AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

APRIL/ MAY 2017

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 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. 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 $z = -2 - 3i$ and $\bar{z} = -2 + 3i$, then find $\frac{\bar{z}}{z}$, giving your answer in the form $a + ib$.

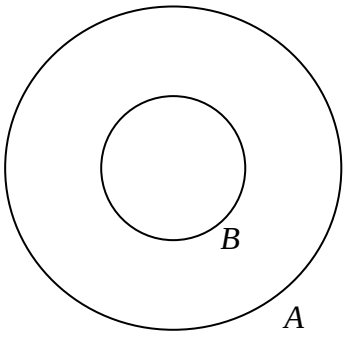
b. Express $\frac{m^{\frac{7}{3}}n}{\sqrt{m^{-4}n^{-2}}}$ in its simplest form.

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

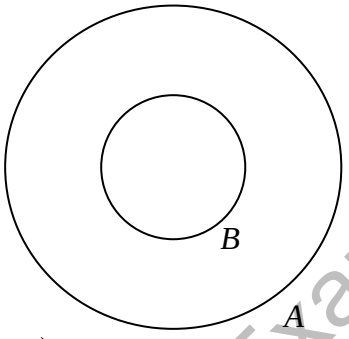
Q.2. (Total 4 Marks)

a. If A and B are two non-empty sets, shade each of the following set operations in the corresponding Venn diagrams.

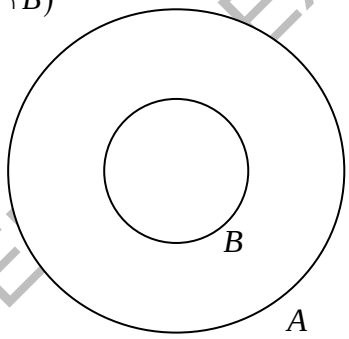
i. $A \cup B$ (1 Mark)



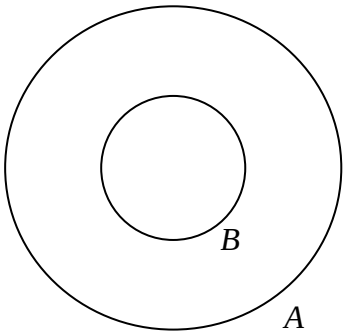
ii. $A \cap B$ (1 Mark)



iii. $(A \cup B) - (A \cap B)$ (1 Mark)



iv. $A - B$ (1 Mark)



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

b. For two non-empty sets *A* and *B*, an **onto function** from *A* to *B* is defined as $f_1 = \{(p, 10), (q, 10), (r, 25), (s, 30)\}$. Answer the following.

i. Find the domain of f_1. (1 Mark)

ii. Find the set *A*. (1 Mark)

iii. Select and write down the possible set *B* from the given two choices. (1 Mark)

Choice I: {10, 25, 30}
Choice II: {10, 15, 20, 25, 30}

iv. Write down a function f_2 from *A* to *B*. (1 Mark)

(**Note:** f_2 should not be the same as f_1)

Q.3. (Total 3 Marks)

Given that $\log_3 x = m$, find the value of the following in terms of *m*.

i. x (1 Mark)

ii. $\log_3 \frac{x}{3}$ (2 Marks)

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

Q.4. (Total 4 Marks)

a. Show that $\frac{a^3-b^3}{a^2+ab+b^2}+\frac{1}{a+b}=\frac{a^2-b^2+1}{(a+b)}$.

b. Find the value of $a^2+b^2+c^2$, when $a+b+c=7$ and $ab+bc+ca=18$.

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

Q.5. (Total 5 Marks)

a. Find the zeros of the polynomial $y^2 - 5y + 6$. Hence, find the remainder when $y^2 - 5y + 6$ is divisible by $y - 3$.

b. Factorise $(z^2 - z - 3)(z^2 - z + 1) + 4$ completely.

