AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2013

Mathematics Paper II

Time: 2 hours 20 minutes Marks: 45

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**

2. RUBRIC. There are ELEVEN questions. Answer ALL questions. Choices are specified inside the paper.

3. When answering the questions:

   Read each question carefully.
   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. You may use a simple calculator if you wish.

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

Q.1. (Total 4 Marks)

a. If $\overline{w} = -2 - i$ is a complex number, then find

i. w (1 Mark)

ii. $\overline{w} \div w$ (3 Marks)

b. Evaluate $\sqrt[3]{512} + \frac{64}{\sqrt{64}} \times \sqrt[3]{10^6} - 16$ (4 Marks)

(ATTEMPT EITHER PART a OR PART b OF Q.2.)

Q.2. (Total 4 Marks)

a. Given that $A = \{x \mid x \text{ is an integer greater than or equal to zero}\}$.

Write set B whose elements are x^2, where $x \in A$. Also find $A \cup B$ and $A \cap B$.

b. If $T = \{0, \phi\}$ and $R = \{\phi\}$, then find $[T \cup (T - R)] \cap (R - T)$.

Q.3. (Total 3 Marks)

If $\log_a \sqrt{(m - 2)} = 1$, then find m in terms of a, where $a > 0$ and $a \neq 1$.

(ATTEMPT EITHER PART a OR PART b OF Q.4.)

Q.4. (Total 4 Marks)

a. Show that $1 - \frac{\sqrt{a}}{1 + \sqrt{a}}$ can also be written as $\frac{1 - \sqrt{a}}{1 - a}$.

b. If $3pq = -15$ and $(p-q)^3 = 216$, then find the value of $p^3 - q^3$.

(ATTEMPT EITHER PART a OR PART b OF Q.5.)

Q.5. (Total 5 Marks)

a. Find the possible values of p, if $(px - p)$ is divided by $\left(x - \frac{4}{p}\right)$ and the remainder is $p^2 - p$.

b. Factorize $25a^6 - 25b^6$ completely.

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

Q.6. (Total 4 Marks)

a. If $\sqrt{y} \propto \sqrt{x}$ and $y = x = a^2$, then find the equation connecting x and y.

Hence, find the value of y when $x = \frac{a^2}{4}$.

b. If $\frac{c}{p} = \frac{d}{q} = \frac{e}{r}$, then show that $\frac{c+e}{p+r} = \frac{c+d}{p+q}$.

Q.7. (Total 5 Marks)

Given that the matrix $M = \begin{bmatrix} \frac{3}{2} & -1 \\ P & 2 \end{bmatrix}$ and $N = \begin{bmatrix} 1 & 3 & 1 \\ 2 & 3 & 2 \end{bmatrix}$.

i. Find the determinant of the matrix M in terms of p. (1 Mark)

ii. If M is a singular matrix, then find the value of p. (2 Marks)

iii. Find if possible the transpose of the matrix $N \times M$ .Give a reason to support your answer. (1 Mark)

iv. Why can the determinant of the matrix N NOT be determined? (1 Mark)

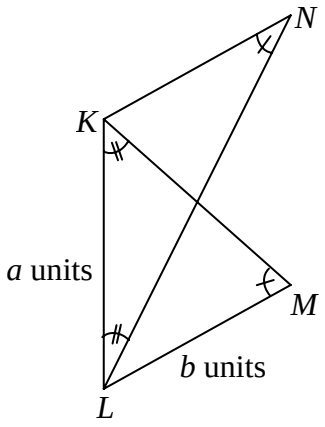
Q.8. (Total 4 Marks)

Fill in the missing entries in the given table. Hence, find the arithmetic mean for the given data.

Marks	**Number of Candidates**	**Class Mark (x)**	**$f\,x$**
1 – 5	9	3	
6 – 10	13	8	104
11 – 15		13	195
16 – 20		18	
21 – 25	27	23	621
Total	**100**		**1595**

Q.9. (Total 4 Marks)

Given that ΔLKM is congruent to ΔKLN as shown in the diagram. Find $m\ \overline{KM}$ and $m\ \overline{NL}$ if the sum of all the sides of the ΔKLN is 15 units. Also give reasons for all the necessary steps.



(ATTEMPT EITHER PART a OR PART b OF Q.10.)

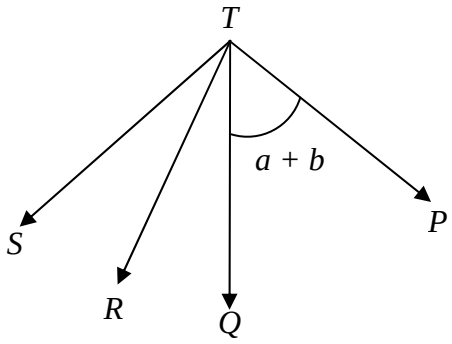
Q.10. (Total 4 Marks)

a. Given that TQ and TR are the angle bisectors of $\angle STP$ and $\angle STQ$ respectively, as shown in the diagram, find

i. $m \angle STR$

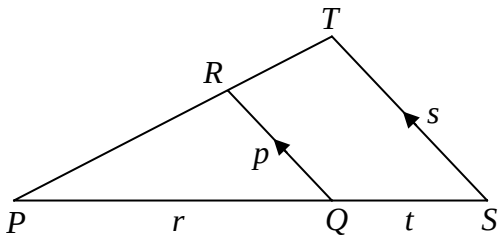
ii. $m \angle STP$

Give a reason for each of your answers. (4 Marks)



(ATTEMPT EITHER PART a OR PART b OF Q.10.)

b. The given diagram shows $\Delta\ PRQ$ is similar to $\Delta\ PTS$.



Comprehend the diagram and complete the following statements.

i. $m\angle\ PRQ$ is equal to (1 Mark)

ii. $\Delta\ RPQ$ is similar to (1 Mark)

iii. $\frac{PR}{PT}$ is equal to (1 Mark)

iv. $\frac{p}{s}$ is equal to (1 Mark)

Q.11. (Total 4 Marks)

Draw an equilateral triangle *ABC* whose one side measures 5 cm.
Hence, draw any TWO altitudes of the triangle.

END OF PAPER

Please use this page for rough work