DR WADA'S TUTORIALS
INTERNAL EXAMINATION

CANDIDATE NAME

BSSE GENERAL MATHEMATICS **1236/02**

PAPER 2 **2025 FINAL EXAMINATION**

2 hours

Candidates answer on the Question Paper

INSTRUCTIONS

- Answer **all** questions.
- Write your names in the spaces provided at the top of this page
- Write in dark blue or black pen.
- Write your answer to each question in the spaces provided.
- You may use HB pencil for any diagrams, graphs or rough working.
- Do **not** use staples, paper clips, highlighters, glue or correction fluid.
- Do **not** write in any barcodes.
- Electronic calculators may be used.

INFORMATION

- The total mark for this paper is 60.
- You may lose marks if you do not show your working or if you do not use appropriate units.
- The number of marks is given in brackets [ ] at the end of each question or part question.

MARKS:

List of formulas

Equation of a circle with centre (a, b) and radius r.

$$(x-a)^2 + (y-b)^2 = r^2$$

Curved surface area, A, of cone of radius r, sloping edge l.

$$A = \pi r l$$

Surface area, A, of sphere of radius r.

$$A = 4\pi r^2$$

Volume, V, of pyramid or cone, base area A, height h.

$$V = \frac{1}{3}Ah$$

Volume, V, of sphere of radius r.

$$V = \frac{4}{3}\pi r^3$$

Quadratic equation

For the equation $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Binomial theorem

$$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \ldots + \binom{n}{r}a^{n-r}b^r + \ldots + b^n,$$

where n is a positive integer and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$

Arithmetic series

$$u_n = a + (n-1)d$$

$$S_n = \frac{1}{2}n(a+l) = \frac{1}{2}n\{2a + (n-1)d\}$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r} \quad (r \neq 1)$$

$$S_\infty = \frac{a}{1-r} \quad (|r| < 1)$$

Identities

$$\sin^2 A + \cos^2 A = 1$$

$$\sec^2 A = 1 + \tan^2 A$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

Formulas for ΔABC

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\Delta = \frac{1}{2}ab\sin C$$

1. Write these numbers in order of size, starting with the smallest.

$\frac{5}{8}$ 0.62 63.5% $0.\overline{63}$ $\frac{19}{20}$

..... , ... , ... , ... , ... [4]

