

KENYA NATIONAL EXAMINATION COUNCIL

KCSE 2009

MATHEMATICS

PAPER1

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Answer all the questions in this section in the spaces provided

1.

Without using mathematical tables or calculator, evaluate

$$\underline{\quad \sqrt{5184} \quad}$$

$$6 \times 18 \div 9 + (5-3)$$

(3 mks)

2.

Without using a calculator, evaluate, a fraction in its simplest form $1\frac{7}{10}$ $\frac{2\frac{1}{4} + \frac{3}{5} \div \frac{5}{6} \text{ of } 2\frac{2}{5}}$ leaving the answer as $\frac{\quad}{\quad}$ (3 mks)

3.

Given that the ratio $x : y = 2 : 3$, find the ratio $(5x-2y) : (x+y)$ (3 mk)

4.

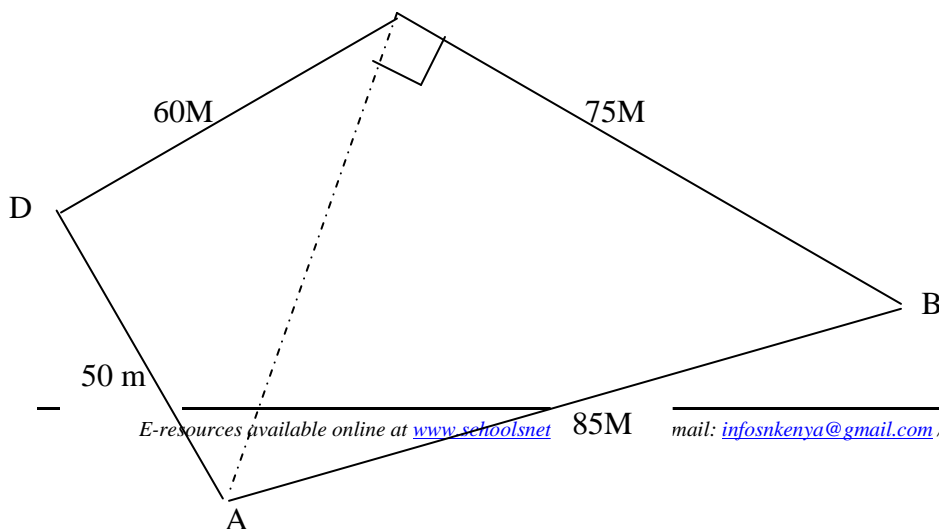
A bus traveling at an average speed of 63 km/h left a station at 8.15 a.m. find the average speed of the car. (3 mks)

5.

Without using Logarithm tables or calculators, evaluate, $\frac{64\frac{1}{2} \times 27000^{\frac{2}{3}}}{2^4 \times 3^0 \times 5^2}$ (4 mks)

6.

The figure below represents a plot of land ABCD such that $AB = 85 \text{ m}$, $BC = 75 \text{ m}$, $CD = 60 \text{ m}$, $DA = 50 \text{ m}$ and $\angle ABC = 90^\circ$



Determine the area of the plot in hectares correct to two decimal places. (4 mks)

7. A watch which loses a half-minute every hour was set to read the correct time at 05 45 h on Monday. Determine the time in the 12- hour system, the watch will show on the following Friday at 19 45h

(3 mks)

8. Simplify the expression $\frac{12x^2 + ax - 6a^2}{9x^2 - 4a^2}$

(3 mks)

9. A line which joins the points A (3, k) and B (-2, 5) is parallel to another line whose equation is $5y + 2x = 10$

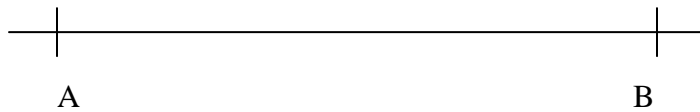
Find the value of k.

(3 mks)

10. The size of an interior angle of a regular polygon is $6\frac{1}{2}$ times that of its exterior angle determine the number of sides of the polygon.

