

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

ANNUAL EXAMINATIONS (THEORY) 2024

General Mathematics Paper II

Time: 1 hour 40 minutes Marks: 30

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

agree that this is my name and school.
Candidate's Signature

RUBRIC

2. There are **EIGHT** questions. Answer **ALL** the Questions. Choices are specified inside the paper.
3. When answering the questions:

Read each question carefully.
Use a black pointer to write your answers. **DO NOT** write your answers in pencil.
Use a black pencil for diagrams. **DO NOT** use coloured pencils.
DO NOT use staples, paper clips, glue or correcting fluid.
Complete your answer in the allocated space only. **DO NOT** write outside the answer box.
4. The marks for the questions are shown in brackets ().
5. A formulae list is provided on page 2. You may refer to it during the paper, if you wish.
6. You may use a simple calculator if you wish.

List of Formulae

NOTE:

- The symbols have their usual meanings.

Financial Mathematics

$$I = PT \times \frac{R}{100}$$

Basic Statistics

$$\bar{X} = \frac{\sum x}{n}$$

$$\bar{X} = \frac{\sum fx}{n} \quad \text{or} \quad \bar{X} = \frac{\sum fx}{\sum f}$$

$$\text{Median} = l + \frac{1}{f} \left(\frac{n}{2} - c \right) \times h$$

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

$$\sigma^2 = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2$$

$$\sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2}$$

Quadratic Equation

$$ax^2 + bx + c = 0, a \neq 0$$

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

$$\text{Disc} = b^2 - 4ac$$

Sequence and Series

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

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

$$AM = \frac{a+b}{2}$$

$$GM = \pm \sqrt{ab}$$

Area and Volumes

$$\text{Area of a circle} = \pi r^2$$

$$\text{Area of a triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{Volume of a cube} = l^3$$

$$\text{Volume of a cuboid} = l \times b \times h$$

$$\text{Volume of a sphere} = \frac{4}{3} \times \pi r^3$$

$$\text{Volume of a cone} = \frac{1}{3} \times \pi r^2 \times h$$

$$\text{Volume of a cylinder} = \pi r^2 \times h$$

Introduction to Coordinate Geometry

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M.P = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Algebraic Formulae

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

(ATTEMPT EITHER PART a OR PART b OF Q.1.)

Q.1.

(Total 3 Marks)

- a. An investor has deposited \$50,000 for a certain period of time.
- i. If he received an additional amount of \$3,750 at the end of 3 years, then determine the interest rate earned by the investor. (2 Marks)
- ii. If the investor aims to receive a total interest of \$10,000 at the same interest rate, then what is the minimum time duration that the same amount should be invested? (1 Mark)
- b. In the year 2018, Halimah paid an income tax of Rs 7,500 at the rate of 3.2% while she was eligible for a tax exemption of Rs 50,000.

Find out her taxable income for the year 2018.