Smallest

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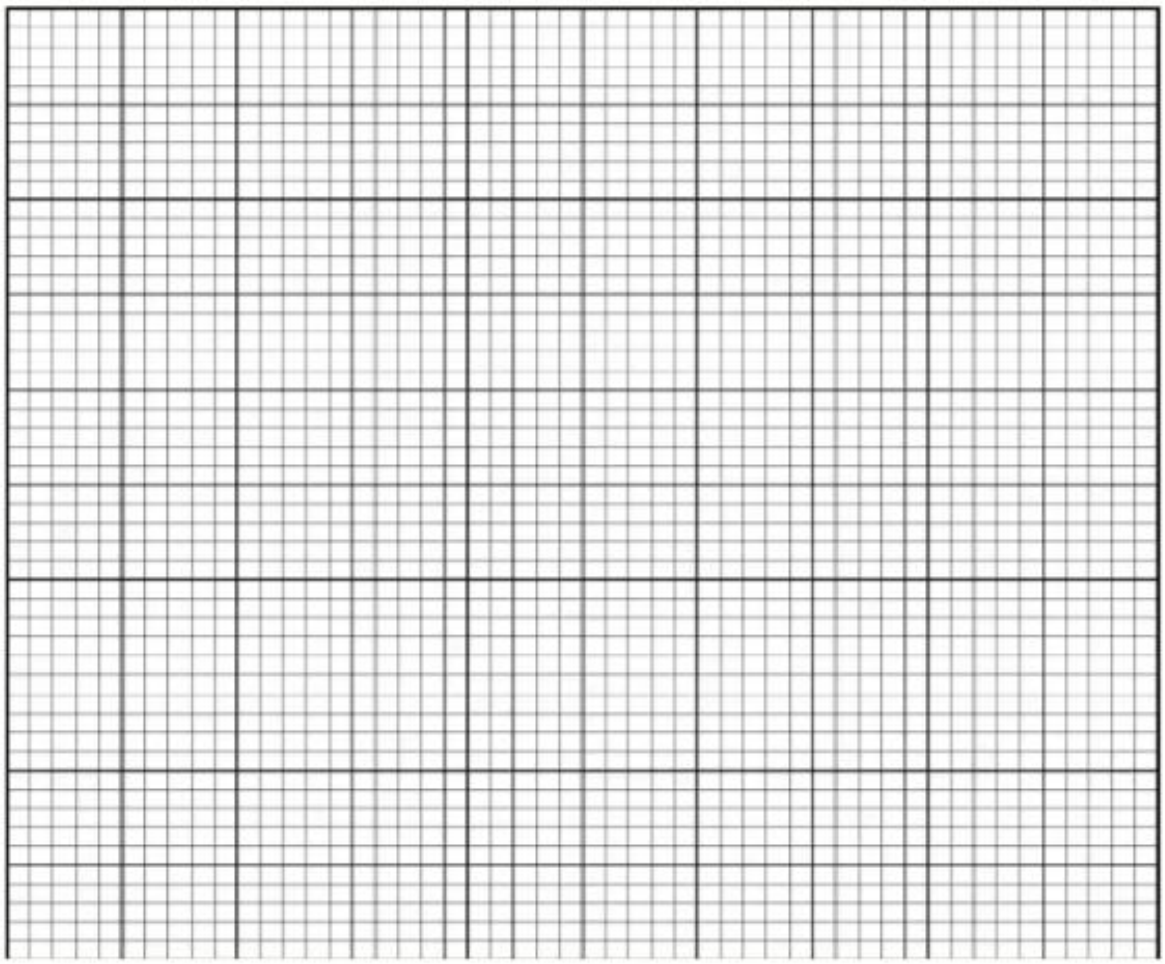
2. Sketch the graph of the function $y = 2^x$ for $-2 \leq x \leq 2$. Use the provided grid.

[3]



3. The diagram shows an arrangment of bricks

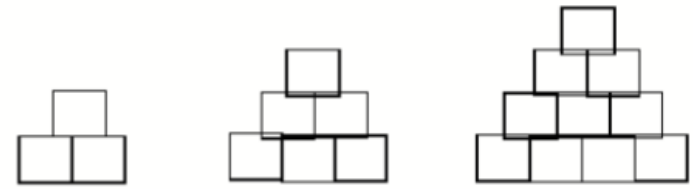


Diagram 1 Diagram 2 Diagram 3

(a) What is the expression for the number of bricks in diagram n?

…….[3]

(b) how many bricks will be in diagram 70?

…….[2]

4. Three cousins Topo, Zoe and Tia are given some sweets. Topo is given x sweets, Zoe id given a quarter of the number of sweets Topo got.

(a) Write down an expression, in terms of x, for the number of sweets that Zoe is given

…….[1]

(b) Tia is given 6 sweets more than Zoe

Write down an expression in x, for the number of sweets that Tia got.

……..[1]

(c) the total number of sweets in the bag is 30

(i) hence form and solve an equation in x

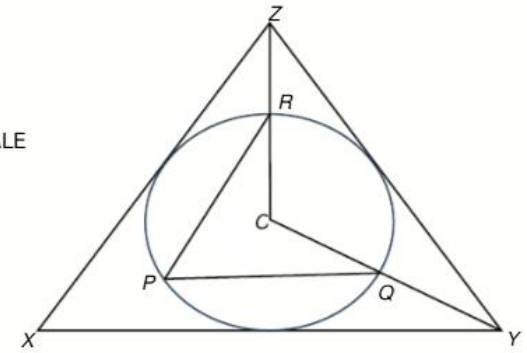
…….[1]

(ii) solve the equation in part (c) (i)

……..…….[2]

5.the diagram shows circle, centre O, inscribed in an equilateral triangle XYZ. the points P, Q and R lie on the circumference of the circle

NOT DRAWN TO SCALE



(a) Write down the size of angle OYZ.

.....[1]

(b) Calculate the size of angle reflex YOZ.

.....[2]

(c) State with a reason , the size of angle RPQ.