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

Q.6. (Total 4 Marks)

a. If $\frac{m}{n} = \frac{l}{p} = \frac{q}{r} = k$, then using K-method verify $\frac{mlq}{npr} = \frac{m^3 + l^3 + q^3}{n^3 + p^3 + r^3}$.

b. Given that p varies inversely as the square root of q. If $q = 100$ when $p = \frac{1}{5}$, find p when $q = 144$.

Q.7. (Total 5 Marks)

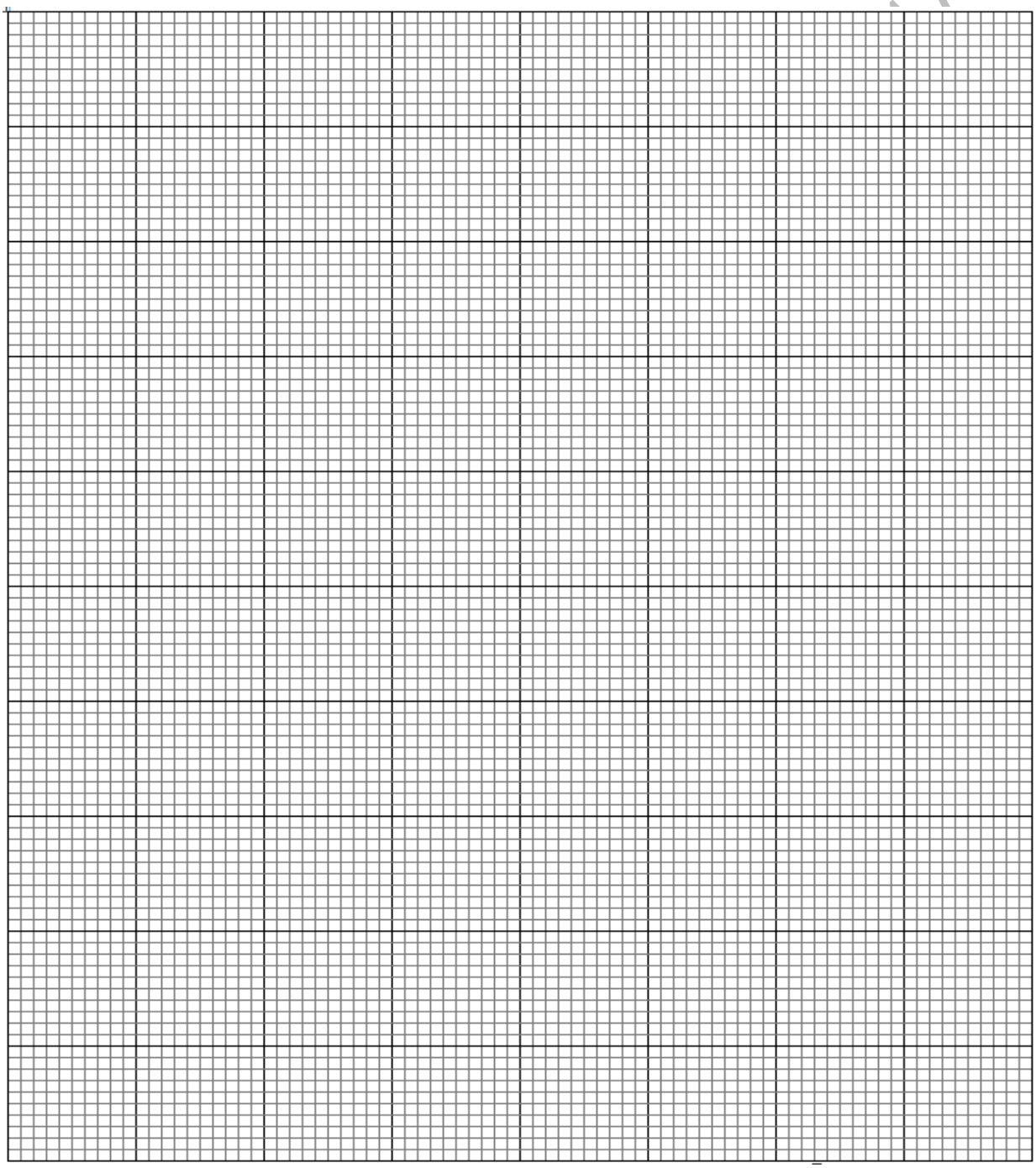
Find the value of x and y in the following matrix equation.

