



ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Secondary School Certificate (SSC)

Examination Syllabus

General Mathematics IX

**Based on Provincial Revised
Curriculum
(Sindh)**



PREFACE

The Ziauddin University Examination Board (ZUEB) was established under **Sindh ACT XLI 2018**, with the primary objective of enhancing the quality of education in Sindh. ZUEB is responsible for administering examinations for the **Secondary School Certificate (SSC)** and **Higher Secondary School Certificate (HSSC)** in alignment with the most recent revisions to the **National Curriculum**, as outlined by the **Directorate of Curriculum Assessment and Research (DCAR), Sindh**. Through its ordinance, ZUEB is mandated to provide examination services for both English, Urdu, and Sindhi medium candidates from private schools across Sindh. This examination syllabus reflects ZUEB's dedication to achieving the educational goals set by the provincial authorities.

In collaboration with subject professors, ZUEB has developed a comprehensive syllabus for each subject. It is important to distinguish between the syllabus and the curriculum. The syllabus serves as a guide for both teachers and students, outlining the key areas of focus within the subject. It provides students with a clear understanding of what is expected of them in their studies and helps them prepare effectively for their exams. This examination syllabus incorporates all cognitive outcomes derived from the **Provincial Curriculum Statement**, ensuring that assessments are both valid and reliable. While the focus is primarily on the cognitive domain, significant emphasis is placed on the application of knowledge and understanding.

The syllabus is made available to all stakeholders via the ZUEB website to assist affiliated schools in planning their teaching. It is crucial to note that the syllabus, rather than the prescribed textbook, forms the foundation of ZUEB examinations. Additionally, this syllabus supports the development of learning materials for both students and teachers. ZUEB remains committed to supporting students undertaking the SSC and HSSC courses by facilitating their learning outcomes through this detailed syllabus document.

To further assist in the learning process, ZUEB provides a dedicated **e-resource tab** on its website, offering both text-based and video content on various subjects. These 15–20-minute instructional videos, created around key subject concepts, allow students to learn at their own pace and convenience. The videos can be used as a reinforcement tool to revisit lessons already taught or as pre-lesson material. This initiative is an ongoing effort, and new videos will continue to be uploaded.

We encourage all students and educators to make the most of these resources for a more enriched and flexible learning experience.

Sincerely,

Saleem Ahmed

Manager Social Sciences

Ziauddin University Examination Board

INTRODUCTION

Mathematics has been a cornerstone of human knowledge since ancient times, with civilizations such as the Egyptians, Babylonians, and Greeks recognizing its significance in solving real-world problems. The ancient Egyptians, for instance, used mathematical concepts to construct monumental pyramids, while the Babylonians developed sophisticated mathematical systems to track celestial bodies. The study of mathematics has continued to evolve over the centuries, and its importance in modern times cannot be overstated. As Galileo Galilei aptly put it, "Mathematics is the language with which God has written the universe."

In today's rapidly changing world, mathematics education is more crucial than ever. It equips students with the skills to analyze complex problems, think critically, and make informed decisions. Mathematics teaching can develop a range of skills in students, including problem-solving, logical reasoning, and analytical thinking. By mastering mathematical concepts, students can cultivate a deeper understanding of the world around them and develop a sense of curiosity and wonder. As Albert Einstein noted, "Pure mathematics is, in its way, the poetry of logical ideas."

In the Pakistani context, mathematics education literacy is essential for the country's economic and technological development. With a growing population and increasing global competition, Pakistan needs a mathematically literate workforce to drive innovation and growth. Mathematics education can support learning in other subjects, such as science, technology, and engineering, by providing a foundation for understanding complex concepts and phenomena. Moreover, mathematical thinking can be applied to a wide range of real-life situations, from personal finance to environmental sustainability. As Lynn Arthur Steen observed, "Mathematics is not just a subject, but a way of thinking about the world."