(3 mks)

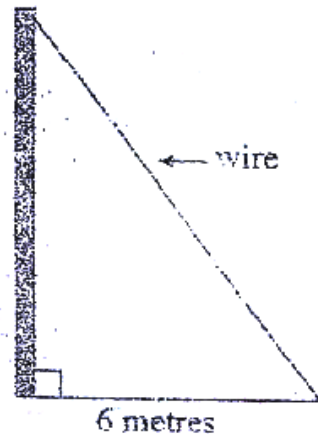
11. Line AB shown below is a side of a trapezium ABCD in which angle ABC in which angle $ABC = 105^\circ$, $BC = 4$ cm, $CD = 5$ cm and CD is parallel to AB.



Using a ruler and a pair of compasses only:

- a) Complete the trapezium; (3 mks)
b) Locate point t on line AB such that angle $ATD = 90^\circ$ (1 mk)

12. An electric pole is supported to stand vertically on a level ground by a tight wire. The wire is pegged at a distance of 6 metres from the foot of the pole as shown.



The angle which the wire makes with the ground is three times the angle it makes with the pole.

Calculate the length of the wire to the nearest centimeter. (3 mks)

13. Give the equation: $\sin(3x + 30^\circ) = \frac{\sqrt{3}}{2}$, for $0^\circ \leq x \leq 90^\circ$ (4 mks)

14. The diagonals of a rhombus PQRS intersect at T. Given that P(2,2), Q(3, 6) and

R(-1, 5):

a) Draw the rhombus PQRS on the grid provided; (1 mk)

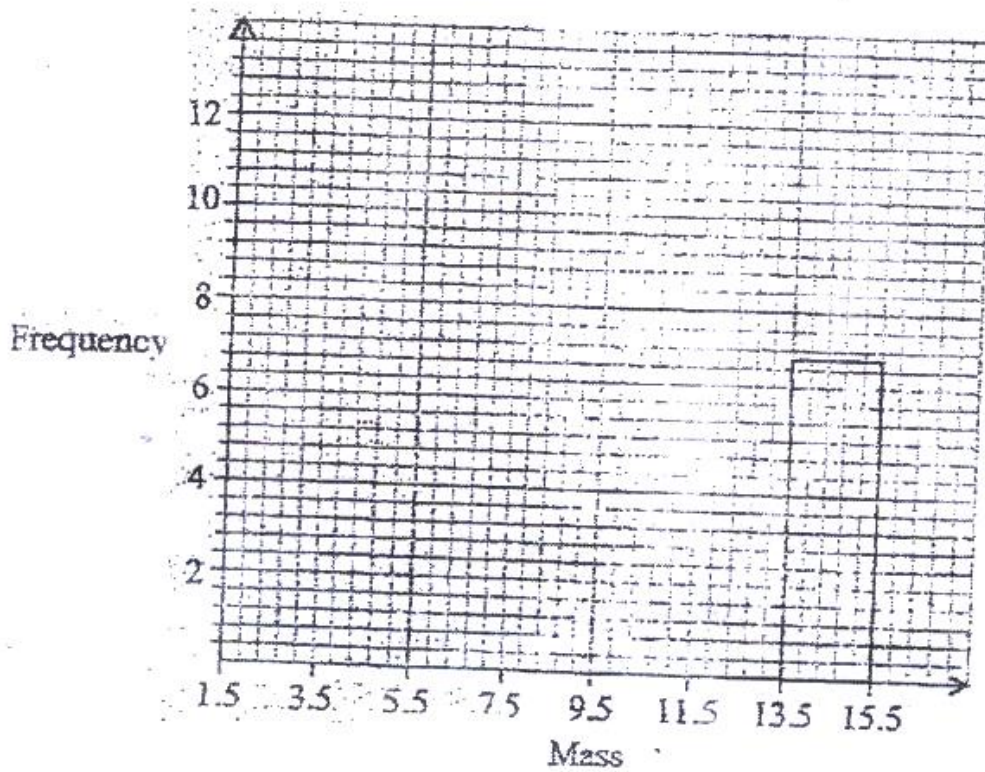
b) State the coordinates of T. (1 mk)

15. Abdi sold a radio costing Kshs 3 800 at a profit of 20%. He earned a commission of $\frac{22}{100}$ on the profit. Find the amount he earned. (2 mks)

16. The following data was obtained for the masses of certain animals.

Mass (x kg)	Frequency
$1.5 \leq x < 5.5$	16
$5.5 \leq x < 7.5$	20
$7.5 \leq x < 13.5$	18
$13.5 \leq x < 15.5$	14

