AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X

ANNUAL EXAMINATIONS (THEORY) 2023

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.

<div style="border:1px solid">

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

</div>

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 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.

List of Formulae

Note:

- All symbols used in the formulae have their usual meaning.

Basic Statistics

$$\overline{X} = \frac{\sum x}{n}$$

$$\text{Median} = l + \frac{1}{f}\left(\frac{n}{2} - c\right) \times h$$

$$\overline{X} = \frac{\sum fx}{n} \text{ or } \overline{X} = \frac{\sum fx}{\sum f}$$

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

$$\text{variance} = \frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2$$

$$\text{Standard deviation} = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

Algebraic Manipulation

$$HCF \times LCM = p(x) \times q(x)$$

Linear Equations and Inequalities

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

Quadratic Equations

$$ax^2 + bx + c = 0, \ a \neq 0$$
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$\text{Disc} = b^2 - 4ac$$

Introduction to Coordinate Geometry

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Introduction to Trigonometry

$$1^\circ = \frac{\pi}{180} \text{ rad}, \ 1 \text{ rad} = \left(\frac{180}{\pi}\right)^\circ$$
$$A = \frac{1}{2}r^2\theta$$
$$\sin^2\theta + \cos^2\theta = 1$$

$$l = r\theta$$
$$1 + \tan^2\theta = \sec^2\theta$$
$$1 + \cot^2\theta = \text{cosec}^2\theta$$

Algebraic Formulae

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

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

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

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

Q.1. (Total 3 Marks)

At a camping point, 126 tourists visited in a day. Their age groups were recorded in the given table.

Age Groups	Number of Tourists (f)		
16 - 20	10		
21 - 25	25		
26 - 30	30		
31 - 35	15		
36 - 40	20		
41 - 45	14		
46 - 50	12		
Total			

Label the given columns and complete the given table. Also, find the arithmetic mean for the given data.

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

Q.2. (Total 4 Marks)

a. The HCF and LCM of two polynomials is $x-5$ and $(x-5)(x+5)(x-1)$ respectively. If one of the polynomials is $x^2 - 6x + 5,$ then find the other polynomial.

b. Resolve the fraction $\dfrac{x}{(x-1)(x+1)}$ into partial fractions.

(ATTEMPT EITHER PART a OR PART b OF Q.3.)

Q.3.   (Total 3 Marks)

a.   Solve the equation $\dfrac{|x-1|}{2} = 1$.

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b.   Solve the inequality $\dfrac{x+2}{3} \geq 1$ and show the solution on the given number line.

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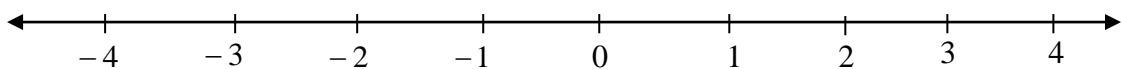
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Q.4. (Total 3 Marks)

i.   Fill the following table for the equation $y = \dfrac{6 - 3x}{2}$. (2 Marks)

x		4
y	3	

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ii.   Draw graph of the given equation using the values from the table in part (i). (1 Mark)
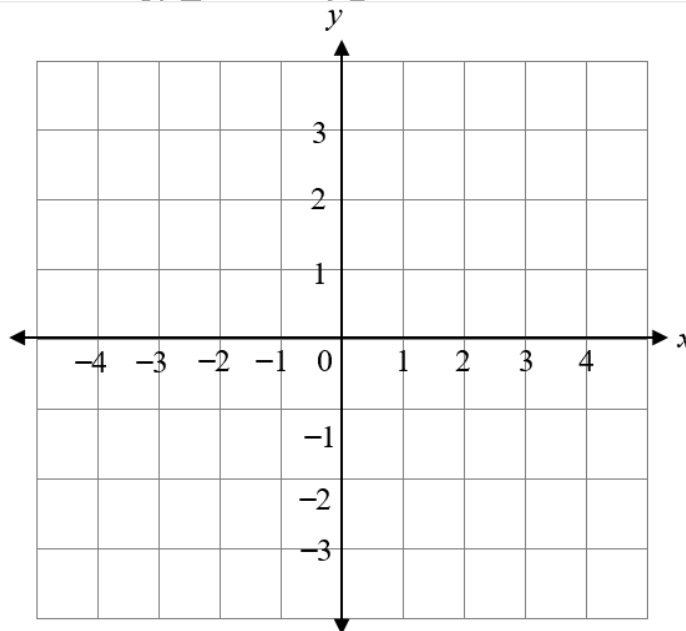
Q.5. (Total 3 Marks)

A quadratic equation is given as $(3x-2)(2x+3)=7$.

