

MATHEMATICS 2
0570



CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examinations

JUNE XXXX

INTERMEDIATE LEVEL

Subject Title	MATHEMATICS
Subject Code No.	0570
Paper No.	TWO

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

INSTRUCTIONS

- This paper is arranged in three sections: A, B and C.
- **SECTION A** is for all candidates. Answer all the questions in the spaces provided. The mark allocation for each question is indicated.
- **SECTION B** is for all industrial candidates except IH (Clothing Industry). All questions in this section carry equal marks.
- **SECTION C** is for all commercial candidates including IH. All questions in this section carry equal marks.

You are reminded of the necessity for good English and orderly presentation in your answers. In calculations, you are advised to show all the steps in your working, giving your answer at each stage.

Calculators are allowed.

Turn Over

SECTION A

THIS SECTION IS FOR ALL CANDIDATES
ANSWER ALL QUESTIONS IN THIS SECTION

1. Evaluate $\frac{1}{4}$ of $14 \div \frac{3}{4}$ of 7.
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-(5marks)
2. Given the real number $B = 7\sqrt{98} - 7\sqrt{128} + 3\sqrt{50}$
- a. Express B in the form $a\sqrt{2}$, where a is a whole number.
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-
- b. Given that $1.732 < \sqrt{3} < 1.733$ and $1.414 < \sqrt{2} < 1.415$; write in a similar manner the bounds within which the number $8\sqrt{6}$ lies and state the amplitude of the bounds to the nearest thousandth
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-(6marks)
3. A polynomial function is defined by $g(x) = x^3 + x^2 - 9x - 9$.
- a. Evaluate $g(-3)$
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- b. Write $g(x)$ in the form $g(x) = (x + 3)(x^2 + ax + b)$, $a, b \in \mathbb{Z}$.
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- c. Solve the in equation: $(x + 3)(x - 1)(x - 3) < 0$
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-(5marks)

4. a. Given that $x = 1$ is a root of $f(x) = x^2 + kx - 5$, calculate the value of k and write $f(x)$ completely.

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b. Solve in $\mathbb{R}$ the equation $f(x) = 0$

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(6marks)

5. To produce a fruit punch during a practical class, $\frac{1}{3}$ litres of pawpaw juice, $\frac{3}{4}$ litres of pineapple juice, $\frac{5}{6}$ litres of orange juice and $\frac{1}{2}$ litres of carrot juice were used by the HE department of a certain school.

a. What quantity of punch was produced during this practical lesson.

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b. If $\frac{1}{2}$ litres of punch is sold at 1200FRS. How much money did the HE department realize on the sales of punch?

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(6 marks)

6. Solve in $\mathbb{R}$:

a. $\frac{x-3}{2} = \frac{2x-3}{3}$

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b. $\frac{2x-3}{3} \leq \frac{4x-7}{5}$

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(6marks)

7. A roof has dimensions as shown below:

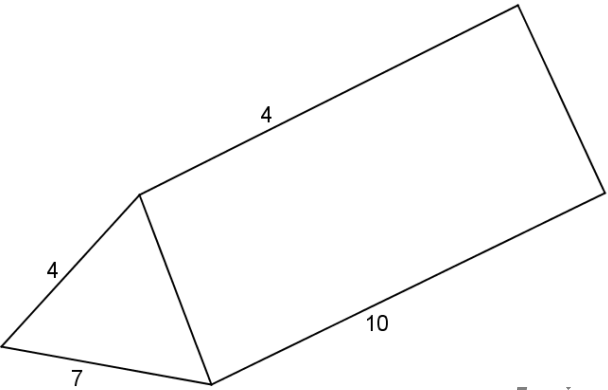


Figure 1

Calculate the number of roofing sheets to be used to roof the house if each roofing sheet is $3\text{m} \times 1\text{m}$:
a. If the gabled ends are not roofed.

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(b). If the gabled ends are roofed

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(6marks)

8. Calculate $P = \frac{(2^{-2})(3^3)(5^{-3})^3(7^5)}{(2^3)(5^{-6})(7^2)^3}$ and give the answer as a fraction in its lowest form.

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(5marks)

9. In a right-angled triangle, where angle x is acute and $\cos x = \frac{5}{13}$, find:
a. $\sin x$

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b. $\cot x$

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(5marks)

10. Given the vectors $p = 4i - j$, $q = -3i - 4j$ and $r = 5i + \mu j$. Find

a. $p - 2q$

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b. magnitude of $p - 2q$

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c. the value of the scalar μ for which r is parallel to $p - 2q$.

