AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

ANNUAL EXAMINATIONS (THEORY) 2023

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.

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

RUBRIC

2. There are NINE questions. Answer ALL 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 colour 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.

Business Mathematics

$$\text{Loss }\% = \left(\frac{\text{Loss}}{CP} \times 100\right) \qquad \text{Profit }\% = \left(\frac{\text{Profit}}{CP} \times 100\right) \qquad SP = CP \times \left(\frac{100 + \text{profit}\,\%}{100}\right)$$

$$SP = CP \times \left(\frac{100 - \text{loss}\%}{100}\right) \qquad \text{Discount }\% = \frac{\text{Discount}}{MP} \times 100$$

Sets and Functions

$$(A \cup B)^c = A^c \cap B^c \qquad (A \cap B)^c = A^c \cup B^c$$

Exponents and Logarithms

$$a^m \times a^n = a^{m+n} \qquad a^m \div a^n = a^{m-n} \qquad \frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$$

$$\left(a^m\right)^n = a^{mn} \qquad (a \times b)^m = a^m \times b^m \qquad a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

$$\log_a (m)^n = n \log_a m \qquad \log_a (m \times n) = \log_a m + \log_a n \qquad \log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$$

$$\log_a n = \log_b n \times \log_a b \qquad \log_a b = n \Leftrightarrow a^n = b$$

Algebraic Formulae and Applications/ Factorisation

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

$$a^2 - b^2 = (a+b)(a-b) \qquad 2\left(a^2 + b^2\right) = (a+b)^2 + (a-b)^2$$

$$(a+b)^2 - (a-b)^2 = 4ab \qquad (a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

Linear Graphs

$$1 \text{ mile} = \frac{8}{5} \text{km} \qquad 1 \text{ Hectare} = 2.471 \text{ Acres} \qquad {}^\circ F = \left(\frac{9}{5} \times {}^\circ\text{C}\right) + 32$$

Matrices and Determinants

$$A^{-1} = \frac{1}{|A|} AdjA$$

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

Q.1. (Total 3 Marks)

a. Atif travels from his workplace to his residence driving at 84 km/ hour in 70 minutes.

If he drives 12 km/ hour faster, then calculate the time he will take to drive home.

b. Majid left behind a property of worth Rs 4,000,000. His decedents include a son, a daughter and his widow.

Calculate the share of each.

(**Note**: Share of widow is one eighth of the property and share of son is twice of daughter's share.)

Q.2. (Total 4 Marks)

In a business, Karim and Saima invested Rs 500,000 and Rs 1,000,000 respectively. In the first year of their business, they earned a net profit of Rs 60,000.

According to the shared capital, calculate their due shares in the profit.

(**Note**: The profit will be shared in the ratio of their investments.)

Q.3. (Total 3 Marks)

For sets $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{2, 4, 6, 8, 10\}$, show that $(A \cup B)' = A' \cap B'$.

Q.4. (Total 3 Marks)

Find the value of x in the equation $\log_5 625 = x$.

Q.5. (Total 4 Marks)

It is given that $(2a+1)=6$ and $(2a-1)=4$. Using appropriate algebraic formula, find the value of

i. $4a^2-1$ (2 Marks)

ii. $4a^2+1$ (2 Marks)

(ATTEMPT EITHER PART a OR PART b OF Q.6.)

Q.6. (Total 4 Marks)

a. Completely factorise the polynomial $2x^2 - 14x + 20$.

b. Write the THREE factors of the polynomial $x^3 + 2x^2 - x - 2$ using factor theorem.