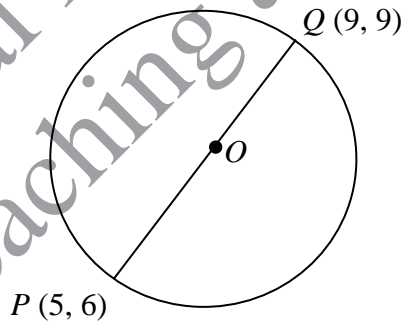i. Convert the equation in the form $ax^2 + bx + c = 0$. (1 Mark)

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ii. Find the solution of the equation obtained in part (i). (2 Marks)

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Q.6. (Total 3 Marks)

In the diagram, a circle with centre O is given. The end points of the diameter of the circle are P (5, 6) and Q (9, 9).
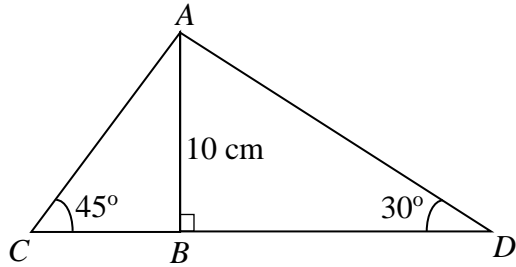
Q (9, 9)

NOT TO SCALE

O

P (5, 6)

Find the coordinates of the point O and the radius of the circle.

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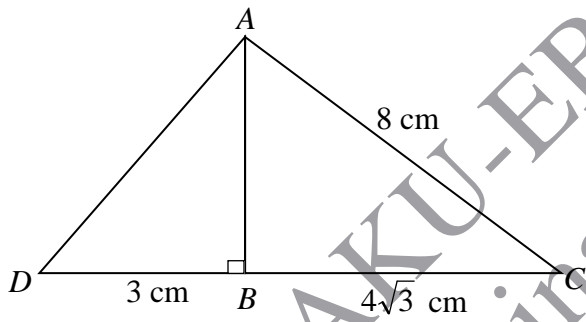
(ATTEMPT EITHER PART a OR PART b OF Q.7.)

Q.7. (Total 4 Marks)

a. In the given diagram, find the length of *CD*.

NOT TO SCALE

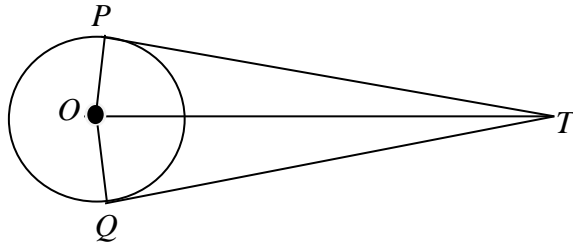b. In the given diagram, find the length of *AD*.

NOT TO SCALE

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

Q.8.   (Total 4 Marks)

a.   In the given diagram, *O* is the centre of the circle and *PT* and *QT* are the two tangents drawn to the
       circle.

NOT TO SCALE

       Find the value of

       i. $\angle OPT + \angle OQT$.   (2 Marks)

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       ii.   *PT*, if *OP* = 3 units and *OT* = 12 units.   (2 Marks)

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

Q.8.   (Total 4 Marks)

b.   In the given diagram, O is the centre of the circle.

