OKUAS 4022
MOCK EXAMINATION, 2023
GENERAL MATHEMATICS/
MATHEMATICS (CORE) 2
2
2 ½ hours

Name……

Index Number……....

OKUAPEMMAN SCHOOLMOCK EXAMINATION

OKUAS, 2023 GENERAL MATHEMATICS/MATHEMATICS (CORE) **2** $2\frac{1}{2}$hours

[100 *marks*]

*Write your **name** and **index number** in **ink** in the spaces provided above.*

*Answer **ten** questions in all. **All** the questions in Section* **A** *and* **five** *questions from Section* **B**.

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

Give answers as accurately as data and tables allow.

Graph papers are provided for your use in the examination.

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

SECTION A [40 marks]

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

1. (a) Without using mathematical tables or calculators, evaluate $\frac{0.567 \times 0.0015}{0.0005 \times 0.0189}$, leaving your answer in the form $k \times 10^n$, where k is the first non – zero figure.

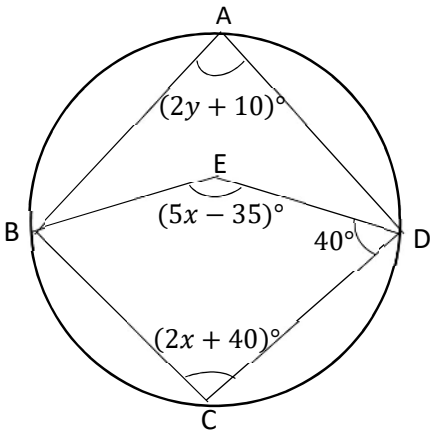
   b) If $\frac{5y-x}{8y+3x} = \frac{1}{5}$, find, correct to three significant figures, the value of $\frac{x}{y}$.

2. a) Given that $m = \left(\frac{px}{y} - p^2x\right)^{\frac{-3}{2}}$,
   - i make x the subject.
   - ii find the value of x when $m = -8,\ y = 1$ and $p = 3$.

3. a) Given that $p = \tan 30$ and $q = \tan 45$, simplify without using calculator, $\frac{p-q}{pq}$ leaving your answer in the surd form.

   b). Find the truth set of the equation $\log(9x + 3) - \log(x + 2) = \log(x + 3)$

4. In the diagram ABCD is a circle with center E, $< BCD = (2x + 40)°, < BED = (5x - 35)°, < BAD = (2y + 10)°$ and $< EDC = 40°$. Find the values of x and y.



   b) In how many years will GH¢312.50 invested at 4% per annum simple interest amount to GH¢500.00?

5. The fifth term of an arithmetic progression is three times the first term. If a quarter of the fifth term is 9. Find,
   - i. the first term and common difference
   - ii. the sum of the first eight terms

SECTION B [60 marks]

Answer **five** questions **only** from this section. **All** questions carry **equal** mark

6. The following is a frequency table of marks scored by some candidates in an examination.

Marks	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Frequency	8	10	14	28	46	25	17	9	2	1

a) Construct a cumulative frequency table and use it to draw a cumulative frequency curve for the distribution.

b) Use your curve to estimate the;

i inter - quartile range.

ii percentage of candidates who scored at least 65 marks.

7. a) If $(y - x)$ is partly constant and partly varies as x. Given that $y = 8$ when $x = 3$ and $y = 12$ when $x = 5$, find

(i) a relation connecting y and x

(ii) the value of x when $y = 20$.

b) A solid cube of side 8cm was melted to form a solid circular cone. The base radius of the cone is 4cm. Calculate, correct to one decimal place, the height of the cone [Take $\boldsymbol{\pi} = \frac{22}{7}$].

8. a) The probability that an athlete will **not** win any of the **three** races is $\frac{1}{4}$.

If the athlete runs in all the races, what is the probability that the athlete will win

i **only** the **second** race

ii **all** the **three** races

iii **only two** of the races?