The study of mathematics has far-reaching implications for real life, enabling individuals to navigate complex systems, evaluate evidence, and make informed decisions. By incorporating mathematics education into the curriculum, we empower students to become critical thinkers, problem-solvers, and innovators who can contribute to Pakistan's development and progress. Through mathematics education, students can develop a deeper understanding of the world and their place in it, enabling them to make a positive impact in their communities and beyond.

STANDARDS for GENERAL MATHEMATICS GRADE IX

Following standards have been framed for Grade IX General Mathematics Education. These standards are followed by bench marks. These bench marks further divided into student learning outcomes for each learning area.

These are the details of each standard:

Standard 1: Percentage, Ration and Proportions

Students will be able to demonstrate a thorough understanding of percentage, ratio, and proportion by accurately applying concepts, converting between different forms, and solving real-life problems involving these topics with precision and mathematical reasoning.

Standard 2: Zakat, Ushr and Inheritance

Students will be able to consistently demonstrate proficiency in calculating Zakat, Ushr, and solving inheritance problems, showcasing a deep understanding of Islamic financial principles and their application.

Standard 3: Profit and Loss, Discount and Business Partnership

Students will be able to efficiently apply mathematical concepts to determine profit/loss, and discount in a purchasing or selling deal, and fairly distribute profits and losses among business partners in a business partnership.

Standard 4: Financial Mathematics

The students will be able to demonstrate proficiency in applying financial mathematics concepts to solve problems related to commercial banking, currency exchange, profit and mark-up calculations, insurance, leasing, and financing.

Standard 5: Consumer Mathematics

Students will be able to showcasing a practical understanding of consumer mathematics in real-life scenarios such as in calculating various taxes, amount of utility bills, and personal income.

Standard 6: Exponents and Logarithm

Students should be able in manipulating and simplifying radical expressions, applying the laws of exponents to solve problems, and expressing very large or small numbers in scientific notation. Additionally, the student should be able to understand the concept of logarithms, apply logarithmic properties to solve problems, and use logarithms to model and analyze real-world phenomena.

Standard 7: Arithmetic and Geometric Sequence

Students will be able to develop a deep understanding of sequences, including arithmetic and geometric sequences, and apply these concepts to solve mathematical and real-world problems. They should be able to identify, extend patterns, calculate specific terms, and find sums of sequences. Additionally, students will be able to calculate arithmetic and geometric means, and apply these concepts to analyze and solve problems in a variety of contexts.

Standard 8: Sets and Functions

Students should be able to demonstrate a thorough understanding of set theory and functions by accurately performing operations on sets, applying properties of union and intersection, and using Venn diagrams to visualize set relationships. They should be able to identify and describe binary relations and functions, determining domain, range, and co-domain, and apply these concepts to solve problems in various contexts.

Standard 9: Linear Graphs

Students will be able to develop a deep understanding of the cartesian plane, linear graphs, and conversion graphs by accurately plotting points, graphing linear equations, and interpreting graphical representations. They should be able to analyze and interpret linear relationships, identify key features of graphs, and apply conversion graphs to solve real-world problems.

Standard 10: Basic Statistics

Students will be able to demonstrate mastery of statistical concepts by accurately constructing and interpreting frequency distributions, cumulative frequency tables, and graphical representations. They should be able to calculate and apply measures of central tendency, such as mean, median, and mode, and measures of dispersion, such as range, variance, and standard deviation, to analyze and describe datasets.

Key

K = Knowledge

U = Understanding

A = Application and other higher order cognitive skills

CRQs = Constructed Response Questions

ERQs = Extended Response Questions

CA = Classroom Activity

ECA = Extended Classroom Activity

(ECAs are not to be assessed under examination condition)