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(6marks)

11. Find the volume of the cone shown below:

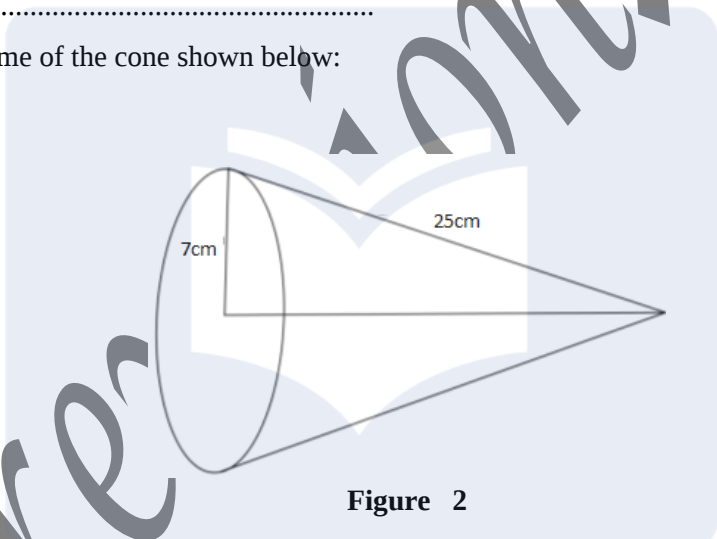


Figure 2

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(4marks)

12. The table below represents the performance of students in a Mathematics test, marked out of 20:

Marks	5	7	8	10	14	15	18	20
No of students	2	3	5	7	6	2	3	2

i. a. How many students wrote the test?

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b. What is the modal mark?

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ii. What is the probability that a student scores at least 15marks for the test.

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(5marks)

13. The figure below represents a circle and a square, both having the same centre O. The area of the square is 1225 cm^2 .

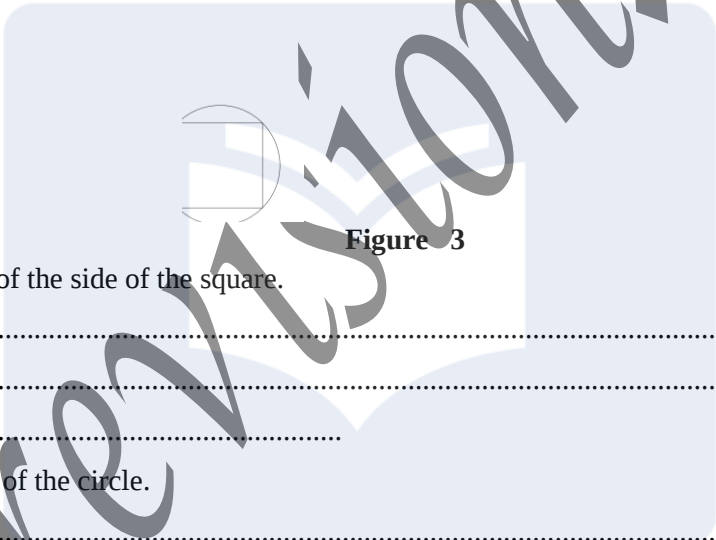


Figure 3

a. Calculate the length of the side of the square.

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b. Calculate the radius of the circle.

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(4marks)

14. a. Find the midpoint of the line segment $[AB]$ given that $A(-4; -7)$ and $B(-6; -2)$.

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b. Find the equation of the line AB .

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(6marks)

15. A woman sold fourteen(14) cartons of fish for 168,000FCFA.

a. What is the selling price of one carton?

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b. If the cost price of one carton is 10500FCFA. What was her gain after selling all the cartons?

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(6marks)



SECTION B

THIS SECTION IS FOR ALL INDUSTRIAL CANDIDATES EXCEPT IH (Clothing Industry)
ANSWER ALL QUESTIONS IN THIS SECTION

1.
 - i. The n^{th} term of a sequence (U_n) is given by $U_n = 11 - 3n$, $n \in \mathbb{N}^*$
 - a. Calculate U_1 , U_2 and U_3 (the first three terms)
 - b. Find the common difference.
 - c. Determine U_{20} and S_{20} (the sum of the first twenty terms)
 - ii. Consider the vectors $\vec{V} = (x - 2)\mathbf{i} + 3\mathbf{j}$ and $\vec{U} = 5\mathbf{i} - 5\mathbf{j}$. Determine the values of x when
 - a. $\vec{V}$ and $\vec{U}$ are perpendicular.
 - b. $\vec{V}$ and $\vec{U}$ are parallel.