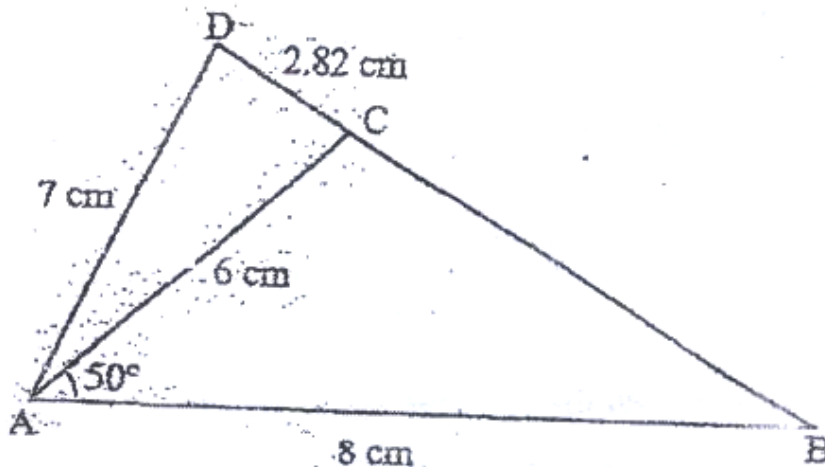
Complete the histogram on the grid provided (3 mks)



SECTION II (50 MARKS)

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

- 17 In the figure below (not drawn to scale), $AB = 8\text{cm}$, $AC = 6\text{cm}$, $AD = 7\text{cm}$, $CD = 2.82\text{cm}$ and angle $CAB = 50^\circ$



Calculate, to 2 decimal places

- a) The length BC, (2 mks)
- b) The size of angle ABC, (3 mks)
- c) The size of angle CAD, (3 mks)
- d) The area of triangle ACD (2 mks)

- b) Express vector NM in terms of OB (1 mk)

- c) Point P maps onto P by a translation $\begin{pmatrix} -5 \\ 8 \end{pmatrix}$ given that

$OP = OM + 2 MN$, find the coordinates of P. (3 mks)

18. The marks scored by a group of pupils in a mathematics test were as recorded in the table below

Marks	Frequency
0-9	1
10-19	2
20-29	4
30-39	7
40-49	10
50-59	16

60-69	20
70-79	6
80-89	3
90-99	1

- a) i) State the modal class (1 mk)
- ii) Determine the class in which the median mark lies (2 mks)
- b) Using an assumed mean of 54.4, calculate the mean mark (7 mks)

19.

A school planned to buy x calculators for a total cost of Kshs 16 200. The supplier agreed to offer a discount of Kshs 60 per calculator. The school was then able to get three extra calculators for the same amount of money.

- a) Write an expression in terms of x , for the:
- i) Original price of each calculator. (1 mk)

- ii) Price of each calculator after the discount (1 mk)
- b) Form an equation in x and hence determine the number of calculators the School bought. (5 mks)
- c) Calculate the discount offered to the school as a percentage (3 mks)

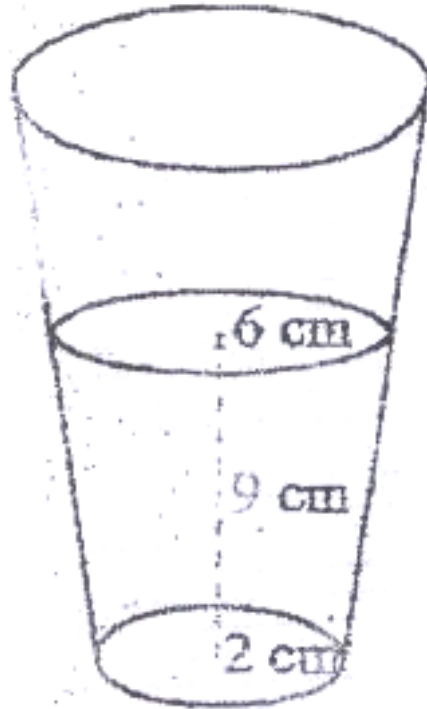
20. The position vectors of points A and B with respect to the origin O, are

$$\begin{pmatrix} -8 \\ 5 \end{pmatrix} \text{ and } \begin{pmatrix} -12 \\ -5 \end{pmatrix} \text{ respectively}$$

- a) Find:
- i) The coordinates of N and M; (3 mks)
- ii) The magnitude of Nm (3 mks)

21. A glass, in the form of a frustum of a cone, is represented by the diagram below.

The glass contains water to a height of 9 cm,. The bottom of the glass is a circle of radius 2 cm while the surface of the water is a circle of radius 6 cm.

