

AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X EXAMINATION

APRIL/ MAY 2019

Mathematics Paper II

Time: 2 hours 15 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**

RUBRIC

2. 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 5 Marks)

a. Simplify $(a^3x^2 - 2a^2xb + ab^2) \div (a^3x^2 - ab^2)$ to express as $\frac{ax-b}{ax+b}$.

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

- b. Complete the solution of the square root of an algebraic expression by filling the space provided. Hence, verify your answer.

.....	$36x^4 - \dots x^3 + \dots x^2 - 16x + \dots$
.....	
$12x^2 - \dots x$	$- 96x^3 + \dots x^2$
$- \dots x$	$\mp 96x^3 \pm \dots x^2$
$12x^2 - 16x + 1$	$\times \quad 12x^2 - \dots x + \dots$
	$\dots x^2 - 16x + \dots$

Q.2.

(Total 3 Marks)

If $\frac{8x - 17}{x(2x + 1)} = \frac{A}{x} + \frac{B}{2x + 1}$, then find the value of B .

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

Q.3.

(Total 5 Marks)

a. It is given that $k - k^2\sqrt{x+1} = k\sqrt{x+1}$, where $k > 0$.

i. Show, by working, that the above equation reduces to $x+1=\left(\frac{1}{k+1}\right)^2$ (4 Marks)

ii. Hence, find the value of x when $k = 1$. (1 Mark)

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

- b. It is given that $\left| x - \frac{3}{a} \right| + 5 > 5$, $a = \frac{1}{3}$ and x is an integer. (5 Marks)

Find the value of x which does NOT satisfy the given inequality.

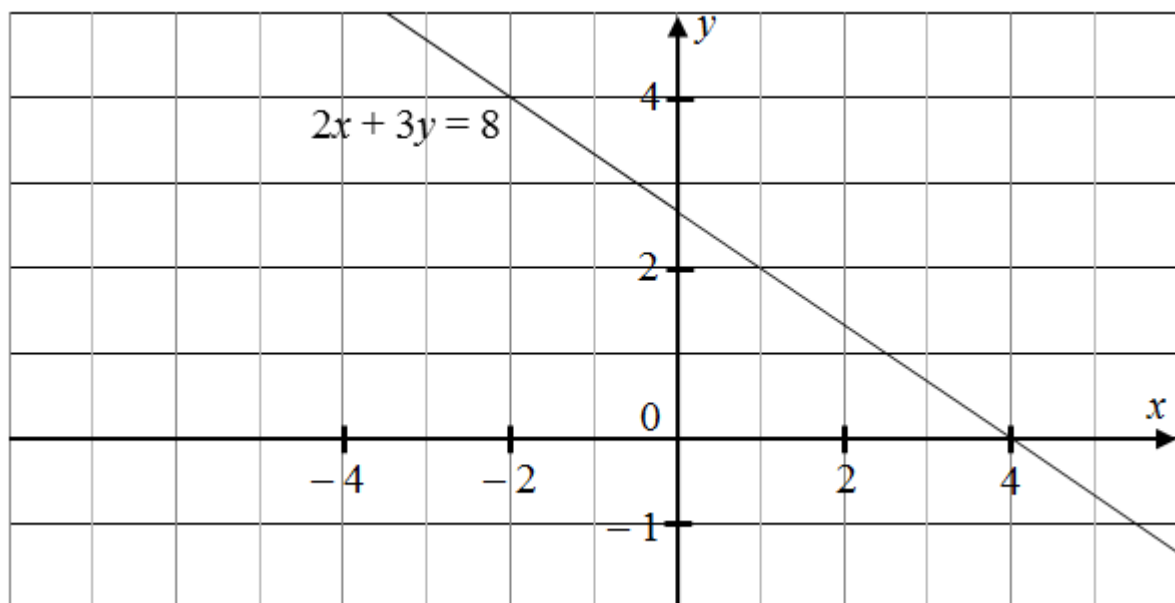
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Q.4.

(Total 4 Marks)

Given that $\left\{\left(1, \frac{a}{2}\right)\right\}$ is the solution set of simultaneous linear equations $x + y = 3$ and $2x + 3y = 8$.

- Line $2x + 3y = 8$ is shown in the given graph. On the same graph, draw another line $x + y = 3$ by taking two points only. (2 Marks)
- From the graph, find the solution set. (1 Mark)
- Hence, find the value of a . (1 Mark)



Q.5.

(Total 4 Marks)

Find the solution set of $3x^2 - 4x + 2 = 0$ by using quadratic formula.

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

Q.6.

(Total 3 Marks)

- a. For the given points M, P and N whose coordinates are $(1,1), (0,1)$ and $(-1,1)$ respectively, find the value of k such that $MN:MP = k:1$.
- b. The midpoint of $P_1(x, -3)$ and $P_2(y, 7)$ is (a, b) . Show that $a - b = \frac{1}{2}(x + y - 4)$.

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

Q.7. (Total 4 Marks)

a. A man stands on a flat surface at a distance of 50 metres from a vertical electric pole, x meter high. The angle of elevation of the top of electric pole from the man on flat surface is θ .

i. Use the given condition to show that $\theta = \tan^{-1}\left(\frac{x}{50}\right)$ (1 Mark)

ii. Hence, find the height of electric pole when the angle of elevation is 45° . (2 Marks)

iii. After some time, the man moves y metres back from his original position. Express in terms of x and y , the angle of elevation of the top of electric pole from the new position of man. (1 Mark)

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

b.

