ALLIANCE HIGH SCHOOL
PRE-TRIAL EXAMINATION 2016

Name.....ADMISSION No.....CLASS.....

Mathematics
121/1
Duration 2hours 30 minutes

INSTRUCTIONS TO CANDIDATES

1. Write your name and Admission number in the spaces provided
2. Answer ALL the questions in SECTION I and ANY FIVE in section II
3. All answers and working MUST be written in the question paper in the spaces provided below each question.
4. Marks may be given for correct working even if the answer is wrong.
5. Electronic calculators and Mathematical tables may be used.

Section I **FOR EXAMINER'S USE ONLY**

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Marks																	

Section II

Question	17	18	19	20	21	22	23	24	TOTAL
Marks									

Grand Total

This paper consists of 14 printed pages.

Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

SECTION I (50MARKS)

ANSWER ALL THE QUESTIONS IN THIS SECTION

1. Solve the equation $2^{2x} = 2^{x+2} + 5$ (3marks)

2. Given that **OA**= $\begin{pmatrix} -17 \\ 25 \end{pmatrix}$ and **OB** = $\begin{pmatrix} 4 \\ 5 \end{pmatrix}$ find, the vector OC such that **AC=3AB** (2marks)

3. (a)Students are given marks 0,1,2,3,4 for a piece of work. The table below shows the number of students getting each mark

Mark	0	1	2	3	4
Frequency	3	10	12	9	x

(i) If the mean mark is 2.125,find the value of x (3marks)

(ii) State the lower quartile mark (1mark)

4. Solve the equation (3marks)

$$\frac{9^{2y}}{3^{7-y}} = \frac{3^{4y+3}}{27^{y-2}}$$

5. Find the values of m for which the line $y = mx - 5$ is a tangent to the curve $y = x^2 + 3x + 4$ *(3marks)*

6. A line segment PQ with coordinates at (0, 2) and (1, 1) respectively is mapped onto P^1Q^1 with coordinates at (4,6) and (7,3) respectively by an enlargement. Calculate the scale factor and the coordinates of the center of this enlargement.(3marks)

7. Find the integral values that satisfy the inequalities (3marks)

$$4 + 10x > 6x - 5 \leq 20 + 2x$$

8. Given that $2\tan(90 - x) = \frac{8}{3}$ find without calculators or mathematical tables the value of Cos x- Sin x (3marks)

9. Two parallel chords of length 6cm and 8cm have the perpendicular distance between them as 1cm. Find the radius of the circle. (3marks)

10. Simplify $\frac{3x^2y^2+8xy-11}{xy-x^3y^3}$ (3marks)

11. Mr.Seneta rides a *Bodaboda* from his house to work at an average speed of 30km/h. He parks the *Bodaboda* at the car park and completes the journey on foot at an average speed of 4km/h. The whole journey takes 50 minutes. One day his Bodaboda broke down on the way. He had to walk 4 times as far arriving at his office 20 minutes late. Find the distance between his house and place of work. (3marks)

12. The GCD and LCM of three number are 3 and 1008 respectively. If two of the numbers are 48 and 72, find the least possible value of the third number.

(2mks)

13. Cate and Jane working together can complete a piece of work in 6days while Cate working alone can complete the work in 10 days. The two worked together for 3 days and Cate withdrew. Find the time taken by Jane to complete the remaining work. (3marks)

14. A ship sails 6km from S to T on a bearing of 063^0 and then 9km from T to U on a bearing of 148^0 .Calculate,

(a)The distance SU (2marks)

(b)The bearing of U from S (2marks)

15. James invested shs. 6000 for 1 ½ years at 12% p.a compounded quarterly. Determine:

a) The amount accruing at the end of 1 ½ years. (3mks)

b) Interest earned. (1mk)

