آغا خان یونیورسٹی ایگزامینیشن بورڈ

AGA KHAN UNIVERSITY EXAMINATION BOARD

Pacing Guide for Teachers

Mathematics

Grade XI

Number of weeks: 28

Number of periods per week: 6

Key Textbook: Mathematics for Grade 11, Punjab Textbook Board

Teacher Developer(s): Muhammad Nasir Humayun and Uroosa Manzar

Institution(s): Aga Khan Higher Secondary School, Karachi and

Bai Virbaiji Soparivala Parsi High School, Karachi

Topic — Total Periods

1. Complex Number — 10

Sub-Topic	Range of SLOs	Periods (40 mins)
1.1 Complex Number	1.1.1-1.1.6	2
1.2 Properties of Complex Numbers	1.2.1-1.2.5	4
1.3 Solution of Equation	1.3.1-1.3.3	4

Learning Resource

- Pure mathematics: Complex numbers, Volume 3 By Anthony Nicolaides

Suggested Activities and/or Formative Assessment

Activity 1

Brain Storming Quiz

A popup quiz can be conducted to evaluate background knowledge of students regarding complex numbers.

Activity 2

Assessment based Worksheets

Through assessment-based worksheets, learners can be able to answer the essential questions and use different strategies to solve the questions.

Further Resources

For additional resources related to formative assessments, please refer to **Learn Smart Classroom by Knowledge Platform:**

https://akueb.knowledgeplatform.com/login

Topic	Total Periods
2. Matrices and Determinants	14

Sub-Topic	Range of SLOs	Periods (40 mins)
2.1 Matrices	2.1.1-2.1.3	2
2.2 Algebra of Matrices	2.2.1-2.2.4	3
2.3 Determinants and Inverse Matrices	2.3.1-2.3.7	3
2.4 Properties of Determinants	2.4.1-2.4.2	3
2.5 System of Linear Equation	2.5.1-2.5.3	3

Suggested Activities and/or Formative Assessment

Activity 1

Students can explore rows and columns by their physical appearance in the classroom.

Activity 2

Pop up Quiz

A simple quiz at the end of the topic that easily assesses the performance of students and struggling areas of the related topic.

Further Resources

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Topic	Total Periods
3. Sequence and Series	23

Sub-Topic	Range of SLOs	Periods (40 mins)
3.1 Sequence (Progression)	3.1.1-3.1.3	1
3.2 Arithmetic Sequence	3.2.1-3.2.3	3
3.3 Arithmetic Mean	3.3.1-3.3.2	1
3.4 Arithmetic Series	3.4.1-3.4.3	3
3.5 Geometric Sequence	3.5.1-3.5.3	3
33.6 Geometric Mean	3.6.1-3.6.2	3
3.7 Geometric Series	3.7.1-3.7.5	4
3.8 Harmonic Sequence	3.8.1-3.8.3	2
3.9 Harmonic Mean	3.9.1-3.9.3	3

Suggested Activities and/or Formative Assessment

Activity 1

Card Sorting and Matching

Picture of pattern, different mathematical IQ pattern, Table formation

Activity 2

Peer Correction

Students will do a small test after completion of concept then do peer correction and analyse the mistakes of conceptual understanding.

Further Resources

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Topic	Total Periods
4. Miscellaneous Series	3

Sub-Topic	Range of SLOs	Periods (40 mins)
4.1 Evaluation of $\sum n, \sum n^2, \sum n^3$	4.1.1-4.1.3	3

Further Resources

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Topic	Total Periods
5. Permutation, Combination and Probability	16

Sub-Topic	Range of SLOs	Periods (40 mins)
5.1 Factorial of a Natural Number	5.1.1	2
5.2 Counting Techniques (Fundamental Principle of Counting, Permutation and Combination)	5.2.1-5.2.8	8
5.3 Probability	5.3.1-5.3.10	6

Learning Resource

- Schaum's Outline of College Algebra, Third Edition by Murray Spiegel

Suggested Activities and/or Formative Assessment

Activity 1

Physical Activity

Involve students in classroom by doing Chair activity, Games activity (balls, coins), play cards, Tree card activity through matchstick and coins.

Activity 2

Project Based Learning

Students will do a project on the real-life application of this topic. They will share their individual ideas, do group work, generating hypothesis and plan and explore any one application of this topic.