Syllabus General Mathematics IX

Topics & Sub-topics	Student Learning Outcome	Cognitive Level ¹		
A: Percentage, Ratio, and Proportion	Student will be able to:	K	U	A
Percentage	A-1 Explain the concept of percentage A-2 Convert percentage to a fraction and vice versa A-3 Convert percentage to a decimal and vice versa A-4 Calculate quantities when percentage is given A-5 Solve real-life problems involving percentage		*	* * * *
Ratio	A-6 Explain the concept of ratio A-7 Solve real-life problems involving ratio		*	*
Proportions	A-8 Explain the concept of proportion A-9 Differentiate among direct, inverse and compound proportions A-10 Solve problems involving direct, inverse, and compound proportion		*	* *
Topics & Sub-topics	Student Learning Outcome	Cognitive Level		
B: Zakat, Ushr and Inheritance	Student will be able to:	K	U	A
Zakat	B-1 Define the concept of Zakat, rate of zakat and nisab of zakat B-2 Calculate the amount of zakat	*		*
Ushr	B-3 Define the concept of Ushr and nisab of ushr B-4 Calculate the amount of Ushr	*		*
Inheritance	B-5 Define the concept of Inheritance B-6 Calculate the amount of the share of each legal inheritor	*		*
Topics & Sub-topics	Student Learning Outcome	Cognitive Level		
C: Business Mathematics	Student will be able to:	K	U	A
Profit and Loss	C-1 Explain the concept of profit and loss C-2 Define the terms: cost price, selling price, Profit and Loss C-3 Explain Profit ($SP > CP$) and Loss ($SP < CP$) C-4 Calculate profit or loss	*	* *	 *

Discount	C-5 -Solve real-life problems involving profit and loss	*		*
Business Partnership	C-6 Define the term discount C-7 Solve real-life problems involving discount C-8 Describe the concept of business partnership C-9 Distribute the profit/loss among the partners		*	* *
Topics & Sub-topics	Student Learning Outcome	Cognitive Level²		
D: Financial Mathematics	Student will be able to:	K	U	A
Commercial Banking	D-1 Describe the concept of commercial bank deposits D-2 Differentiate among different types of bank accounts (PLS saving bank account, current deposit account, PLS term deposit account, and foreign currency account) D-3 Explain the concept of negotiable instruments like cheques, demand draft, and pay order D-4 Explain the concept of online banking, transactions through ATM, Debit, and Credit cards		* * *	*
Exchange of Currencies	D-5 Describe the concept of Exchange of Currencies D-6 Convert the value of a given amount of the currency of one country in terms of another currency		*	*
Profit/Mark-up	D-7 Explain the concept of Profit/Markup, the principal amount, the profit/markup rate, the period D-8 Calculate the profit/markup, the principal amount, the profit/markup rate, the period D-9 Solve problems related to commercial banking and national saving schemes		*	* *
Insurance	D-10 Define insurance in its simple terms D-11 Describe life insurance and vehicle insurance D-12 Solve simple real life problems regarding purchase of life and motor vehicle insurance	*	*	*
Leasing and Financing	D-13 Describe leasing/financing of motor vehicle, down payment, motor vehicle insurance, processing charges, payments in monthly installments. D-14 Solve problems related to leasing/financing of motor vehicle under the different conditions		*	*
Topics & Sub-topics	Student Learning Outcome	Cognitive Level		
E: Consumer Mathematics	Student will be able to:	K	U	A
Taxes	E-1 Define direct and indirect taxes	*		

Utility Bill	E-2 Explain the terms in simple words: sales tax, excise duty, property tax, income tax		*	
	E-3 Calculate the amount of sales tax, levied on various commodities			*
Personal Income	E-4 Calculate the amount of excise duty, levied on various commodities			*
	E-4 Calculate the amount of property tax, imposed on property			*
	E-5 Calculate the amount of income tax, imposed on an individual with fixed income			*
	E-6 Calculate the amount of bill for electricity, gas and telephone			*
	E-7 Calculate personal income: weekly, monthly and yearly			*
	E-8 Calculate the income of a worker who is paid on daily basis			*
	E-9 Calculate the income of a worker who is paid overtime on hourly basis in addition to his daily wage			*
	E-10 Calculate the income of a salesman who is paid for overtime on hourly basis and commission on different sales in addition to his regular pay			*
	E-11 Calculate the gross income of a salaried person who is paid on the basis of government pay scales or otherwise			*
	E-12 Calculate net income taking into account assorted deductions (income tax etc.)			*
Topics & Sub-topics	Student Learning Outcome	Cognitive Level ³		
F: Exponents and Logarithm	Student will be able to:	K	U	A
Radicals and Radicands	F-1 Identify radicals and radicands	*		
Laws of Exponents/Indices	F-2 Distinguish between the radical form and exponential form of an expression			*
	F-3 Convert an expression given in radical form to an exponential form or vice versa			*
	F-4 Identify base and exponent		*	
	F-5 Apply the law of exponents to simplify expressions with real exponents			*
Scientific Notation	F-6 Convert a number in an ordinary form (common form) to scientific notation or vice versa			*