- i. Define the term radian. (1 Mark)

- ii. Derive $l = r\theta$, where r is the radius of the circle, l is the length of circular arc and θ is the central angle measured in radians. (2 Marks)

- iii. Hence, find θ when $l = \frac{1}{2}r$. (1 Mark)

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(Total 4 Marks)

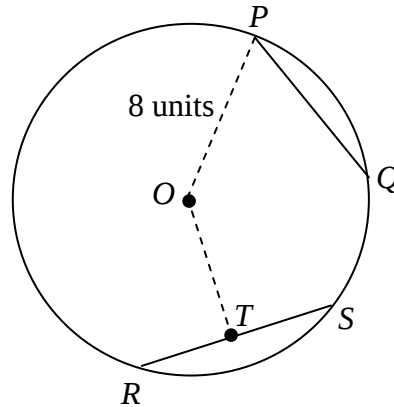
- (**Note:** a and b are positive integers.)

- Show that the third side R is constant.

Q.9.

(Total 4 Marks)

The given circle having centre O has a radius of 8 units. Two equal chords PQ and RS are of length l units respectively.



NOT TO SCALE

- a. State, in terms of l , the length of TS . (1 Mark)

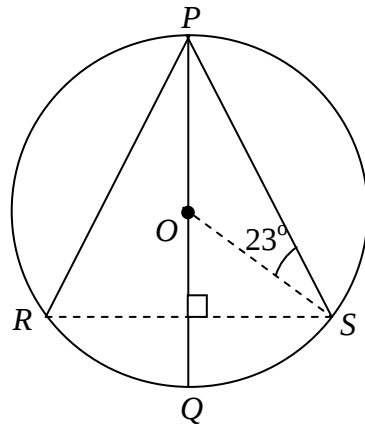
- b. Hence, find the value of l when $OT = 5$ units. (3 Marks)

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Q.10.

(Total 4 Marks)

In the diagram, O is the centre of the circle and it is given that $\angle OSP = 23^\circ$ and $PS = PR$.



NOT TO SCALE

a. State the value of $\angle OPS$.

(1 Mark)

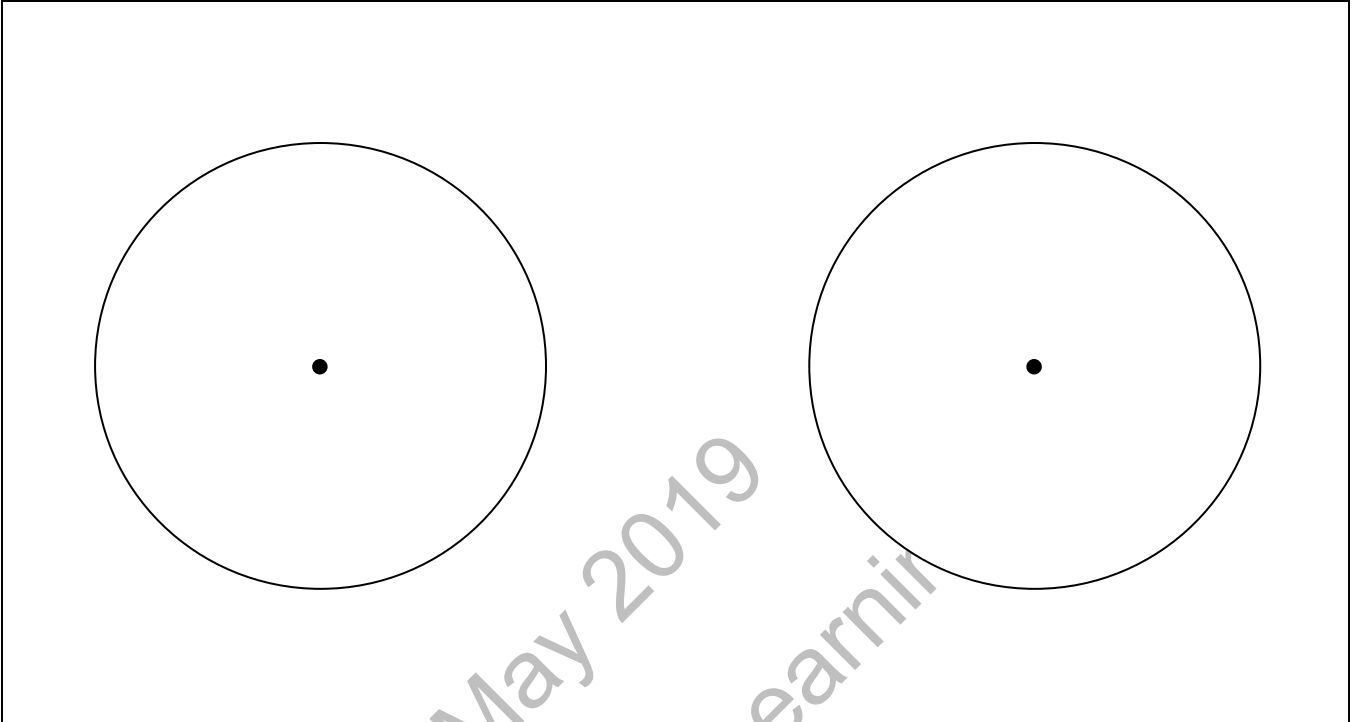
b. Find the value of $\angle SOR$. Show all the necessary working with a valid reason.

(3 Marks)

Q.11.

(Total 5 Marks)

Two circles of same radii with their centres are shown in the given diagram. Draw direct common tangents to the given circles. Show all the necessary steps.



END OF PAPER

Please use this page for rough work

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