Further Resources

For additional resources related to teaching, learning and formative assessments, please refer to **Learn Smart Classroom by Knowledge Platform:**

https://akueb.knowledgeplatform.com/login

Topic	Total Periods
6. Mathematical Induction and Binomial Theorem	22

Sub-Topic	Range of SLOs	Periods (40 mins)
6.1 Mathematical Induction	6.1.1-6.1.2	4
6.2 Binomial Theorem	6.2.1-6.2.4	8
6.3 Binomial Series	6.3.1-6.3.4	10

Learning Resource

- Additional mathematics by Cheah Tat Huat, Tan Beng Theam, Khor Gark Kim, Leong Wei Ching

Suggested Activities and/or Formative Assessment

Activity 1

Ask higher order questions and give challenging questions to assess conceptual understanding of students in this topic.

Further Resources

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Topic	Total Periods
7. Quadratic Equations	32

Sub-Topic	Range of SLOs	Periods (40 mins)
7.1 Solution of Quadratic Equation	7.1.1-7.1.2	2
7.2 Solution of Equation Reducible to Quadratic Equation in one Variable	7.2.1	8
7.3 Nature of the Roots of Quadratic Equation	7.3.1-7.3.2	3
7.4 Cube and Fourth Roots of Unity and Their Properties	7.4.1-7.4.6	3
7.5 Roots and Coefficient of a Quadratic Equation	7.5.1-7.5.4	4
7.6 Formation of Quadratic Equation	7.6.1-7.6.3	4
7.7 Synthetic Division	7.7.1-7.7.2	3
7.8 Simultaneous Equations	7.8.1	3
7.9 Application of Quadratic Equations	7.9.1	2

Learning Resource

- Higher GCSE Mathematics for EDEXCEL by Alan Smith
- Additional mathematics by Cheah Tat Huat, Tan Beng Theam, Khor Gark Kim, Leong Wei Ching

Suggested Activities and/or Formative Assessment

Activity 1

Assessment through Collaboration

Activity worksheets can be given to students to match equations with its components. Students can then be divided into two groups and after mutual discussion they make a board of correct equations. The teacher can then assess these equations.

Further Resources

For additional resources related to formative assessments, please refer to **Learn Smart Classroom by Knowledge Platform:**

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Topic	Total Periods
8. Introduction to Trigonometry and Trigonometric Identities	18

Sub-Topic	Range of SLOs	Periods (40 mins)
8.1 Trigonometric Ratios	8.1.1-8.1.3	2
8.2 Trigonometric Identities	8.2.1-8.2.2	2
8.3 Fundamental Law of Trigonometry	8.3.1-8.3.4	4
8.4 Trigonometric Ratios Allied Angle	8.4.1-8.4.3	4
8.5 Double, Half and Triple Angle Identities	8.5.1-8.5.2	3
8.6 Sum, Difference and Product of Sine and Cosine	8.6.1-8.6.2	3

Learning Resource

- Additional mathematics by Cheah Tat Huat, Tan Beng Theam, Khor Gark Kim, Leong Wei Ching

Web Resource

https://youtu.be/mhd9FXYdf4s

Suggested Activities and/or Formative Assessment

Activity 1

Puzzle

Teacher can prepare Trigonometric Ratios puzzle for the students. Students can complete the puzzle and connect the series of ratios.

Further Resources

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Topic	Total Periods
9. Application of Trigonometry	10

Sub-Topic	Range of SLOs	Periods (40 mins)
9.1 Solution of Triangles	9.1.1-9.1.5	5
9.2 Area of Triangles	9.2.1-9.2.2	2
9.3 Circles Connected with Triangle	9.3.1-9.3.4	3

Learning Resource

- Higher GCSE Mathematics for EDEXCEL by Alan Smith

Further Resources

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Topic	Total Periods
10. Graph of Trigonometric Functions, Inverse Trigonometric Functions and Solution of Trigonometric Equation	14

Sub-Topic	Range of SLOs	Periods (40 mins)
10.1 Period of Trigonometric Functions	10.1.1-10.1.5	2
10.2 Graph of Trigonometric Functions	10.2.1-10.2.8	5
10.3 Inverse Trigonometric Functions	10.3.1-10.3.5	3
10.4 Solution of General Trigonometric Equations	10.4.1-10.4.3	4

Learning Resource

- Calculus & Its Applications by Larry Goldstein, David Lay, David Schneider and Nakhle Asmar

Suggested Activities and/or Formative Assessment

Activity 1

Use Digital Apps

Use GeoGebra to explore concepts of Trigonometry. It is handy to explore the concept and students will understand it easily through this application.

Further Resources

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Note: This teacher-led pacing guide has been developed for AKU-EB affiliated schools to facilitate them by

- ensuring smooth transition of a school's academic year.
- ensuring curricular continuity in schools.
- predicting the time and pace of syllabi implementation.

This document also contains **suggested activities and/or formative assessments** that may enhance the learning experience. Please note that these activities are meant to serve as suggestions. As educators, you have the flexibility and autonomy to adapt and modify them to best suit the needs of your students and the dynamics of your classroom.

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