Name .....

Class.....Index

Number:...../.....Signature.....Date.....

PRE-MOCK

Kenya Certificate of Secondary Education

MATHEMATICS

Paper 1

2 ½ HOURS

Instructions to candidates

- *Write your name, index number, admission number and class in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *The paper contains **TWO** sections: **Section I** and **Section II.***
- *Answer **ALL** the questions in **Section I** and any **five** questions from **Section II***
- *All answers and working must be written on the question paper in the spaces provided below each question.*
- ***Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.***
- *Non – programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.*

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

This paper consists of 15 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.

Section I (50 Marks)

*Answer **all** questions in this section*

1. Using logarithm tables only, evaluate:

$$\sqrt[3]{\frac{849.6 \times 2.41}{3941}}$$ **(4 marks)**

2. A basketball team play 10 matches in a tournament. The following are scores in each match.

9, 15, 17, 16, 7, 20, 21, 15, 10, 12

Determine:

(a) The mode. **(1 mark)**

(b) The median. **(2 marks)**

3. Solve the equation $\log 3(\chi + 3) = 3 \log 3 + 2$. **(3 marks)**

4. The marked price of a car in a dealer's shop was Ksh. 450,000/=. Magari bought the car at 7% discount. The dealer still made a profit of 13%. Calculate the amount of money the dealer had paid for the car. **(3 marks)**

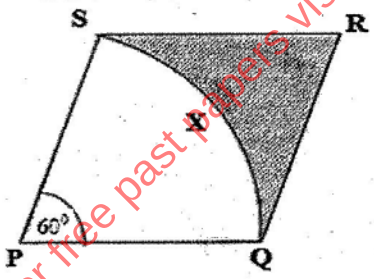
5. Points S (-2, 2) and T (-3, 7) are mapped onto S^1 (4,-10) and T^1 (0, 10) by an enlargement. Calculate the ratio of the length of corresponding sides of the image and the object. **(3 marks)**

6. A key cutting factory starts cutting keys at the rate of 500 per hour. The rate of production reduces by 10% every 2 hours. Calculate the numbers of keys cut in the first 6 hours. **(2 marks)**

7. Two boys and a girl shared some money. The elder boy got $\frac{4}{9}$ of it, the younger boy got $\frac{2}{5}$ of the reminder and the girl got the rest. Find the percentage share of the younger boy to the girl's share. **(3 marks)**

8. Annette has some money in two denominations only. Fifty-shilling notes and twenty-shilling coins. She has three times as many fifty shilling notes as twenty shilling coins. If altogether she has sh. 3400, find the number of fifty shilling notes and 20 shilling coins. **(3 marks)**

9. The figure below shows a rhombus PQRS with PQ = 9cm and $\angle SPQ=60^0$. SXQ is a circular arc; centre P.

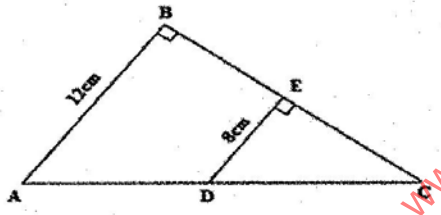


Calculate the area of the shaded region correct to two decimal places. (Take $\pi = \frac{22}{7}$)

(4 marks)

10. A particle accelerates uniformly from rest and attains a maximum velocity of 30 m/s after 16 seconds. It travels at this constant velocity for the next 20 seconds before decelerating to rest after another 8 seconds. Calculate the total distance covered by the car. **(3 marks)**

11. The figure below shows a right angled triangle with AB = 12 cm. ED is parallel to BA, CE = 6.3 cm and ED = 8 cm.



Given that the area of EBAD = 31.5cm^2, find the length of BC. **(4 marks)**

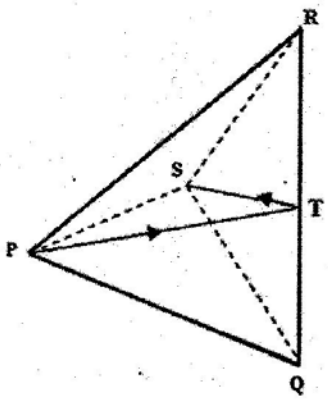
12. Find the value of x in the equation $5^{\frac{x}{4}} = \frac{1}{25}$. **(3 marks)**