Logarithm	F-7 Describe the concept of Logarithm and exponential form and relationship with each other F-8 Convert logarithmic form to exponential form or vice versa F-9 Define a common logarithm, characteristic, and mantissa of a log number F-10 Find the log of a number by using a table F-11 Find the antilog of a number by using the antilog table	*	*	*
Laws of Logarithm	F-12 Prove the laws of logarithm: $\log_a (mn) = \log_a m + \log_a n$ $\log_a \frac{m}{n} = \log_a m - \log_a n$ $\log_a m^n = n \log_a m$			*
Application of Logarithm	F-13 Apply logarithm laws to solve related problems			*
Topics & Sub-topics	Student Learning Outcome	Cognitive Level⁴		
G: Arithmetic and Geometric Sequence	Student will be able to:	K	U	A
Sequence	G-1 Define a sequence (progression) and its terms	*		
Arithmetic Sequence	G-2 Identify arithmetic sequence G-4 Find the nth or general term of an arithmetic sequence G-5 Solve problems involving arithmetic sequence		*	* *
Arithmetic Mean	G-6 Identify the arithmetic mean between two numbers G-7 Insert n arithmetic mean between two numbers		*	* *
Geometric Sequence	G-8 Identify a geometric sequence G-9 Find the nth or the general term of a geometric sequence G-10 Solve problems involving geometric sequence		*	* *
Geometric Mean	G-11 Identify the geometric mean between two numbers G-12 Insert n geometric means between two numbers		*	*
Topics & Sub-topics	Student Learning Outcome	Cognitive Level⁵		
H: Sets and Functions	Student will be able to:	K	U	A
Operation on Sets	H-1 Identify operations on set (U, \cap , \cup or /) H-2 Apply the operations on sets: union, intersection,		*	*

Properties of Union and Intersection	difference, and complement			
	H-3 Verify the fundamental properties of union and intersection of two or three given sets: Commutative Property of Union and Intersection. Associative Property of Union and Intersection			*
	Venn Diagram			
	H-4 Draw a Venn Diagram to represent the union and Intersection of sets, the Complement of a set H-5 Draw a Venn Diagram to verify: Commutative Laws for Union and Intersection of sets, Associative Laws for Union and Intersection of Sets H-6 Prove De-Morgan's Laws			*
Binary Relation	H-7 Describe the Binary Relation H-8 Find the domain and range of binary relation H-9 Define functions and identify their Domain and Range	*	*	*
	Function			*
Topics & Sub-topics		Student Learning Outcome		Cognitive Level
I: Linear Graphs		Student will be able to:		K U A
Cartesian Plane and Linear Graphs	I-1 Identify pair of real numbers as an ordered pair		*	
	I-2 Recognize an ordered pair through different examples		*	
	I-3 Describe rectangular or cartesian plane consisting of two number lines intersecting at right angles at the point 'o'		*	
	I-4 Identify origin (o) and coordinate axes in the rectangular plane		*	
	I-5 Locate an ordered pair (a, b) as a point in the rectangular plane		*	
	I-6 Recognize 'a' as the x-coordinate (or abscissa) and 'b' as the y-coordinate (or ordinate)		*	
	I-7 Draw different geometrical shapes (e.g. line segment, triangle and rectangle, etc.) by joining a set of given points.			*
	I-8 Construct a table for a pair of values satisfying a linear equation in two variables.			*
	I-9 Plot the pair of points to obtain the graph of a given expression.			*
	I-10 Chose an appropriate scale to draw a graph of: an			*