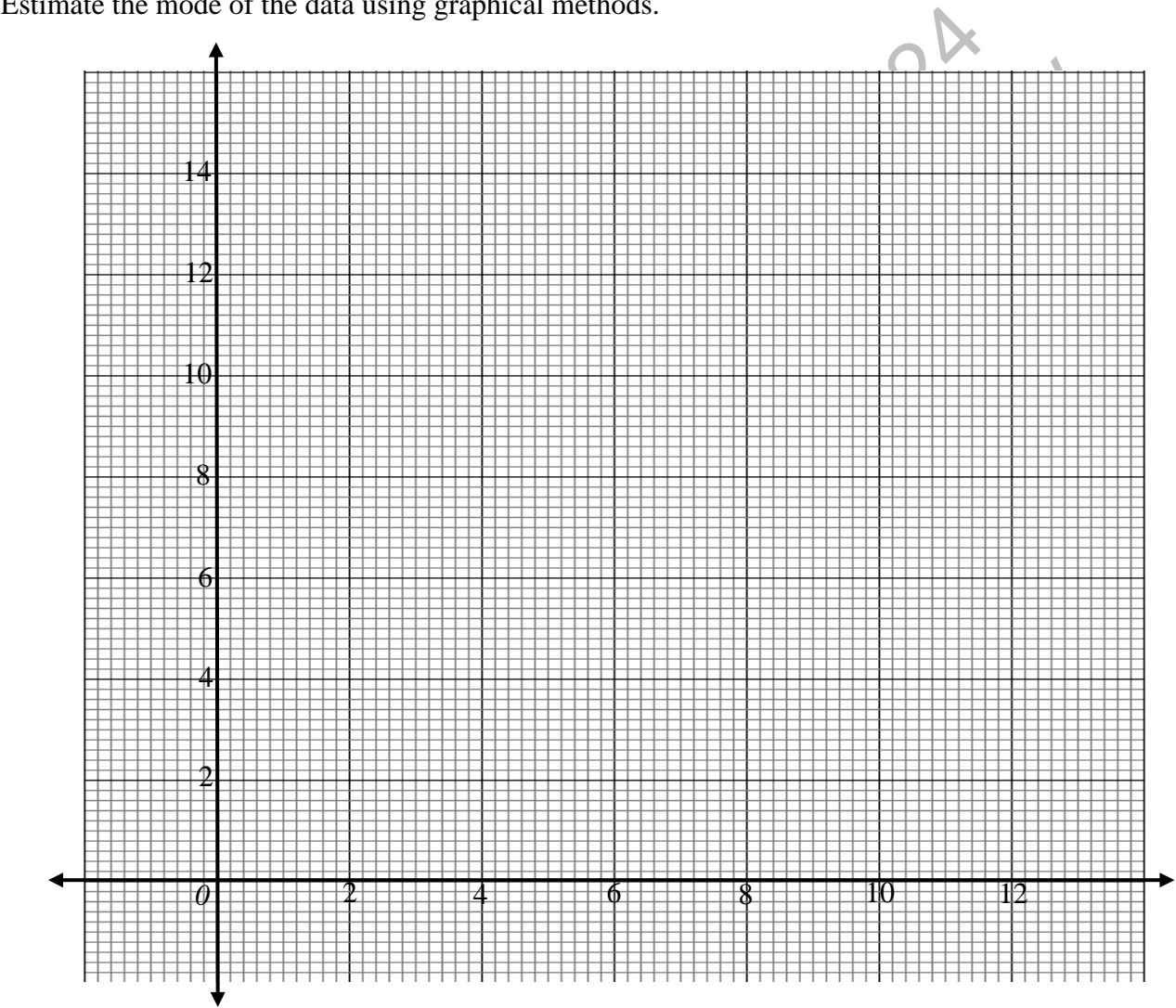
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Q.2.
(Total 4 Marks)

A group of students conducted a survey to find out the number of hours they spent studying per day. The results are given in the following table.

Number of hours	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10
Number of Students	4	7	12	7	1

Estimate the mode of the data using graphical methods.



(ATTEMPT EITHER PART a OR PART b OF Q.3.)

Q.3.

(Total 4 Marks)

a. Write the following algebraic expression in its simplest form.

$$\left(\frac{3x^2}{x^2+1} - \frac{1-x^2}{x^2+1}\right) \div \left(\frac{2x+1}{x^2+1}\right)$$

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(ATTEMPT EITHER PART a OR PART b OF Q.3.)

b.

- i. Using **division method** find the perfect square of $x^4 - 8x^2 + 16$. (3 Marks)

- ii. Find the highest common factor (HCF) of $(x-4)(x^2 + 4x + 16)$ and $(x-4)^2$ (1 Mark)

Q.4.

(Total 3 Marks)

If $x \in R$, then for $8 > 2x + 1$,

i. solve for x .

(2 Marks)

ii. show the solution on the given number line.

(1 Mark)



Q.5.

(Total 4 Marks)

Solve the equation $x^2 + 2x + \frac{3}{4} = 0$, by using completing square method.

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Q.6.

(Total 4 Marks)

Insert two positive geometric means between 12 and 96.