13. Given that $\tan x = 2.4$, evaluate without use of tables and calculators, $\sin x - \cos x$ in the form of $\frac{a}{b}$ where a and b are integers. **(4 marks)**

14. The difference between the interior and exterior angles at each vertex of a regular polygon is 162^0. Find the number of sides of the polygon. **(3 marks)**

15. A number n is such that when it is divided by 27 and 30 or 45, the remainder is always 3. Find the smallest value of n. **(2 marks)**

16. The figure below shows a regular tetrahedron PQRS of edges 4cm. Draw its net and measure the length of the straight path of PS through the midpoint T over the edge QR. **(3 marks)**



SECTION II (50marks)

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

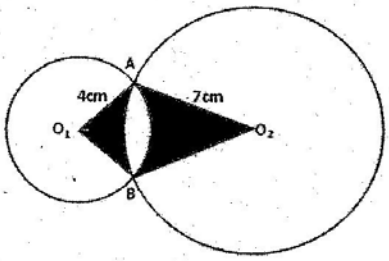
17. Three business partners, Baba, Melon and Weta contributed Kshs 112, 000, Kshs. 128, 000 and Kshs 210, 000 respectively to start a business. They agreed to share their profits as follows:
30% to be shared equally
30% to be shared in the ratio of their contributions
40% to be retained for the running of the business.
If at the end of the year, the business realised a profit of Kshs. 1. 35 million
Calculate:

(a) The amount of money retained for running the business at the end of the year. **(1mark)**

(b) The difference between the amounts received by Weta and Baba. **(6marks)**

(c) Express Melon's share as percentage of the total amount of money shared between the three partners. **(3 marks)**

18. In the figure below, O_1 and O_2 are the centres of the circles whose radii are 4 cm and 7 cm respectively. The circles intersect at A and B and angle $AO_1O_2 = 60^\circ$



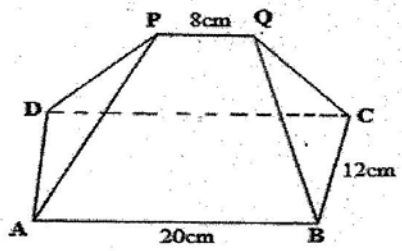
Find by calculation; take $\pi = 3.142$

(a) The angle AO_2O_1 **(1 marks)**

(b) The area of the quadrilateral AO_1BO_2 **(4 marks)**

(c) The shaded area **(5 marks)**

19. The figure below shows a plan of a roof with a rectangular base ABCD. AB = 20 cm and BC = 12 cm. the ridge PQ = 8 cm and is centrally placed. The faces ADP and BCQ are equilateral triangles. N is the midpoint of AD.



Calculate:

(a) The length of PN. **(2 marks)**

(b) The altitude of P above the base. **(3 marks)**

(c) The angle between the planes ABQP and ABCD. **(2 marks)**

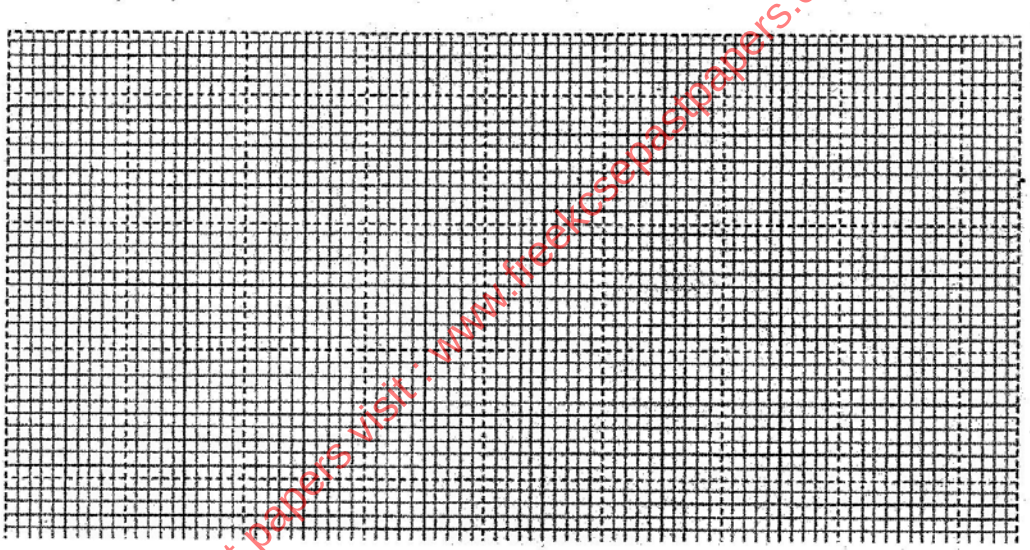
(d) The obtuse angle between the lines PQ and DB. **(3 marks)**