.....[2]

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6 Solve the equation $sinx = 0.4$ for $90^0 \leq x \leq 180^0$.

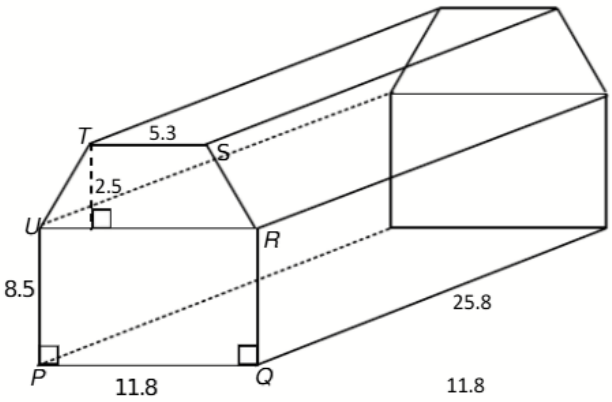
.....[2]

7. Simplify $27^{\frac{1}{4}} \times 3^{\frac{1}{4}} \times (\sqrt[3]{3})^{-4}$ and leave the answer in index form.

.....[3]

8.

The diagram shows the model of a fish tank in the form of a prism. The prism consists of a trapezoid fitted exactly on a cuboid. The cross section is a hexagon, PQRSTU, with a length of 25.8 cm. The height of the trapezoid is 2.5 cm. PQ = 11.8 cm, PU = 8.5 cm and ST = 5.3 cm. The length of the prism is 25.8 cm.



NOT TO SCALE

Calculate the capacity of the fish tank.

.....[3]

9. In 2015, Botswana Telecommunication Corporation (BTC) paid its shareholders a dividend of P2.22 per share.

Swani has 5000 BTC shares.

(a) How much did Swani earn as a dividend payment?

……..[2]

(b) Assuming that one day in the future, the market value of the BTC shares can reach P25.00 per share.

How many BTC shares of market value P25.00 can be purchased for P15 775?

……[2]

(c) In mid-January 2016, the share price for Choppies Botswana was P38.90 and the dividend yield was 9.46%.

What is the expected dividend per share?

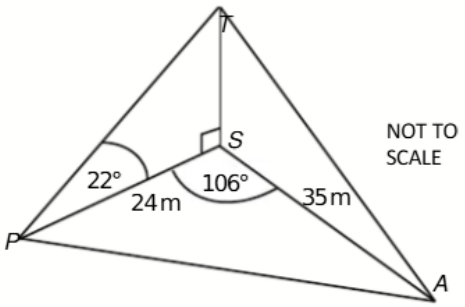
…….[3]

10. Solve the equation $8^{2-x} = 4^{2x-1}$.

.....[3]

11.

The diagram represents the positions of a vertical tree, *ST*, Pako, *P*, and Alec, *A*. Pako is 24 m from the foot of the tree. Alec is 35 m from foot of the tree. The size of the angle of elevation from Pako's position to the top of the tree is 22°. Angle PSA =106°.



Calculate

(a) The height of the tree

.....[2]

(b) The distance between Pako and Alec , AP.

.....[4]

12.

Points O,A and B are such that vector $\overrightarrow{OA} = p + q$,and vector $\overrightarrow{OB} = 2p - q$ .The point *M* is the midpoint of the straight line *AB*. Write, in terms of p and/or q, the following vectors.

(a) $\overrightarrow{AB}$

Answer (a) _____ [2]

(b) $\overrightarrow{AM}$

Answer (b) _____ [1]

(c) $\overrightarrow{OM}$

Answer (c) _____ [3]

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13 Find the equation of an ellipse with vertices (0,2),(4,2) and a mirror axis 2.

.....[5]

14. The cummulative frequency table shows mass ,m in grams of 100 fish caught in a river

Mass (m grams)	Cumulative frequency
$100 < m \leq 250$	12
$250 < m \leq 50$	43
$450 < m \leq 750$	72
$750 < m \leq 1050$	86
$1050 < m \leq 1450$	94
$1450 < m \leq 2050$	98
$2050 < m \leq 3050$	100

Without drawing a graph, calculate an estimate of :

(a) The mean

.....[3]