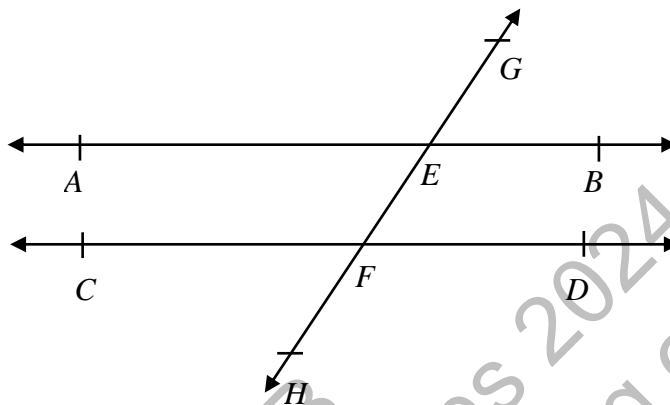
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(ATTEMPT EITHER PART a OR PART b OF Q.7.)

Q.7.

(Total 4 Marks)

- a. If in the given diagram, lines AB and CD are parallel to each other, then complete the following statements.



- i. One pair of vertically opposite angles is (1 Mark)

- ii. One pair of adjacent angles is (1 Mark)

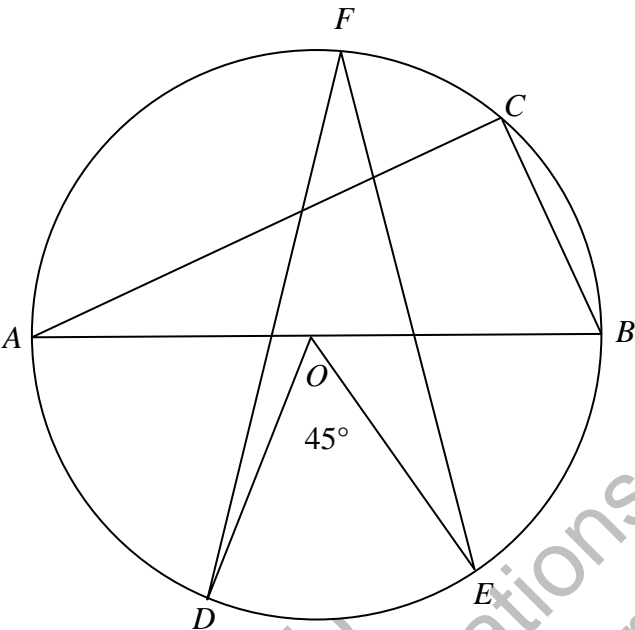
- iii. One pair of corresponding angles is (1 Mark)

- iv. One pair of alternate angles is (1 Mark)

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(ATTEMPT EITHER PART a OR PART b OF Q.7.)

b. In the given figure, O is the centre of the circle and AB is the diameter.



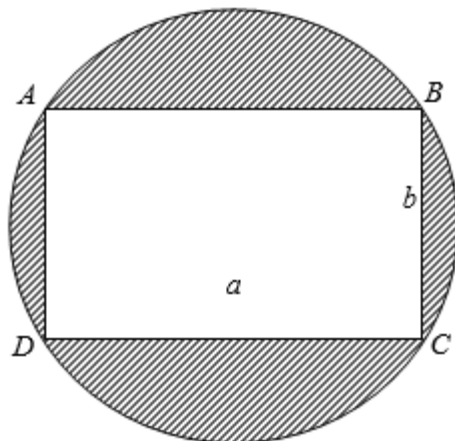
i. Find $\angle DFE$ and justify your answer. (2 Marks)

ii. Find $\angle ACB$ and justify your answer. (2 Marks)

Q.8.

(Total 4 Marks)

In the given diagram, $ABCD$ is a rectangle touching four points on the given circle internally.



If the radius of the circle is r cm, then

- i. show that the area of the shaded region is $(\pi r^2 - ab)$ cm². (3 Marks)

- ii. calculate the area of the shaded region if $a = 4$ cm, $b = 3$ cm and $r = 2.5$ cm. (1 Mark)

END OF PAPER

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