16. The distance S in metres covered by a moving particle after time t in seconds is given by

$S = t^3 + 4t^2 - 3t + 2$

Find

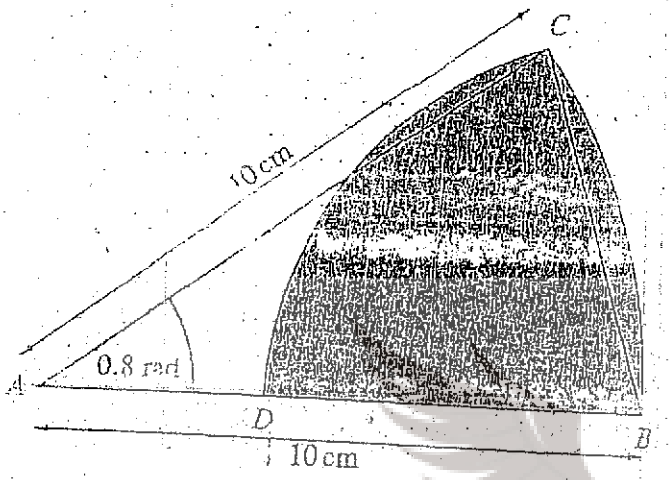
(a) the distance covered at t=4 seconds. (1mark)

(b) the instant at which the particle is at rest. (3marks)

SECTION II (50MARKS)

ANSWER ANY FIVE QUESTIONS IN THIS SECTION

17. The diagram below shows a sector ABC of the circle centre A and radius 10cm, in which angle BAC=0.8 radians. The arc CD of a circle has centre B and the point D lies on AB.

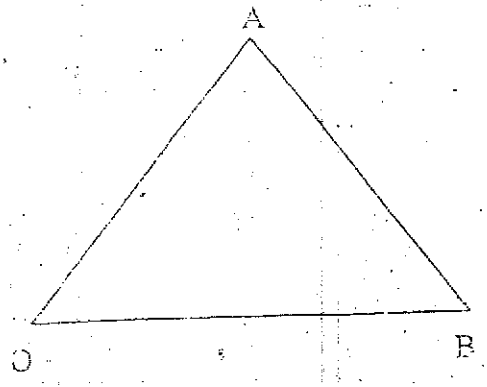


(a) Find the length of the line BC, correct to 2 decimal places (3marks)

(b) Find the perimeter of the shaded region (3marks)

(c) Find the area of the shaded region (4marks)

18. In triangle AOB, OA=12a and OB=12b. P and Q are points on OA and OB respectively such that 3OP=OA and $OQ=\frac{1}{3}OB$. M is the mid- point of AB.



a) Express in terms of a and b

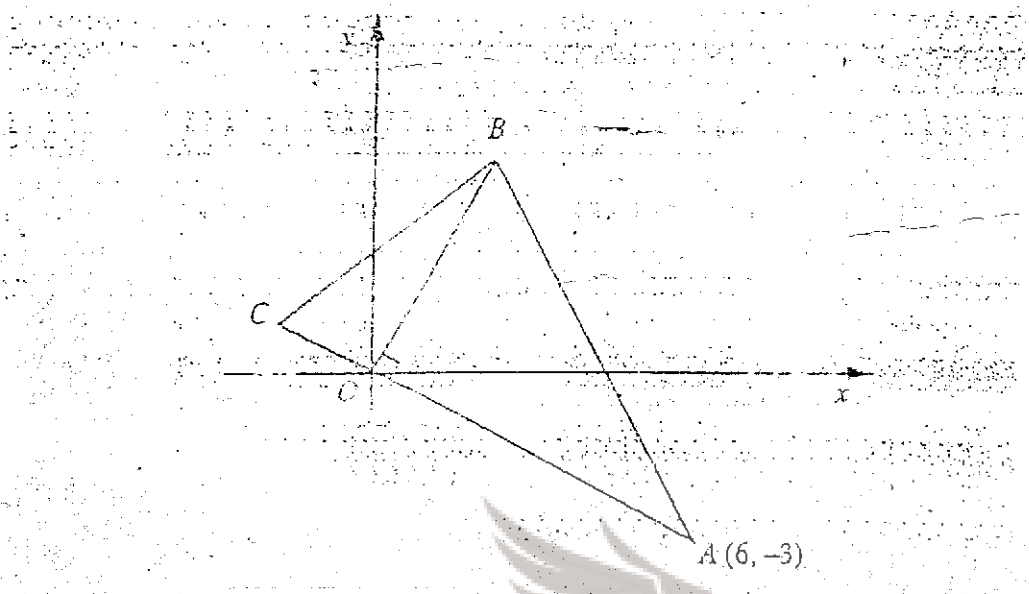
i) OM (1mark)

