

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS IX EXAMINATION

MAY 2015

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. Simplify $z = \frac{1}{-1+i} + 1 - 4i$ and express z in the form of $a + ib$.
- b. Simplify $\sqrt{\frac{128m^{-3}n^3}{2m^{-7}n^9}}$, giving your answer in **positive** exponents.

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

Q.2.

(Total 4 Marks)

a. Two sets A and B are defined as $A = \{1, 2\}$ and $B = \{0, 1, 2\}$.

i. Find the cartesian product $A \times B$.

(1 Mark)

ii. Is $A \times B$ a function? Write a statement to justify your answer.

(1 Mark)

iii. Write an **into** function from A to B .

(1 Mark)

iv. If R is a binary relation such that the domain of $R = \{1\}$ and the range of $R = \{1, 2\}$, write down the relation R in $A \times B$.

(1 Mark)

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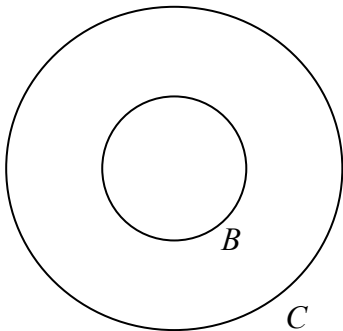
(ATTEMPT EITHER PART a OR PART b OF Q.2.)

b.

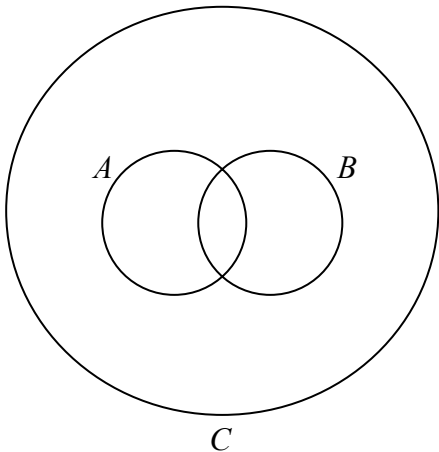
i. If $A = \{1, 3, 5, 7\}$, $B = \{2, 3, 4, 5\}$ and $C = \{1, 2, 3, 4, 5, 6, 7\}$, find $A \cap (B \cup C)$. (2 Marks)

ii. Shade the following regions in the given Venn diagrams.

I. $B \cup C$ (1 Mark)



II. $A \cap (B \cup C)$ (1 Mark)



Q.3.

(Total 3 Marks)

Find the value of x if $\frac{1}{2}\log_4(3x-2)=\frac{1}{2}$.

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

Q.4.

(Total 4 Marks)

a. If $x + \frac{1}{x} = a$, find the value of $x^3 + \frac{1}{x^3}$.

b. If the square of the sum of three quantities a, b, c is 40 and the sum of their squares is 16, find the value of $(ab + bc + ca)$.

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

Q.5.

(Total 5 Marks)

- Factorize $64 - z^6$.
- Find the possible values of p , if $(px - p)$ is divided by $\left(x - \frac{4}{p}\right)$ and the remainder is $p^2 - p$.

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

Q.6.

(Total 4 Marks)

- a. If t^2 is inversely proportional to s , when $s = 16$ and $t = 4$, find the value of t when $s = 4$.

(4 Marks)

b.

- i. Find the value of x if $5 : 2x = 3 : 2x - 4$.

(2 Marks)

- ii. If $x : y = u : v$, prove that $3x + 7y : 3x - 7y = 3u + 7v : 3u - 7v$.

(2 Marks)

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Q.7.

(Total 5 Marks)

What is the value of x and k in the following matrix equation?

$$\begin{bmatrix} 3 & x \\ 4 & 5 \end{bmatrix} + \begin{bmatrix} x & 3x \\ -9 & -5 \end{bmatrix} = k \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - \begin{bmatrix} -2 & 0 \\ 5 & 1 \end{bmatrix}$$

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Q.8.

(Total 4 Marks)

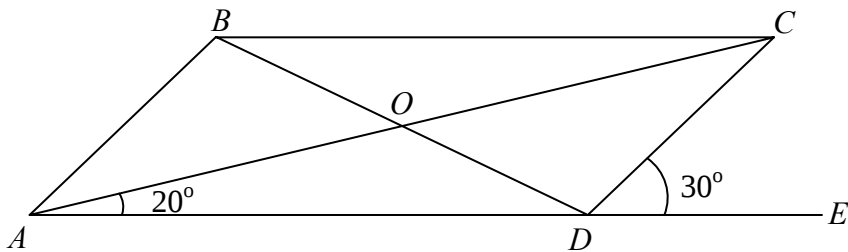
A small office has a staff of 20 employees. The distance (km) of the office from their homes is shown in the table given below. Complete the table and find the standard deviation for this data.

Distance (km)	Number of Employees	Class Mark		
1 – 4	2	2.5		
5 – 8	1	6.5		
9 – 12	6	10.5		
13 – 16	10	14.5		
17 – 20	1	18.5		
Total		–		

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Q.9. (Total 4 Marks)

A parallelogram $ABCD$ is given below.



