P4022 Nov.
WASSCE 2013
GENERAL MATHEMATICS/ MATHEMATICS [CORE] 2

2

$2\frac{1}{2}$ hours

Name:.....

Index Number:.....

THE WEST AFRICAN EXAMINATIONS COUNCIL

West African Senior School Certificate Examination

GENERAL MATHEMATICS/MATHEMATICS [CORE] 2

November 2013 [100 marks] $2\frac{1}{2}$ hours

Write your **name** *and* **index number** *in the spaces provided at the top right-hand corner of this booklet.*

Answer **ten** questions in all; **all** *the questions in* Part I *and* **five** *questions from* Part II.

In **each** *question, all necessary details of working, including rough work,* **must** *be shown with the answer.*

Give answers as accurately as data and tables allow.

The following are provided for use in the examination:

(a) graph paper;

(b) drawing paper for construction work.

The use of non-programmable, silent and cordless calculator is allowed.

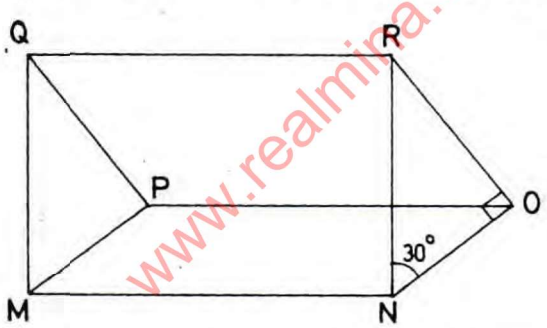
PART I
[40 marks]

Answer **all** *the* **five** *questions in this part.*
All *questions carry equal marks.*

1. *(a)* Evaluate: $6\left(1 - \frac{7}{16}\right)^{-\frac{1}{2}} \times 2^{-1}$.

(b) The interior angle of a regular polygon is 108° greater than the exterior angle. How many sides has the polygon?

2. *(a)*



The diagram shows a triangular prism with $|QR| = |MN| = |OP| = 10\ cm$ and $|NR| = |QM| = 8\ cm$. If $\angle RON = 90°$ and $\angle RNO = 30°$, calculate, correct to 3 significant figures, the volume of the prism.

(b) A bird on top of a tree sights a prey 18 *m* away and on the same horizontal ground as the foot of the tree. If the height of the tree is 8 *m*, calculate, correct to the nearest degree, the angle of depression through which the bird sights the prey.

3. *(a)* The table below gives the distribution of the number of applicants for five courses of study in a university.

Course	*Engineering*	*Medicine*	*Accountancy*	*Education*	*Economics*
Number of Applicants (thousands)	29	42	85	12	140

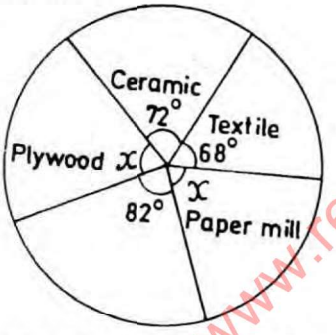
Draw a bar chart to illustrate the data.

(b) The interest to be paid by a borrower was reduced from $2\frac{1}{2}\%$ to 2%. If he paid ₦500.00 less, calculate the amount borrowed.

4. (a) Solve: $7x + 4 < \frac{1}{2}(4x + 3)$ and illustrate your answer on a number line.

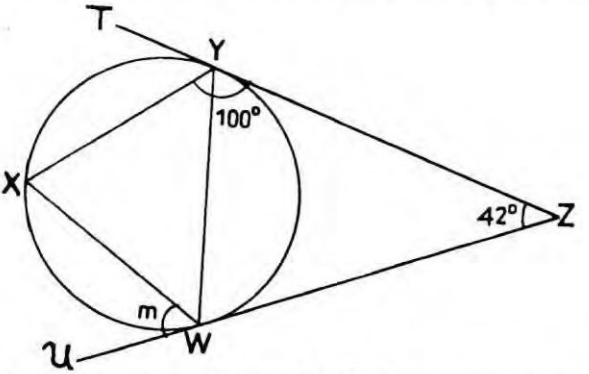
(b) The sum of three numbers is 81. The second number is twice the first and the third number is six more than the second. Find the numbers.