(15marks)

2. In an orthonormal reference system $(O, \vec{i}, \vec{j})$ with $|\vec{i}| = |\vec{j}| = 1\text{cm}$, we have the points $A(-2,1)$, $B(1,-2)$ and $C(4,1)$.
 - a. Plot these points and link them to form triangle ABC .
 - b. Calculate the lengths AB , AC and BC .
 - c. Determine the coordinates of the vectors $\overrightarrow{AB}$ and $\overrightarrow{BC}$ and show that they are orthogonal.
 - d. Deduce the exact nature of triangle ABC .
 - e. Calculate the area of triangle ABC .
 - f. Determine the coordinates of the mid-point I of the line segment $[AC]$.
 - g. With I as center, draw the circle (Ω) circumscribed to triangle ABC .

(15marks)

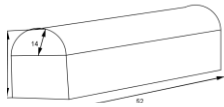
3.
 - i. Given the polynomial function:

$$f(x) = 4x^2 - 9 + (x + 2)(3 - 2x) + (2x - 3)^2$$
 - a. Expand, Simplify and write $f(x)$ in descending powers of x
 - b. Evaluate $f\left(\frac{3}{2}\right)$.
 - c. Factorize $f(x)$ completely
 - d. Solve in $\mathbb{R}$ the equation $f(x) = 0$
 - ii.
 - a. Solve in $\mathbb{R} \times \mathbb{R}$, this system of simultaneous equations below:

$$\begin{cases} 2x + 3y - 6800 = 0 \\ 3x + 2y - 6400 = 0 \end{cases}$$
 - b. Mr. AWASUME spends 272000FCFA to buy 80 tins of chocolate and 120 tins of powder milk. Mrs. Ning spends 384FCFA to buy 180 tins of the same chocolate and 120 tins of the same powder milk from the same shop. Calculate the cost of a tin of powder milk and that of a tin of chocolate.

(15 marks)

4. i. The case of a certain machine is represented by figure 1 not drawn to scale. It is made up of a rectangular box surmounted by a section of a cylinder. The dimensions on the figure are in cm (Take $\pi = \frac{22}{7}$).



- a. Determine the volume allowed for the machine.
- b. Determine the exterior area of the case given that it is opened below.
- Varnish is to be applied on the exterior surface of the case. 300g of the varnish is applied per square metre. The varnish costs 3000FCFA per kg.
- a. How many grams of varnish will be needed to apply on the case?
- b. How much money will be needed to buy the varnish for the case.

- ii. The table below is the partial organisation of heights in centimetres of 80 doors of END TIMES carpentry workshop.

Classes	$2.0 \leq x < 2.2$	$2.2 \leq x < 2.4$	$2.4 \leq x < 2.6$	$2.6 \leq x < 2.8$	Total
Frequency	16				80
Relative frequency in %		40		20	100

- a. Copy and complete the above table.
- b. Draw the corresponding bar chart for this information.
- c. State the modal class width.

(15marks)

SECTION C
For all Commercial candidates and IH (Clothing Industry)
Answer all questions in this section

All questions carry equal marks

1. i. A Fridge cost 430,000FCFA on cash payment. Mary bought the fridge on hire purchase thus;
- She deposits 30% of the cash payment price, followed by
 - 10 months instalments of 32,000FCFA
- a. Find the amount she paid as deposit.
 - b. Find the total amount she paid for the Fridge.
 - c. Determine how much more she actually paid for the fridge.
 - d. Hence, express this extra cost as a percentage of the cost on cash payment, express your answer to 1 decimal place.

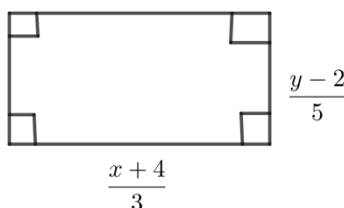
- ii. Two numbers x and y are in the ratio $\frac{12}{24}$ and their sum is 630.000FCFA. Find, the values of x and y

(15marks)

2. i. a. Expand, simplify and arrange $E = 3x(2x - 1) - (2x - 1)(x + 1)$ in descending order.
 b. Evaluate $E\left(\frac{1}{2}\right)$.
 c. Write E as a product of its linear factors.
 d. Solve in $\mathbb{R}$, the equation $(2x - 1)^2 = 0$.
- ii. The points $A(1; -1)$ and $B(-2; 8)$ are given in an orthonormal reference system $(o, \vec{i}, \vec{j})$.
- a. Write the points A and B in the form of vectors represented as $ai + bj$, where a and b are integers.
 - b. Determine the Cartesian equation of the line AB .
 - c. Find $\overrightarrow{AB}$ and $|\overrightarrow{AB}|$.