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NOT TO SCALE

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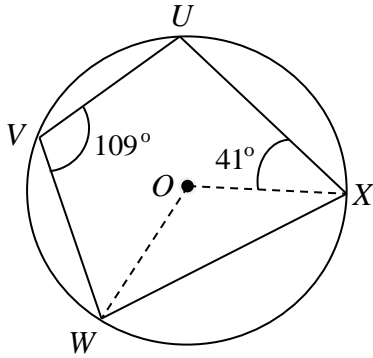
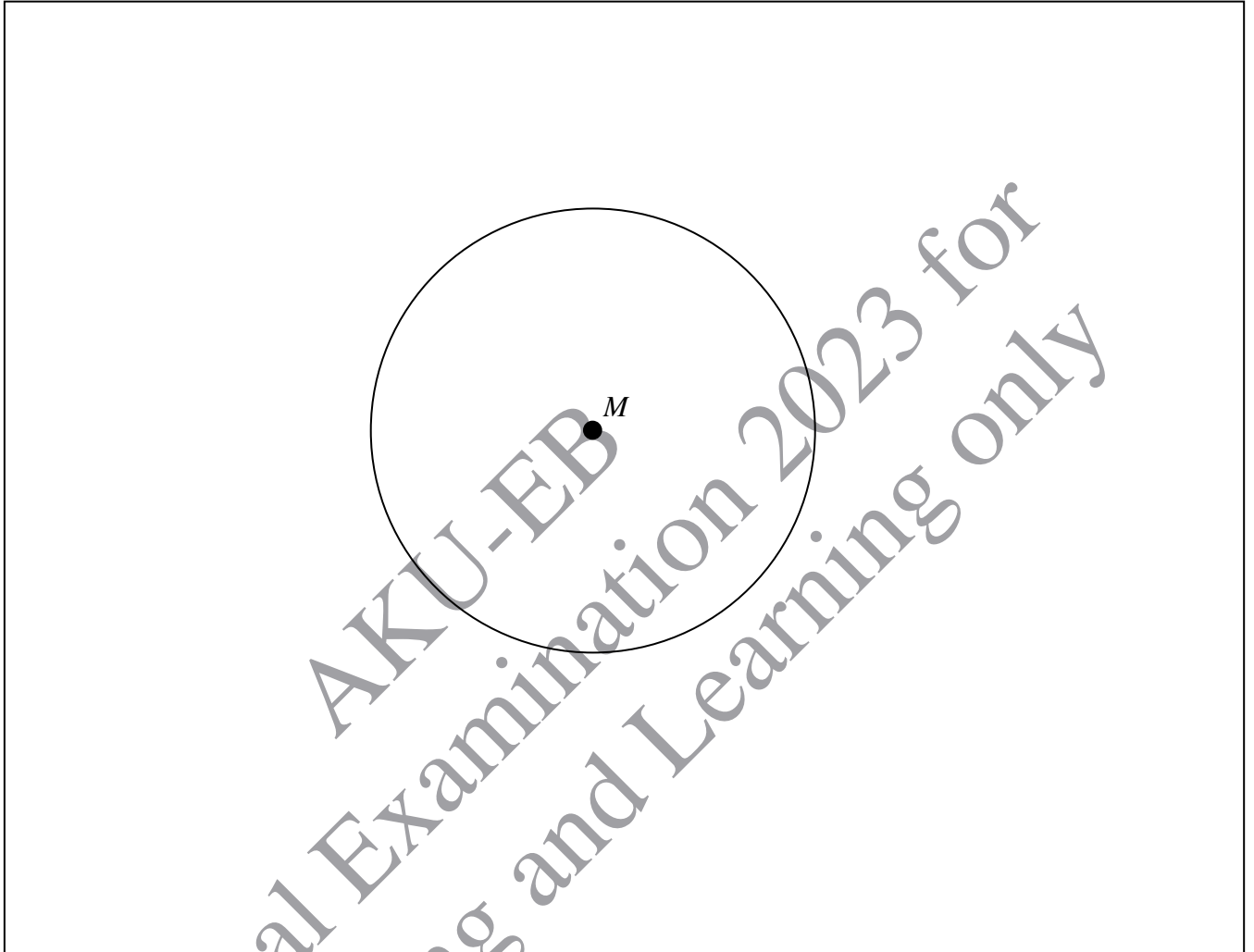If $\angle UVW = 109^\circ$ and $\angle UXO = 41^\circ$, then find the value of

i. $\angle OXW$.   (3 Marks)

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ii. $\angle OXW + \angle OWX$.   (1 Mark)

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Q.9.   (Total 3 Marks)

In the given diagram, draw a circumscribed square around the given circle.

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