5. (a)



The pie chart shows the result of a survey conducted on the maintainance of five small and medium scale industries in a state. If the cost of maintainance of the plywood industry was ₦34,500.00, calculate the cost of maintainance of the textile industry.

(b)



In the diagram, TYZ and UWZ are tangents to the circle WXY, $X\hat{Y}Z = 100°$, $\angle YZW = 42°$ and $\angle UWX = m$. Find the value of m.

Turn over

PART II

[60 marks]

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

All *questions carry equal marks.*

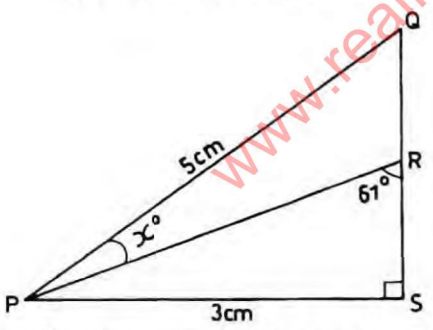
6. *(a)* If $y^2 - x^2 = 5(y - x)^2$, find $x : y$.

(b) In a partnership, Ajayi contributed ₦500,000.00 more than Kunle. The total profit made was 15% of their total contribution. If Kunle received $\frac{2}{5}$ of the total profit which amounted to ₦84,000.00, how much was:

(i) Ajayi's share of the profit?

(ii) Kunle's contribution to the partnership?

7.



In the diagram, ΔPQS is a right angled triangle, $\angle PSQ = 90°$, $|PS| = 3\ cm$, $|PQ| = 5\ cm$, $\angle PRS = 61°$ and $\angle QPR = x°$. Calculate, correct to one decimal place, the:

(a) value of x;

(b) area of ΔPQR .

8. *(a)* Given the cartesian coordinates **A**(1,2), **B**(0, 4), **C**(–2, –2) and **D**(–3, 0), on a graph sheet and using a scale of 2 *cm* to represent 1 unit on both axes, plot the points **A**, **B**, **C** and **D**.

(b) (i) Join the points to form a quadrilateral.

(ii) What type of quadrilateral is formed?

(c) Using ruler and a pair of compasses only, construct:

(i) locus, l_1, of points equidistant from **A** and **C**;

(ii) locus, l_2, of points equidistant from $\overline{\mathbf{AC}}$ and $\overline{\mathbf{BA}}$;

(iii) locate M, the point of intersection of l_1 and l_2.

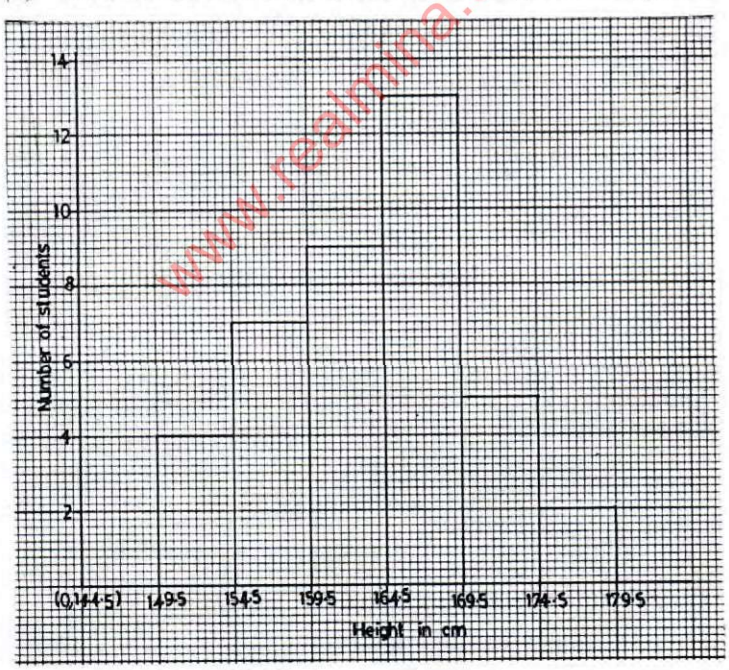
(d) Measure:
(i) $\angle MAB$;
(ii) $|MA|$.

9. (a) Solve: $\frac{x}{2} + \frac{1}{x} = 1\frac{1}{2}$.