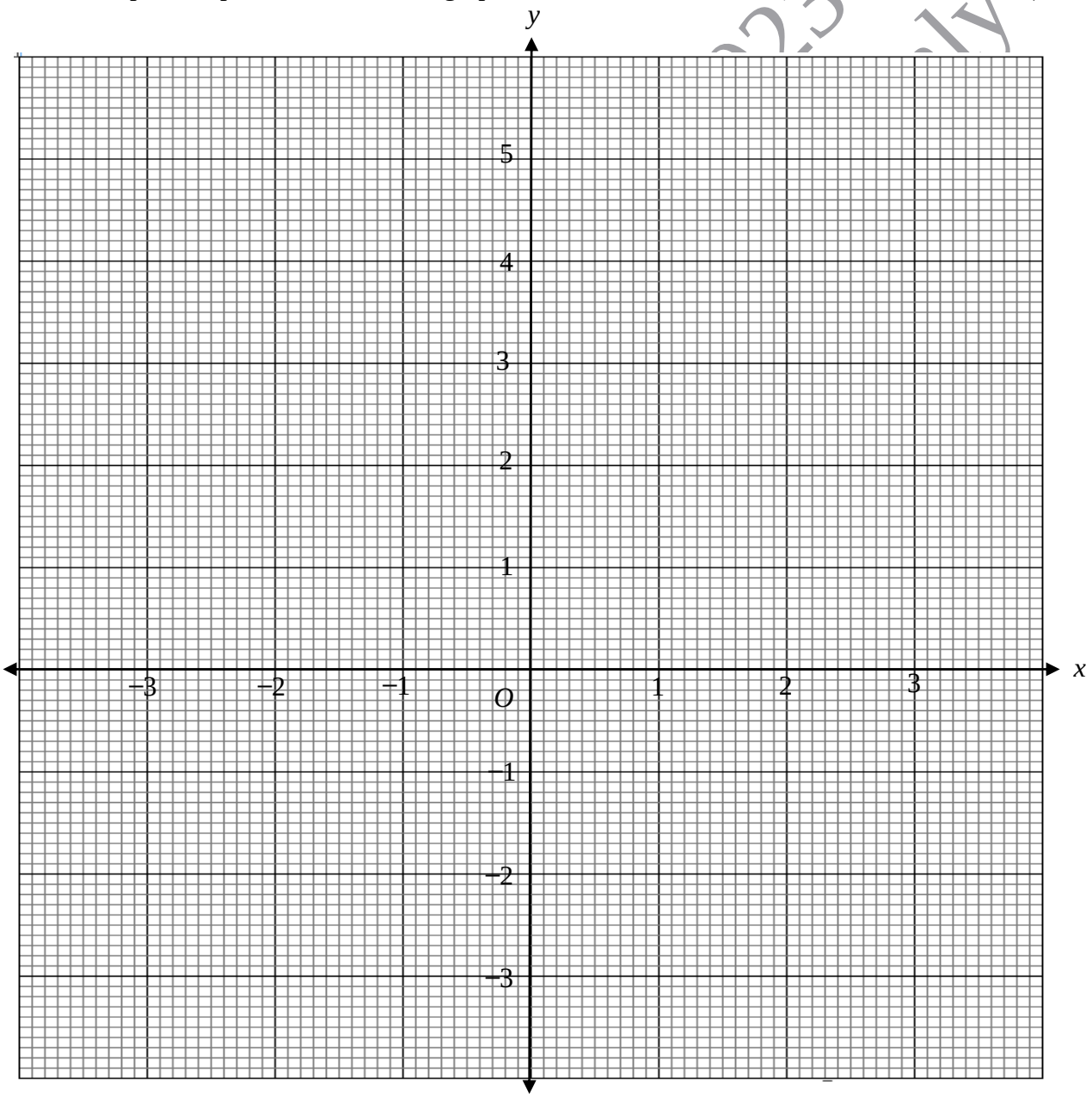
Q.7. (Total 3 Marks)

Using the linear equation $y = 2x + 1$,

i. complete the given table. (1 Mark)

x	-2	1	0	
$y = 2x + 1$		3	1	5

ii. hence, plot the points and draw the graph. (2 Marks)



(ATTEMPT EITHER PART a OR PART b OF Q.8.)

Q.8. (Total 3 Marks)

a. For the matrix $A = \begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$,

i. find A^{-1}. (2 Marks)

ii. show that $AA^{-1} = I$. (1 Mark)

b. Solve the given matrix equation to find the matrix X.

$$X + 2\begin{bmatrix} 1 & -1 \\ 1 & 0 \end{bmatrix}\begin{bmatrix} 3 \\ 2 \end{bmatrix} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$$ (3 Marks)

Q.9. (Total 3 Marks)

Using a compass, draw

i. a triangle ABC when $AB = BC = 6$ cm and $\angle A = 60°$. (2 Marks)

ii. the median AD for the triangle joining A to BC. (1 Mark)

Space for diagram

END OF PAPER

Please use this page for rough work

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