



ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Secondary School Certificate (SSC)

Examination Syllabus

MATHEMATICS IX

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

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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,
Shahbaz Nasim
Head – Measurement & Testing
Ziauddin University Examination Board

Reviewed by:
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Rationale For The Reviewed Provincial Curriculum

The process of revising the National Curriculum 2006 began in August 2004, when the newly elected government of Pakistan initiated education reforms across the country. These reforms included the introduction of a new National Education Policy, a National Education Census, and a revision of curricula (Ministry of Education, 2009).

In practice, the overhaul of the secondary school curriculum began in 2006, leading to a review of the scheme of studies for classes I to XII and the revision of curricula for 25 compulsory subjects.

The 18th Amendment to the Constitution of Pakistan, enacted in 2010, significantly altered the federal-provincial relationship by abolishing the "concurrent legislative list." This amendment granted provinces greater legislative and financial autonomy in sectors such as education and health. The most notable implication of the 18th Amendment for education was the transfer of responsibility for curriculum development, syllabus planning, policy formation, and educational standards to the provinces, marking a significant step forward for education.

In Sindh, the School Education Department tasked a Curriculum Review Team with revising the National Curriculum 2006 for all subjects. The goal was to create a curriculum better suited to the needs of students and teachers while aligning with the principles of the 18th Amendment. Subject-specific curriculum review committees were established to critically examine and align the curriculum's content, both contextually and textually, ensuring coherence across various subjects. The Bureau of Curriculum (BoC) played a crucial role in organizing workshops and meetings in Hyderabad to facilitate the completion of this task. The support of numerous educationists, researchers, and teachers was invaluable in successfully revising the curriculum.

The revised National Curriculum, along with the original version, is available on the DCAR website at https://dcar.gos.pk/National_Curriculum/Draft%20Curriculum%20for%20Mathematics%20Grades%20IX-X%20Revised%20in%202017.pdf for easy access.

The Ziauddin University Examination Board (ZUEB) SSC and HSSC syllabi are developed in accordance with the Sindh Revised Curriculum. To date, textbooks for various subjects have been developed based on the revised curriculum.

Rationale

Mathematics Examination Scheme

This examination scheme provides test designers with a framework to design an achievement test in order to gather evidence of students' learning and to ensure that the judgment about their achievement is valid and fair. In the limited time of formal examination setting, teachers and examiners cannot measure students' achievement level for each single topic and/ learning outcomes.

This document provides a roadmap to ensure that the mathematics examination is designed in consideration of the broader concepts and key learning outcomes as mentioned in the national curriculum. The test specification is designed with a review of student learning outcomes and the content weightage given in the national curriculum in order to establish constructive alignment between examination, learning outcomes and teaching.

This framework suggests teachers to share this examination scheme with their students so that they can recognise the broad concepts, key learning outcomes and the relationship between learning outcomes and assessment smoothly and easily. Open discussion and frequent negotiation of these aspects can encourage higher levels of understanding among students, developing study skills as well as reduce any additional fear of being examined. A review of student learning outcomes, indicated in this document, suggests students to develop conceptual understanding of mathematics topics and skills for them to be able to apply these concepts in related situations.

A review of cognitive level addressed in the students' learning outcomes indicates that the greatest emphasis is on students' developing their application skills, which includes applying mathematical concepts to solving problems, verifying and proving related mathematical relationships. Teachers are, therefore, encouraged to use a variety of strategies – such as problem solving, investigation, discussions as well as available and easily accessible electronic materials and other textbooks, in addition to the government prescribed textbook – so as to help students achieve the learning outcomes. This document comprises of the following components:

- Description of Units and SLOs
- Scheme of Assessment
- Table of Specification

AIMS AND OBJECTIVES:

Curriculum of Mathematics consists of five standards:

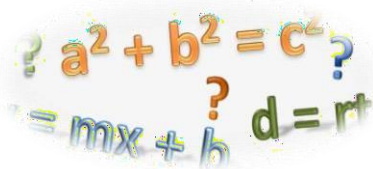
1- Numbers and Operations

The students will be able to:

- Identify numbers, ways of representing numbers and effects of operations in various situations,
- Compute fluently with fractions, decimals and percent,
- Manipulate different types of sequence and apply operations on matrices.



2 - Algebra



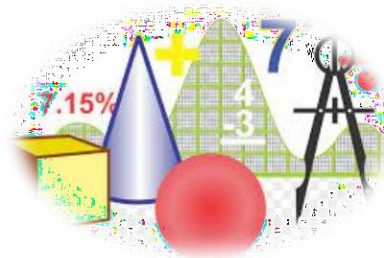
The students will be able to:

- Analyze number patterns and interpret mathematical situations by manipulating algebraic expressions and relations.
- Model and solve contextualized problems, interpret functions, calculate rate of change of functions.
- Integrate analytically and numerically. determine orthogonal trajectories of a family of curves and solve non-linear equations numerically

3 - Measurements and Geometry

The students will be able to:

- Identify measurable attributes of objects, construct angles and two-dimensional figures.
- Analyze characteristics and properties of geometric shapes and develop arguments about their geometric relationships.
- Recognize trigonometric identities, analyze conic sections, draw and interpret graphs of functions.