20. Complete the table below for the function $y = x^3 + 6x^2 + 8x$ for $-5 \leq x \leq 1$ **(3 marks)**

x	-5	-4	-3	-2	-1	0	1
x^3	-125	-64			-1	0	1
$6x^2$			54		6	0	
$8x$	-40		-24	-16		0	8
y		0	3			0	15

(a) Draw the graph of the function $y = x^3 + 6x^2 + 8x$ *for* $-5 \leq x \leq 1$ **(3 marks)**

(Use a scale of 1 cm to represent 1 unit on the x axis. 1 cm to represent 5 units on the y-axis)



(b) Hence use your graph to estimate the roots of the equation

$x^3 + 5x^2 + 4x = -x^2 - 3x - 1$ **(4 marks)**

21. Three islands P, Q, R and a port S are such that island Q is 400 km on a bearing of 030^0 from island P. Island R is 520 km on a bearing of 120^0 from island Q. A port S is sighted 750 km due south of island Q.

(a) Taking a scale of 1 cm to represent 100 km, give a scale drawing showing the relative positions of P, Q, R and S. **(4 marks)**

Use the scale drawing to

(b) Find the bearing of:

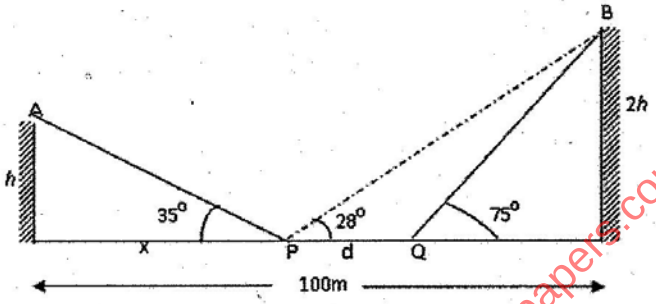
(i) Island R from island P. **(1 mark)**

(ii) Port S from island R. **(1 mark)**

(c) Find the distance between island P and R. **(2 marks)**

(d) A warship T is such that it is equidistant from the islands P, S and R. By construction locate the position of T. **(2 marks)**

22. Two vertical columns A and B of height h and $2h$ respectively stand on level ground and are 100 m apart. Two points P and Q are d metres apart, the elevation of the top of A and B from point P are 35^0 and 28^0 respectively and the elevation of top of B from point Q is 75^0

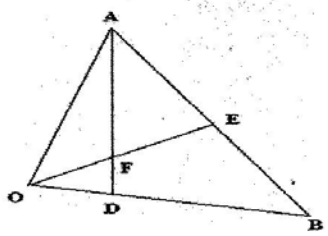


Calculate

(a) The vertical heights of the two columns in metres. **(7 marks)**

(b) The distance PQ in metres **(3 marks)**

23. In the figure below, E is the midpoint of AB, **OD**: **DB** = 2: 3 and F is the point of intersection of OE and AD.



Given that **OA** = **a** and **OB** = **b**,

(a) Express in terms of **a** and **b**

(i) **AD** **(1 mark)**

(ii) **OE** **(2 marks)**

(b) Given further that **AF** = *s***AD** and **OF** = *t***OE**, find the values of *s* and *t*. **(5 marks)**

(c) Show that E, F and O are collinear **(2 marks)**

24. A swimming pool is 20 m by 12 m and it slopes gently from a depth of 1 m at the shallow end to a depth of 3 m at the deep end.

(a) Calculate the volume of water in the swimming pool (in m^3) when it is full. **(3marks)**

(b) If the swimming pool is to be drained by a pump which removes water at the rate of $2.5m^3$ per minute, how long will it take this pump to drain the swimming pool if it was full? **(3marks)**

(c) If the sides of the swimming pool and its floor are to be covered with square tiles of side 20cm, find to the nearest 100 the number of tiles required. **(4marks)**