NOT TO SCALE

Find

i. $m\angle ABC$ (1 Mark)

ii. $m\angle OCD$ (1 Mark)

iii. $m\angle BAO$ (1 Mark)

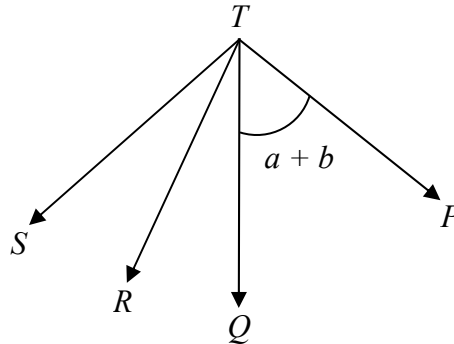
iv. $m\angle BCA$ (1 Mark)

(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 the following and write a statement to justify each of your answers.

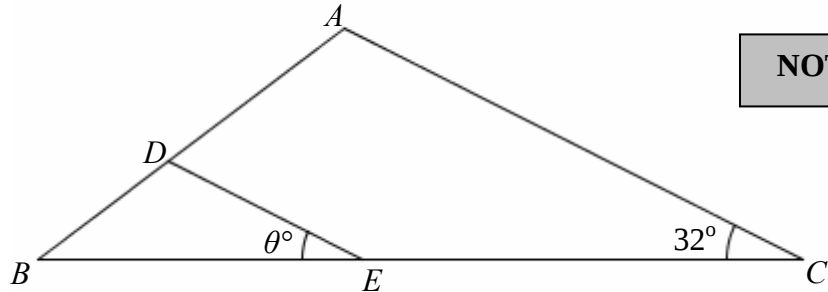
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|-----|---------------|-----------|
| i. | $m\angle STR$ | (2 Marks) |
| ii. | $m\angle STP$ | (2 Marks) |

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

b.



In triangle ABC , $m\overline{AB} = 5$ cm, $m\overline{AD} = 3$ cm, $m\overline{BC} = 10$ cm, $m\overline{EC} = 6$ cm, $m\overline{AC} = 6$ cm and $m\overline{DE} = \frac{12}{5}$ cm.

- i. Is triangle ABC similar to triangle DBE ? Write a statement to justify your answer. (2 Marks)

- ii. Is $\overline{AC}$ parallel to $\overline{DE}$? Write a statement to justify your answer. (1 Mark)

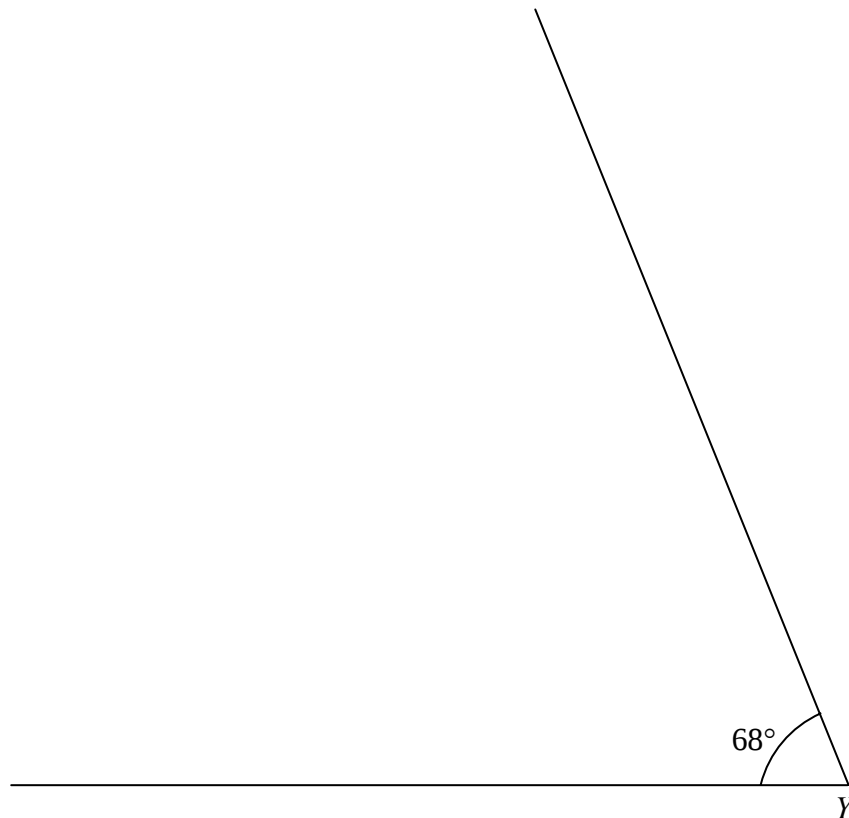
- iii. Find the value of θ . (1 Mark)

Q.11.

(Total 4 Marks)

Given below is an incomplete scaled diagram of a triangle XYZ such that $m \overline{XY} = 8.8$ cm, $m\angle X = 56^\circ$ and $m\angle Y = 68^\circ$.

- i. Complete the given diagram of the triangle. (2 Marks)
- ii. Locate a point O such that O is at the same distance from each vertex of the triangle. Write down the distance of point O from any vertex. (2 Marks)



END OF PAPER

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