AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX

MODEL EXAMINATION PAPER 2023 AND ONWARDS

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 EIGHT 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 coloured pencils.
   DO NOT use staples, paper clips, glue, correcting fluid or ink erasers.
   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.

Aga Khan University Examination Board

List of Formulae for Mathematics IX

Note:

- All symbols used in the formulae have their usual meaning.
- The same formulae will be provided in the annual and re-sit examinations.

Sets and Functions

$A\Delta B = (A \cup B) - (A \cap B)$ $\quad (A \cap B)^c = A^c \cup B^c$ $\quad (A \cup B)^c = A^c \cap B^c$

Real and Complex Numbers

$x^m \times x^n = x^{m+n}$ $\quad (x \times y)^n = x^n \times y^n$ $\quad (x^m)^n = x^{mn}$

$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$ $\quad \frac{x^m}{x^n} = x^{m-n}$ $\quad a^{-m} = \frac{1}{a^m}$

Exponents and Logarithms

$\log_a (m \times n) = \log_a m + \log_a n$ $\quad \log_a \left(\frac{m}{n}\right) = \log_a m - \log_a n$ $\quad \log_a b = n \Leftrightarrow a^n = b$

$\log_a (m)^n = n \log_a m$ $\quad \log_a n = \log_b n \times \log_a b$ $\quad \log_a n = \frac{\log_b n}{\log_b a}$

Algebraic Formulae and Applications/ Factorisation

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

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

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

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$ $\quad (a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

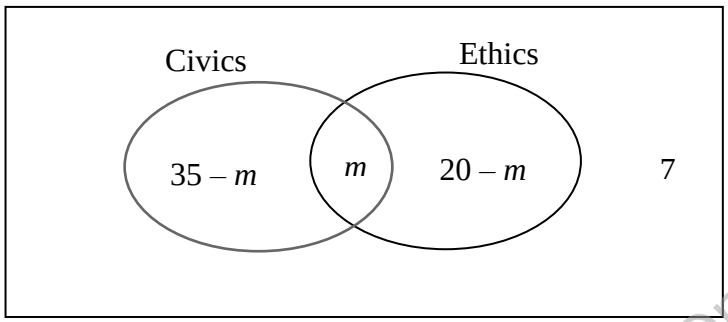
$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ $\quad (a+b)^2 - (a-b)^2 = 4ab$

Matrices and Determinants

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

Q.1. (Total 3 Marks)

The given Venn diagram shows the subject subject-wise distribution of 50 candidates appearing in an examination. It is given that *m* is the number of students who appeared in both the examination.



Use the given Venn diagram to find the number of candidates who appeared in Civics examination.

Q.2. (Total 3 Marks)

Using the laws of logarithms, prove that $\log_3 \frac{1}{\sqrt{3}} = -\frac{1}{2}$.

(ATTEMPT PART a OR PART b ONLY FOR Q.3)

Q.3. (Total 4 Marks)

a. Reduce $\frac{xy(x-y)}{2(x+y)} \div \frac{x^2y - xy^2}{2(x^2+2xy+y^2)}$ to its simplest form.

b. Simplify $\frac{\sqrt{x+y}+\sqrt{x-y}}{\sqrt{x+y}-\sqrt{x-y}} \times \frac{\sqrt{x+y}+\sqrt{x-y}}{\sqrt{x+y}+\sqrt{x-y}}$.

(ATTEMPT PART a OR PART b ONLY FOR Q.4)

Q.4. (Total 4 Marks)

a. Using appropriate formula, completely factorise $16a^3 + 24a^2b + 12ab^2 + 2b^3$ (4 Marks)

b. Factorise the following polynomials.

i. $(a+b)^2 - 49$ (2 Marks)

ii. $4x^2 - 5x + 1$ (2 Marks)

Q.5. (Total 3 Marks)

It is given that $q+1$ is inversely proportional to $\frac{p}{3}$. Show that $q=m\left(\frac{3}{p}\right)-1$, where m is a constant of proportionality.