Conversion Graphs	equation of the form $y=c$, an equation of the form $x=a$, an equation of the form $y=mx$, an equation of the form $y=mx + c$			
	I-11 Draw a graph from a given table of (discrete) values		*	*
	I-12 Identify through graph the domain and range of a function.			
	I-13 Interpret conversion graph as a linear graph relating to two quantities which are in direct proportion			*
	I-14 Read a given graph to know one quantity corresponding to another		*	
	I-15 Read the graph for conversions of the form: miles and kilometers, acres and hectares, degrees Celsius and degrees Fahrenheit, Pakistani currency and another currency, etc.		*	
Topics & Sub-topics	Student Learning Outcome	Cognitive level ⁶		
J: Basic Statistics	Student will be able to:	K	U	A
Frequency Distribution	J-1 Construct a grouped frequency table			*
	J-2 Construct histograms with equal and unequal class intervals			*
	J-3 Construct a frequency polygon			*
Cumulative Frequency	J-4 Construct a cumulative frequency table			*
	J-5 Construct a cumulative frequency polygon			*
Measures of Central Tendency	J-6 Calculate (for ungrouped and grouped data) Arithmetic Mean by definition and using deviations from assumed means			*
	J-7 Recognize properties of arithmetic mean		*	
	J-8 Calculate weighted mean and moving averages			*
	J-9 Estimate median, quartiles, and mode graphically		*	
Measures of Dispersion	J-10 Measure range, variance and standard deviation			*

Scheme of Assessment

Subject: General Mathematics

Grade: IX

Table 1: Number of Student Learning Outcomes by Cognitive Level

Topic No.	Topics	No. of Sub-topics	SLOs ⁷			Total
			K	U	A	
1	A: Percentage, Ratio, and Proportion	3	--	3	7	10
2	B: Zakat, Ushr and Inheritance	3	3	--	3	6
3	C: Business Mathematics	3	2	3	4	9
4	D: Financial Mathematics	5	1	7	6	14
5	E: Consumer Mathematics	3	1	1	11	13
6	F: Exponents and Logarithm	6	2	2	9	13
7	G: Arithmetic and Geometric Sequence	5	1	4	6	11
8	H: Sets and Functions	5	1	3	6	10
9	I: Linear Graphs	2	--	9	6	15
10	J: Basic Statistics	4	-	2	8	10
	Total	39	11	34	66	111
	Percentage		10%	31%	59%	100%

Table 2: Exam Specification

Topic No.	Topics	Assessment Items Distribution		
		MCQs	CRQs	ERQs
1	A: Percentage, Ratio, and Proportion	1	2	1
2	B: Zakat, Ushr and Inheritance	2	1	--
3	C: Business Mathematics	2	1	--
4	D: Financial Mathematics	3	1	1
5	E: Consumer Mathematics	2	1	--
6	F: Exponents and Logarithm	3	--	1
7	G: Arithmetic and Geometric Sequence	-	2	--
8	H: Sets and Functions	--	1	1
9	I: Linear Graphs	1	1	--
10	J: Basic Statistics	1	--	1
	Total	15	10	5

Table 3: Marks Distribution Section-wise

Sections in Exam Paper⁸	A	B	C	Total
Types of Assessment Items in each Section	MCQs	CRQs	ERQs	
Total number of Items given in each Section	15	10	5	
Number of Items to be attempted in each Section	15	6	3	
Maximum Marks for each Item	1	5	10	
(Marks for each item x No. of items)	1 x 15=	5 x 6=	10 x 3=	
Maximum Marks for each Section	15	30	30	75
Percentage	20%	40%	40%	100%