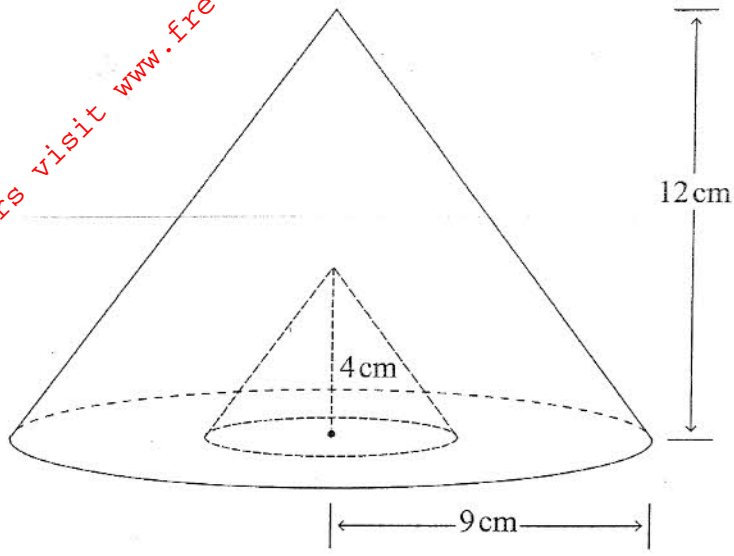


- 23 (a) On the grid provided, draw the square whose vertices are A (6, -2), B (7, -2), C (7, -1) and D (6, -1). (1 mark)



- (b) On the same grid, draw:
- $A'B'C'D'$, the image of ABCD, under an enlargement scale factor 3, centre (9, -4); (3 marks)
 - $A''B''C''D''$, the image of $A'B'C'D'$ under a reflection in the line $x = 0$; (2 marks)
 - $A'''B'''C'''D'''$, 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)

THIS IS THE LAST PRINTED PAGE.