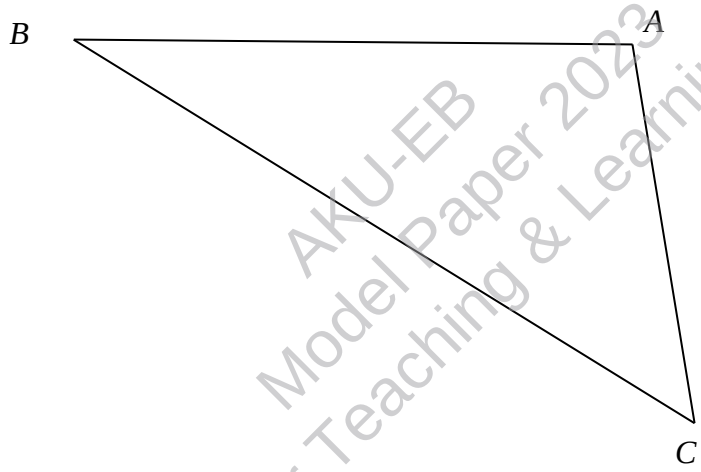
Q.6. (Total 4 Marks)

Find the value of y in the following matrix equation.

$$2\times\begin{bmatrix}3 & 0\\ 4 & 5\end{bmatrix}+\begin{bmatrix}0 & 0\\ 0 & 6y\end{bmatrix}=\begin{bmatrix}6 & 0\\ 8 & 3\end{bmatrix}$$

Q.7. (Total 3 Marks)

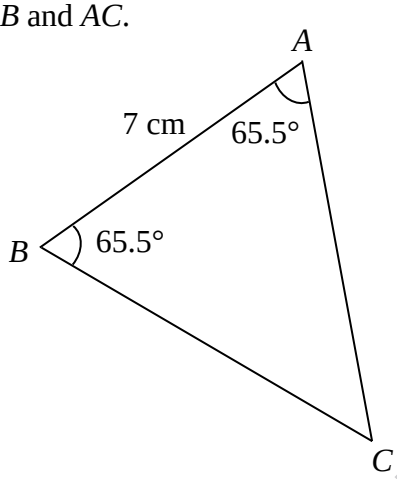
For the given triangle *ABC*, show that the altitudes of the triangles are concurrent.



(ATTEMPT ANY TWO PARTS OF a, b AND c OF Q.8.)

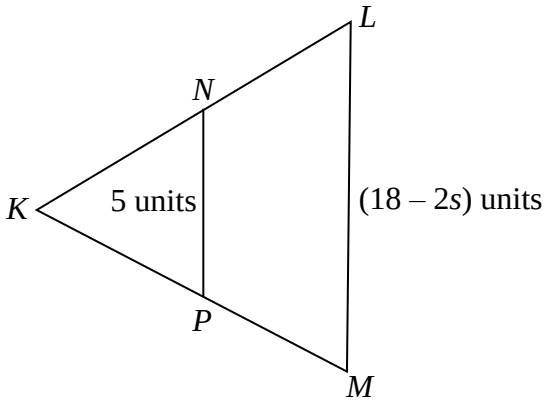
Q.8. (Total 6 Marks)

a. In the given figure *ABC* is a triangle whose perimeter is 24 cm. If the length of *AB* is 7 cm, then find the length of *AB* and *AC*. (3 Marks)



NOT TO SCALE

b. In the given figure, N and P are the midpoints of KL and KM respectively. It is given that NP = 5 units and $LM = (18 - 2s)$ units. (3 Marks)

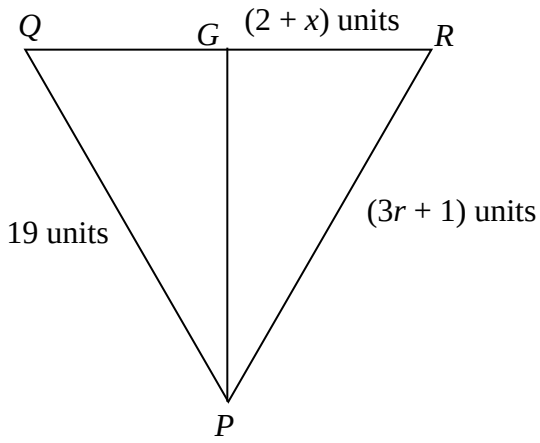


NOT TO SCALE

i. State the relationship between the line segments NP and LM.

ii. Find the value of s.

c. In the given diagram, line segment GP is the right bisector of side QR. It is given that $GR = (2 + x)$ units, $PR = (3r + 1)$ units and $PQ = 19$ units. (3 Marks)



NOT TO SCALE

i. Express the length of QR in terms of x.

ii. Find the value of r.

Please use this page for rough work

Please use this page for rough work