(b) The exterior angles of a polygon are $42°, 38°, 57°, \ x°, \ (x + y)°, \ (2x - 15)°$ and $(3x - y)°$. If x is 7° less than y, find the values of x and y.

9. The relation $y = mx^2 + nx + r$, where *m ,n and r* are constants on the interval $-3 \leq x \leq 4$ has an uncomplete table shown below.

x	-3.0	-2	-1	0	1	2	3	4
y		$5/3$		4				$2/3$

a) Use your table to find the value of *m ,n and r.*

b) Using a scale of 2cm to 1unit on both axes, draw a graph for the function on the given interval.

c) From your graph, find

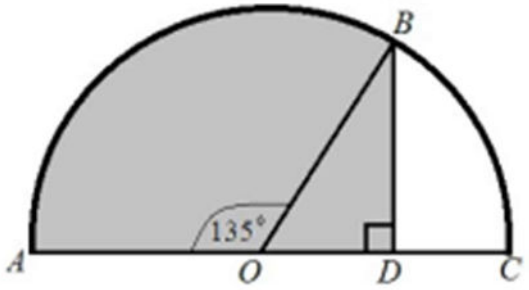
i. The value of p for which $x = 2.2$ and is a member of the truth set of the equation $mx^2 + nx + r = p$.

ii. The equation of axis of symmetry of the curve.

iii. The truth set of the equation $12 + 3x - 2x^2 = 0$.

10. Sylvester, Bentil and Dereck are partners in a business and their contributions to the capital are GH₵ 15,000.00, GH₵ 25,000.00 and GH₵ 30,000.00 respectively. They agreed to share 40% of any net profit in the ratio of their contributions to the capital. In 2021, their profit before tax was GH₵16,800 and 45% of this was paid to the government as tax.
    a) Calculate the share of the profit received by each partner.
    b) Dereck invested his share of the profit in 2021 at 12% per annum simple interest. Calculate the interest earned in 8 years.
    c) Express Dereck's share of the profit in 2021 together with the interest earned on it in 8 years as a percentage of his initial contribution to the capital.

11. a) In the diagram ABC is a semicircle, center O and radius 9cm. the line BD is perpendicular to the diameter AC and $< AOB = 135°$.
    i. Find the length of BD, leave your answer in surd form.
    ii. Find the perimeter of the shaded region
    iii. Find the area of the unshaded region.



    b) Find the value(s) of x which $\frac{2}{x^2+x-6}$ is not defined.

12. a) Using a scale of 2cm to 2 units on both axes, draw on a sheet of graph paper two perpendicular axes 0x and 0y for $-10 \leq x \leq 10$ and $-10 \leq y \leq 10$.
    b) Given points $E(3, 2)$, $F(-1, 5)$ and the vectors $\overrightarrow{FG} = \binom{1}{3}$ and $\overrightarrow{GH} = \binom{3}{-1}$, find the coordinates of the points G and H.
    c) Draw on the same graph, indicating clearly the vertices and their coordinates, the:
    i. quadrilateral *EFGH.*
    ii. image $E_1F_1G_1H_1$ of the quadrilateral *EFGH* under an anticlockwise rotation of 90° about the origin where $E \rightarrow E_1$, $F \rightarrow F_1$, $G \rightarrow G_1$, $H \rightarrow H_1$.
    d) The side E_1F_1 of the quadrilateral $E_1F_1G_1H_1$ cuts the x axis at the point P. Calculate, correct to **one** decimal place, the area of $E_1H_1G_1P$.

13. a)The operation Δ is defined on the set of real numbers by $x \,\Delta\, y = 9 - 2xy$ in modulo arithmetic 11.
    i Draw a table for Δ on the set T $= \{5, 7, 9, 10\}$
    ii from your table find the truth set of:
    α) $n \,\Delta\, (n + 2) = n$ β) $n \,\Delta\, n = 1$

b) Find the truth set of $\frac{1}{2}x - \frac{1}{3}(x + 3) < x + 1\frac{1}{3}$ where x is a real number and Illustrate your answer on a number line

END OF PAPER