TAIDOB COLLEGE

PRE-WASSCE PREPARATORY ASSESSMENT

MATHEMATICS **SS3**

PART I

*Answer **all** the **five** questions in this part.*

1a. If $123_n = 83_{10}$, obtain an equation in n and hence, find the value of n using a method of completing the square.

b. Simplify: $\dfrac{1\frac{1}{4} + \frac{7}{9}}{1\frac{4}{9} + 2\frac{2}{3} \times \frac{9}{64}}$

2a. Without using tables, find the value of

$$\text{Log}_{10}\left(\frac{75}{16}\right) - 2\log_{10}\left(\frac{5}{9}\right) + \log_{10}\left(\frac{160}{243}\right)$$

b. The formula $A = P\left(1 + \frac{r}{100}\right)^n$ gives the total money A, which a principal P amounts to in n years at r% compound interest. Use this formula to find the interest due to a trader who invests ₦5 000.00 for 4 years at 6% compound interest calculated annually.

3. B is the foot of the tower AB standing on a horizontal plane and BCD is a straight line on the plane. The angles of elevation of A from D and C are 30^0 and 60^0 respectively. If /CD/ = 100 metres, with the aid of a diagram, calculate the height of the tower, correct to

the nearest metre.

4a. Express $\sqrt{32} + \frac{6}{\sqrt{2}}$ as a single surd and hence, find the value of:

$\frac{7}{\sqrt{2}}(\sqrt{32} + \frac{6}{\sqrt{2}})$

b. Find the equation of a straight line perpendicular to $3x - 4y + 1 = 0$ and passing through the point (-2, 5).

5a. Using crammer's rule, solve
$$-2x + y = 3$$
$$-x + 4y = 1$$

b. A figure is made of a cone resting on a hemisphere, they are joined by their circular bases and their diameters are equal to 21 cm as shown in figure 1 below. If the total height of the figure is 24.5 cm, calculate, correct to 3 significant figures, the volume of the figure.

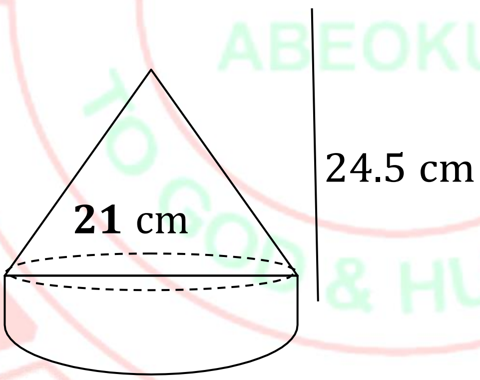

Fig. 1

PART II

*Answer **five** questions **only** from this part.*

6. Use a ruler and a pair of compasses;

a. Construct a triangle PQR such that /QR/ = 8.5 cm, <PQR = 60^0 and <PRQ = 45^0.

b. Construct:

i. the locus l_1 of points equidistant from Q and R.

ii. the locus l_2 of points 4 cm from P.

c. Find the points of intersection N_1 and N_2 of l_1 and l_2 and measure $/N_1N_2/$.

7a. Make a table of the function y = x^2 – 4x for integral values for -2 < x < 6. Using the scale of 1 cm to 1 unit on both axes, draw the graph of the function for real values of x.

b. Using the same scale, draw the graph of y = $1 - \frac{1}{2}x$.

c. Use your graph to solve the equations:

i. x(x – 4) = - 2;

ii. x(x – 4) = 1 – $^1/_2$x.

8a. Given that A = $\begin{pmatrix} -2 & 1 \\ 3 & 4 \end{pmatrix}$, B = $\begin{pmatrix} w & y \\ x & z \end{pmatrix}$ and AB = I where I is a 2 x 2 unit matrix, find the matrix B.

b. The third and fifth terms of an Arithmetic Progression (A.P.) are 13 and 23 respectively, find the:

i. common difference;

ii. first term;

iii. nth term of the Arithmetic Progression.

9a. A plane flies due East from A(50^0N, 25^0E) to a point B(50^0N, 85^0E) at an average speed of 400 km/h. The plane then flies south from B to a point C, 2000km away. Calculate, correct to the nearest whole number, the:

b. distance between A and B;

c. time the plane takes to reach point B;

d. latitude of C.

(Take $\pi = \frac{22}{7}$ and the radius of the earth to be 6400km)

10a. In a given points A(3, 4), B(2, 4) and C(-1, 2),

i. prove that the points A, B and C form a right-angled triangle;

ii. find the length of the hypothenuse of triangle ABC;

iii. find the area of the triangle ABC.

b. Find the first and second derivatives of the following:

i. $3x^5 + 6x$;

ii. $2 \sin (3x + 1)$

11. An aeroplane flew from city G to city H on a bearing of 150^0. The distance between G and H is 300km. The aeroplane then flew a distance of 450 km to city **J** on a bearing of 060^0. Calculate, correct to a reasonable degree of accuracy,

a. the distance from G to J;

b. how far North of H is J?

c. how far west of H is G?

12. The table shows the scores of 100 students in a Mathematics test.

Marks	1 - 10	11 - 20	21-30	31-40	41-50	51-60	61-70	71 - 80	81-90	91-100
No of student	2	4	9	13	18	32	13	5	3	1

a. Draw a cumulative frequency distribution table;

b. Draw a cumulative frequency curve for the distribution.

c. Use your curve to estimate:

i. the median;

ii. the lower quartile;

iii. the 60^{th} percentile.

13a. If a section of a circle of diameter 14cm subtends an angle 90^0 at the centre of the circle is cut off and the left over is folded without overlap to form the curved surface of a cone, find the:

(i) base radius;

(ii) height;

(iii) volume of the cone (Take $\pi = {}^{22}/_{7}$)

b.

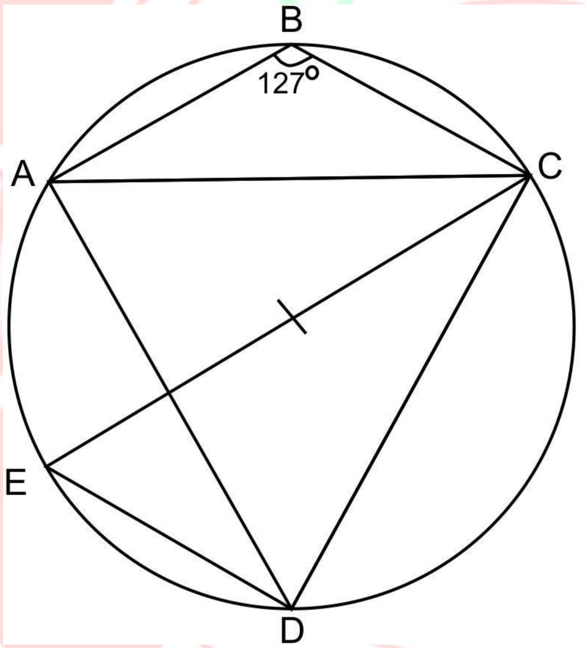

Fig. 1

In figure 1, ABCDE is a circle centre O. If /EC/ is a diameter and <ABC = 127^0, calculate <ACE.