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

Q.8. (Total 4 Marks)

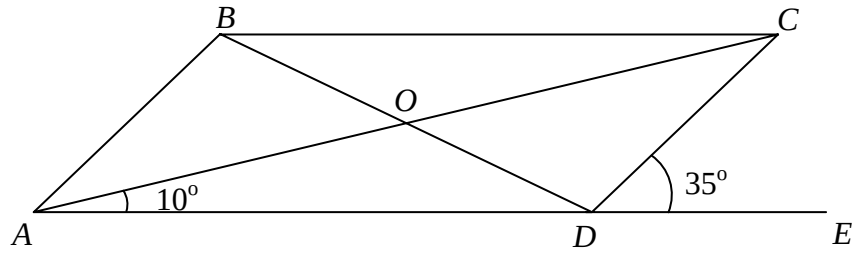
The given data shows the height (in centimetres) of 27 plants. Complete the given table and use it to construct a cumulative frequency curve.

Height (cm)	0 – 2	2 – 4	4 – 6	6 – 8	8 – 10
Frequency	2	5	10	8	2
Cumulative Frequency					



Q.9. (Total 4 Marks)

A parallelogram *ABCD* is given. Find



NOT TO SCALE♯

i. $\angle ABC$ (1 Mark)

ii. $\angle BAO$ (1 Mark)

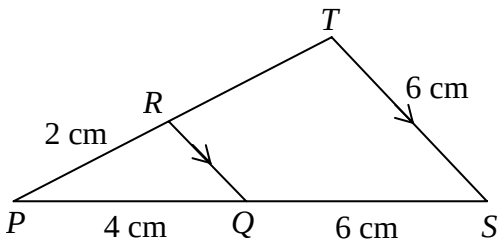
iii. $\angle OCD$ (1 Mark)

iv. $\angle BCA$ (1 Mark)

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

Q.10. (Total 4 Marks)

a. In the given triangle *PST*, *PS* = 10 cm, *ST* = 6 cm, and *PR* = 2 cm. Find the length of



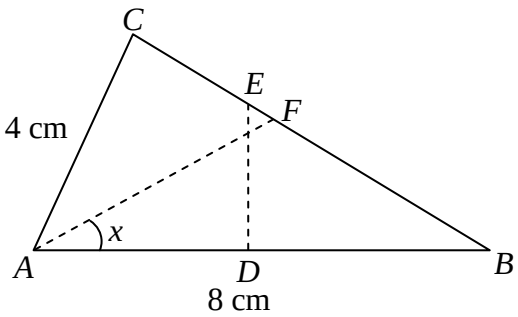
NOT TO SCALE

i. *PT* (2 Marks)

ii. *QR* (2 Marks)

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

b. In the given triangle ABC, $AB = 8$ cm and $AC = 4$ cm. Also, DE is the perpendicular bisector of AB and AF is the angle bisector of $\angle BAC$.



NOT TO SCALE

i. Find $\angle CAB$ in terms of x. (1 Mark)

ii. Find the length of DB. (1 Mark)

iii. If $BF = 6$ cm, find the length of FC. (2 Marks)

Q.11. (Total 4 Marks)

Draw a triangle ABC such that $AB = 9$ cm, $\angle A = 45°$ and $\angle B = 40°$. Also draw any TWO medians of the triangle.

Space for diagram

END OF PAPER

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