(b) The range of the numbers p, 6, 8, 11 and q arranged in ascending order, is 16. If the mean is 9, find the value of $(2p + q)$.

10. Town Q is 20 km due north of P. The bearing of town R from Q is 140°. If R is 8 km from Q, calculate:
(a) the bearing of R from P, to the nearest degree;
(b) how far north of P, R is, correct to 2 significant figures.

11.

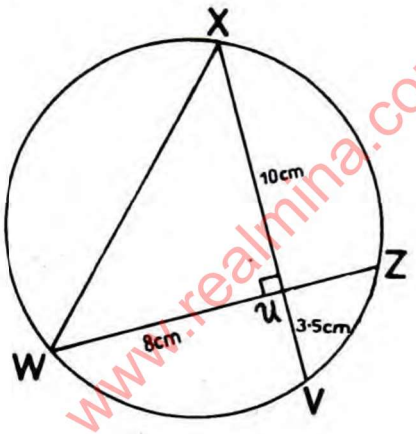


The histogram shows the height of a group of students in a school.
(a) Use the histogram to construct the frequency distribution table.
(b) What percentage of the students have their heights between 159.5 cm and 164.5 cm?
(c) Calculate the mean height.

Turn over

12. *(a)* An open rectangular tank is made from a steel plate of area 1440 m^2. Its length is twice its width. If the depth of the tank is 4 m less than the width, find the length of the tank.

(b)



In the diagram, $|XU| = 10$ cm, $|WU| = 8$ cm, $|UV| = 3.5$ *cm* and XV is perpendicular to WZ. If the radius of the circle is 7 *cm*, calculate, correct to 2 decimal places, the length of the arc WV.

[Take $\pi = \frac{22}{7}$]

13. *(a)* Given that $Y = \{-2 \leq x \leq 5\}$ and $W = \{1 < x < 6\}$, illustrate $Y \cap W$ on the number line.

(b) x varies jointly as the square of m and the cube of n. When $x = 9$, $m = \frac{3}{4}$ and $n = \frac{1}{2}$.

(i) Determine the relationship between x, m and n.

(ii) Calculate, correct to 3 significant figures, the value of:

I. x when $m = \frac{2}{3}$ and $n = \frac{1}{5}$;

II. m when $x = 5$ and $n = \frac{1}{8}$.

QUESTIONS 14 AND 15 ARE FOR CANDIDATES IN GHANA, SIERRA LEONE, LIBERIA AND THE GAMBIA ONLY.

14. *(a)* Find the equation of the line which passes through the points $(2, -3)$ and $(1, -3)$.

(b) (i) Draw a multiplication $\otimes$ table for arithmetic modulo 7.

(ii) Using the table,

I. state with reasons whether or not the operation $\otimes$ is commutative.

II. evaluate: $(4 \otimes 6) \otimes (5 \otimes 4)$.

III. find the truth set of $n \otimes n = n$.

15. *(a)* Using a scale of 2 *cm* to 2 units on **each** axis, draw on a sheet of graph paper, two perpendicular axes Ox and Oy for the intervals $-10 \leq x \leq 10$ and $-10 \leq y \leq 10$.

(b) Draw on the same graph sheet, indicating clearly all vertices and their coordinates:

(i) quadrilateral PQRS with vertices $P(2, 4)$, $Q(4, 7)$, $R(8, 8)$ and $S(6, 3)$;

(ii) the image $P_1Q_1R_1S_1$ of $PQRS$ under an anticlockwise rotation of 90° about the origin where $P \rightarrow P_1$, $Q \rightarrow Q_1$, $R \rightarrow R_1$ and $S \rightarrow S_1$;

(iii) the image $P_2Q_2R_2S_2$ of $PQRS$ under a translation by the vector $\begin{pmatrix} -10 \\ -9 \end{pmatrix}$ where $P \rightarrow P_2$, $Q \rightarrow Q_2$, $R \rightarrow R_2$ and $S \rightarrow S_2$;

(iv) the image $P_3Q_3R_3S_3$ of $PQRS$ under a reflection in the line $y = 1$ where $P \rightarrow P_3$, $Q \rightarrow Q_3$, $R \rightarrow R_3$ and $S \rightarrow S_3$.