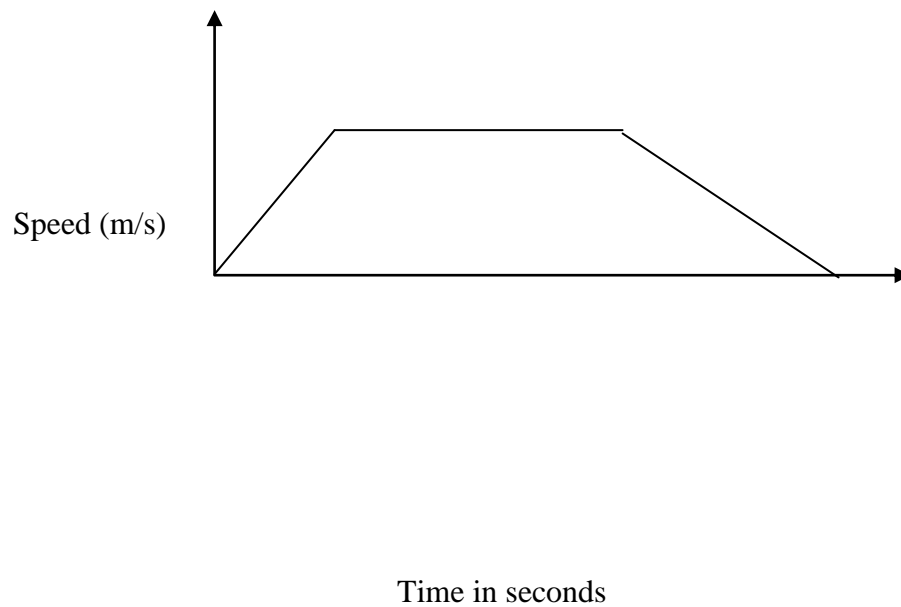


- a) Calculate the volume of the water in the glass (3 mks)
- b) When a spherical marble is submerged into the water in the glass, the water level rises by 1 cm.

Calculate:

- i) The volume of the marble; (4 mks)
- ii) The radius of the marble (3 mks)

22. The diagram below shows the speed-time graph for a train traveling between two stations. The train starts from rest and accelerates uniformly for 150 seconds. It then travels at a constant speed for 300 seconds and finally decelerates uniformly for 200 seconds.



Given that the distance between the two stations is 10 450 m, calculate the:

- Maximum speed, in Km/h, the train attained; (3 mks)
- Acceleration, (2 mks)
- Distance the train traveled during the last 100 seconds; (2 mks)
- Time the train takes to travel the first half of the journey. (3mks)

23. Three points P, Q and R are on a level ground. Q is 240 m from P on a bearing of 230° .
R is 120 m to the east of P

a) Using a scale of 1 cm to represent 40 m, draw a diagram to show the positions of P, Q and R in the space provided below. (2 mks)

b) Determine

i) The distance of R from Q (2 mks)

ii) The bearing of R from Q (2 mks)

c) A vertical post stands at P and another one at Q. A bird takes 18 seconds to fly directly from the top of the post at Q to the top of the post at P.

Given that the angle of depression of the top of the post at P from the top of the post at Q is 9° ,

Calculate:

i) The distance to the nearest metre, the bird covers; (2 mks)

ii) The speed of the bird in Km/h (2 mks)

24. a) On the grid provided, draw a graph of the function

$$Y = \frac{1}{2}x^2 - x + 3 \text{ for } 0 \leq x \leq 6 \quad (3 \text{ mks})$$

- b) Calculate the mid-ordinates for 5 strips between $x=1$ and $x=6$, and hence use the mid-ordinate rule to approximate the area under the curve between $x=1$, $x=6$ and the x -axis. (3 mks)
- c) Assuming that the area determined by integration to be the actual area, calculate the percentage error in using the mid-ordinate rule. (4 mks)

ANSWERS:

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