ii) PM (1mark)

b) OM and BP intersect at R such that PR= kPB and OM =hOR. Express PR in two ways and hence find the values of k and h (4marks)

c) Show that A,R and are collinear (4marks)

19. The diagram below shows a triangle ABC in which A is the point (6,-3).The line AC passes through the origin O. The line OB is Perpendicular to AC.



(i) Find the equation of OB (2marks)

(ii) If the area of triangle AOB is 15 square units ,find the coordinates of B (3marks)

(iii) Given that the length of OA is three times the length of OC, find the coordinates of C (3marks)

(iv) The point D is such that the quadrilateral ABCD is a kite, find the area of ABCD(2marks)

20. Four towns P,Q, R and S are such that town Q is 120km due east of town P. Town R is 160km due north of town Q. Town S is on a bearing of 330^0 from P and on a bearing of $S80^0$ W from R. Use a ruler and a pair of compasses only for all your constructions.

a) Using a scale of 1mto represent 20km,construct a scale drawing showing the positions of P,Q,R and S (4marks)

b) Use the scale drawing to determine

i) The distance from town S to town R (1mark)

ii) The bearing of town S from town Q (1mark)

c) A town T is due north of P and the distance TQ=TR. Locate T by construction and find the bearing and distance of T from R. (4marks)

21. Mike is a sales executive earning a salary of ksh.20,0000 per month and a commission of 8% for the sales in excess of ksh.100,000.If in April 2015he earned a total of ksh.48,000 in salaries and commissions,

a) Determine the amount of sales she made in that month (4marks)

b) If the total sales in the month of May increased by 18% and then dropped by 25% respectively, calculate

i) Mikes commission in the month of May(3marks)

ii) His total earning in the month of June(3marks)

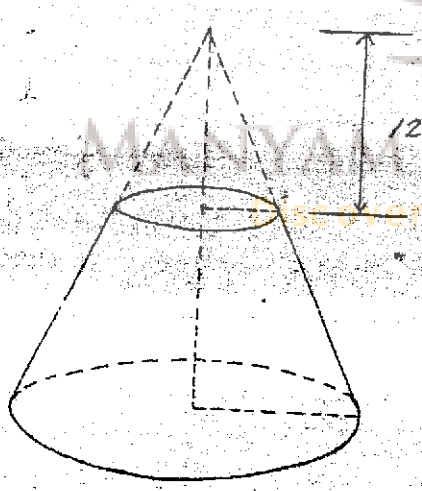
22. A sector of angle 108^0 is cut from a circle of radius 20cm. It is folded and fixed to form a cone. Taking π as $^{22}/_{7}$, calculate:-

a) The curved area of the cone. (2marks)

b) The base radius of the cone. (3marks)

c) The vertical height of the cone. (2marks)

d) If 12cm of the cone is chopped off to form a frustrum as shown below



Calculate the volume of the frustrum formed. (3marks)

23. A class of 50 students sat for a test. The following table shows the distribution of the marks

marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of students	6	7	8	y	9	6	3	1

a) Find the value of y (1mark)

b) Estimate

i) The mean mark (2marks)

ii) The median mark (3marks)

c) Draw a histogram to represent the information (4marks)

24. $y = 2x^3 + px + d$ is the equation of a curve that passes through (0,-15) and its gradient at x=2 is 22.5.

(a)Determine the value of p and d (4marks)

(b) Describe the nature of the turning points of the curve (4marks)

(c) Sketch the curve (2marks)

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