(15marks)

3. i. Consider the following quadrilateral with dimensions $\frac{x+4}{3}$ and $\frac{y-2}{5}$ where, $y \in \mathbb{R}$.



- a. Find the Perimeter P in terms of x and y .
 - b. Given that $P = 32$ and that $4x - 5y = -130$, find the values of x and y .
 - c. With the values of x and y obtained in (b) above, show that the quadrilateral is a square.
- ii. Two numerical functions f and g are defined as follows: $f: x \rightarrow 1 - 2x; x \in \mathbb{R}$ and $g: x \rightarrow \frac{1}{x-1}$.
- a. State the set of values of x for which g is defined.
 - b. Evaluate $f(-1)$ and $g(2)$.
 - c. Solve in $\mathbb{R}$ the equation $gf(x) = \frac{x}{2} - 6$.

(15marks)

4. i. The eighth term of an Arithmetic progression (AP) is 75 and the twentieth term is 39. Find the first term and the common difference

ii. The table below shows the marks distribution of a test in Mathematics taken by some students in a certain Technical High School.

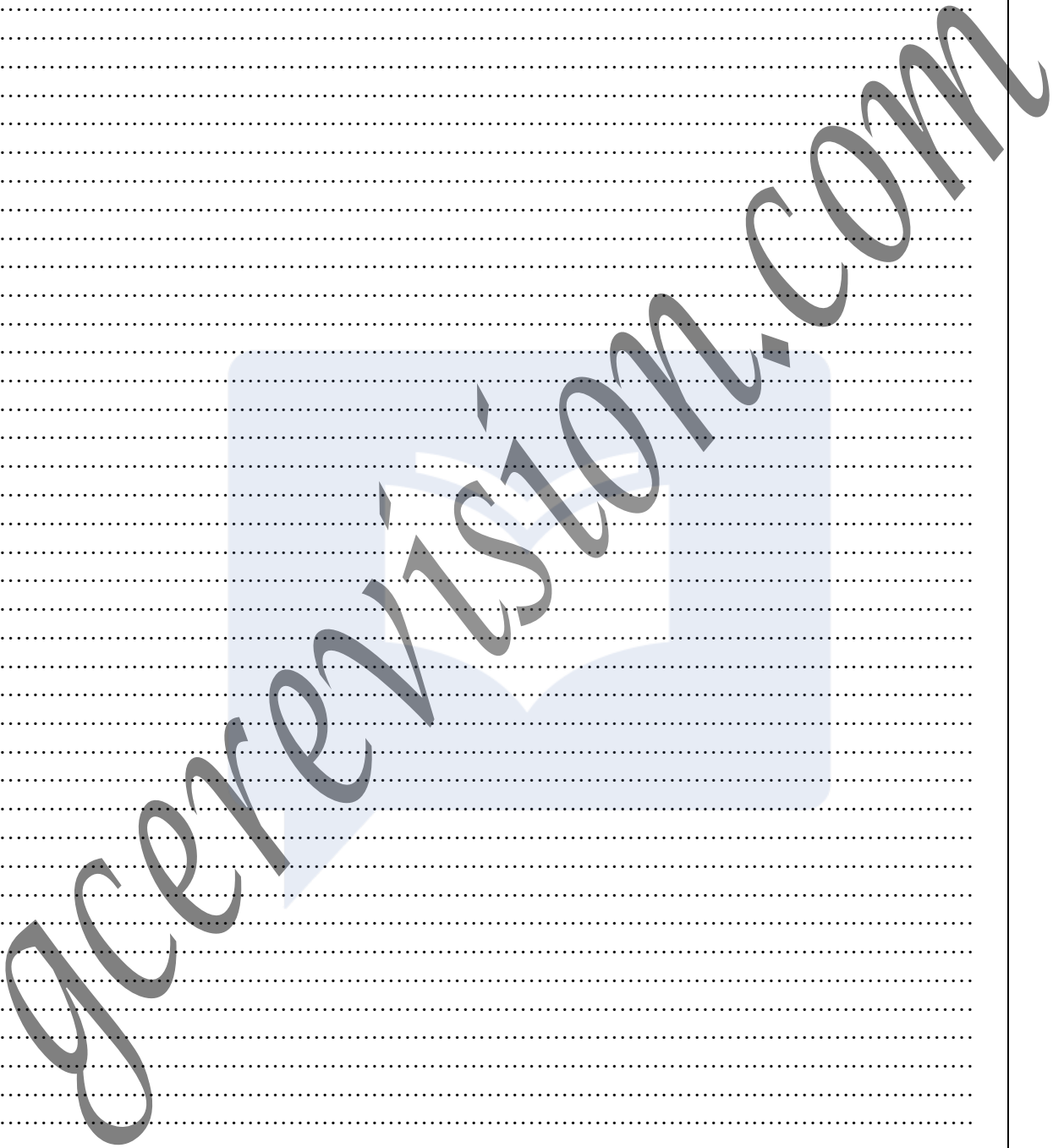
Marks (x)	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
No of students	5	9	7	12	10	7	6	4

- How many students took the Mathematics test?
- State the modal class of the distribution
- Calculate the centre marks (x_i) of the distribution
- Calculate the mean mark of the distribution
- Draw the cumulative frequency table of this distribution
- What percentage of students scored marks of less than or equal to 60 marks?

(15marks)

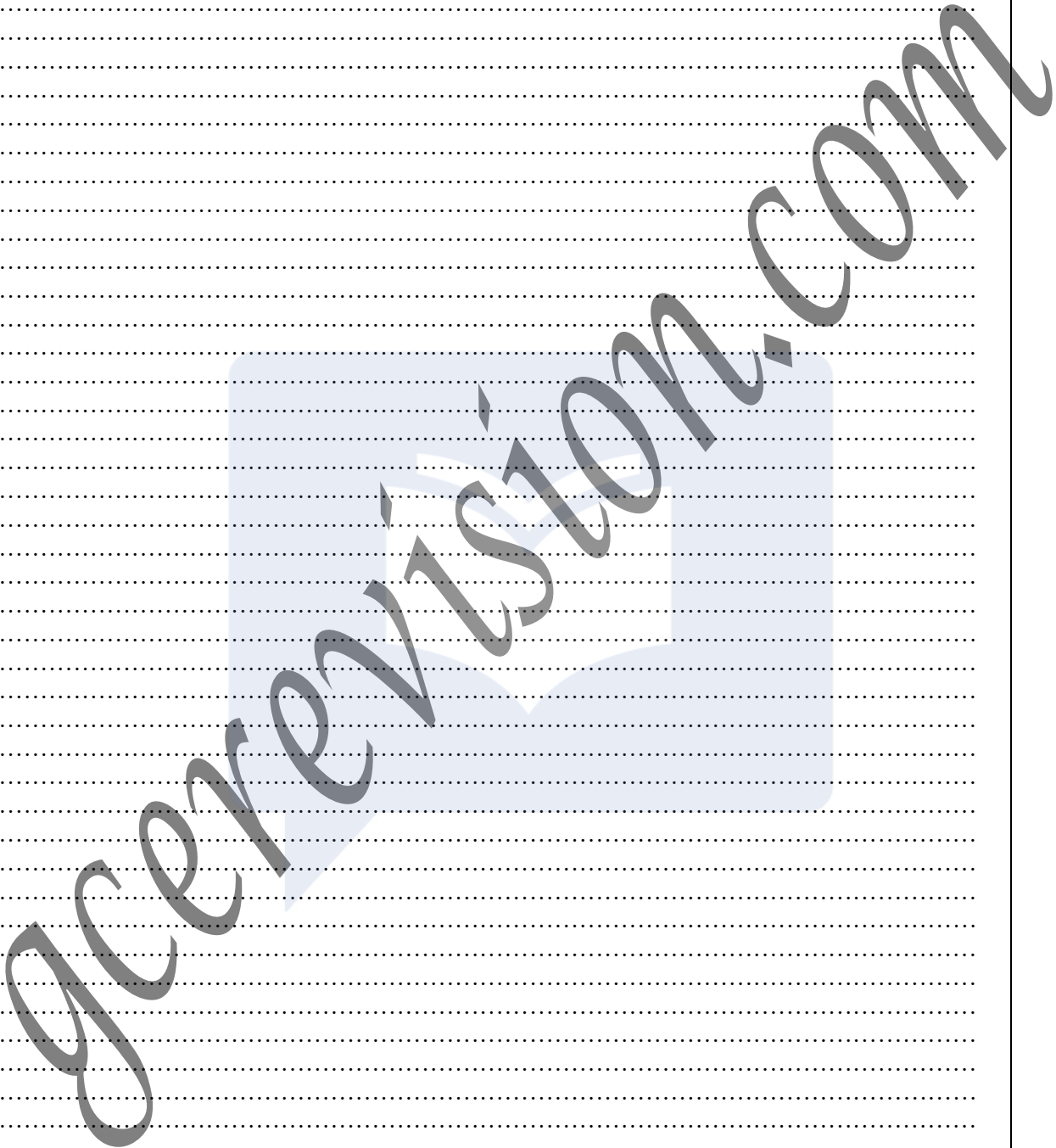
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