4 - Information Handling



The students will be able to:

- collect, organize, analyze, display and interpret data/ information

5 - Reasoning and Logical Thinking

The students will be able to:

- Use patterns, known facts, properties and relationships to analyze mathematical situations.
- Examine real life situations by identifying, mathematically valid arguments and drawing conclusion to enhance their mathematical thinking.



MATHEMATICS GRADE IX

Detailed Syllabus

UNIT 1: REAL AND COMPLEX NUMBERS

Content	Student Learning Outcomes (SLOs)	K	U	A
1.1 Real Numbers	Recall the set of real numbers as the union set of rational and irrational numbers.	✓		
	Represent real numbers on the number line.		✓	
	Demonstrate a number with terminating and non-terminating recurring decimal on the number line.			✓
	Distinguish the decimal representation of rational and irrational numbers.		✓	
1.2 Properties of Real Numbers	Know the properties of real numbers.	✓		
1.3 Radicals and Radicands	Identify radicals and radicands.	✓		
	Differentiate between radical and exponential forms of an expression.		✓	
	Transform an expression given in radical form to an exponent form and vice versa.			✓
1.4 Laws of Exponents/Indices	Recall base, exponent and value.	✓		
	Apply the laws of exponents to simplify expressions with real exponents.			✓
1.5 Complex Numbers	Elucidate, then define a complex number z represented by an expression of the form (a,b) or $z = a + ib$, where a and b are real numbers and $i = \sqrt{-1}$.	✓		
	Recognize a as real part and b as imaginary part of $z = a + ib$ or $z = (a,b)$.		✓	
	Define conjugate of a complex number.	✓		
	Know the condition of equality of complex numbers.	✓		
1.6 Basic Operations on Complex Numbers	Carry out basic operations (addition, subtraction, multiplication and division) on complex numbers.			✓

UNIT 2: LOGARITHMS

Content	Student Learning Outcomes (SLOs)	K	U	A
2.1 Scientific Notation	Express a number in standard form of scientific notation and vice versa.			✓
2.2 Logarithms	Define logarithm of a real number to a base a as a power to which a must be raised to give the number ($a^x = y \Leftrightarrow \log_a y = x$, $a > 0$, $y > 0$ and $a \neq 1$).	✓		
	Define a common logarithm, characteristic and mantissa of log of a number.	✓		
	Use tables to find the log of a number.			✓
	Give concept of antilog and use tables to find the antilog of a number.			✓
	Use a calculator to find the log and antilog of a number.			✓
2.3 Common and Natural Logarithm	Differentiate between common and natural logarithms; write $\log_{10} y = \log y$ or $\lg y$ and $\log_e y = \ln y$; $\lg y = x \Leftrightarrow y = 10^x$, $\ln y = x \Leftrightarrow y = e^x$.		✓	
2.4 Laws of logarithms	Prove the following laws of logarithms: • $\log_a(mn) = \log_a m + \log_a n$ • $\log_a(m/n) = \log_a m - \log_a n$ • $\log_a m^n = n \log_a m$ • $\log_a m \log_a n = \log_a n$		✓	
2.5 Application of Logarithms	Apply laws of logarithms to convert lengthy processes of multiplication, division and exponentiation into easier processes of addition and subtraction, etc.			✓

UNIT 3: ALGEBRAIC EXPRESSIONS AND FORMULAS

Content	Student Learning Outcomes (SLOs)	K	U	A
3.1 Algebraic Expressions	Know that a rational expression behaves like a rational number.	✓		
	Define a rational expression as a quotient $p(x)/q(x)$ of two polynomials $p(x)$ and $q(x)$, where $q(x)$ is not the zero polynomial.	✓		
	Examine whether a given algebraic expression is: (a) polynomial or not, (b) rational expression or not.		✓	
	Define $p(x)/q(x)$ as a rational expression in its lowest term if $p(x)$ and $q(x)$ have no common factor.	✓		
	Examine whether a given rational algebraic expression is in its lowest form or not.		✓	
	Reduce a given rational expression to its lowest form.			✓
	Find the sum, difference, and product of rational expressions.			✓

Content	Student Learning Outcomes (SLOs)	K	U	A
	Divide a rational expression by another rational expression and express the result in its lowest form.			✓
	Find the values of the algebraic expressions at some particular real number.			✓
3.2 Algebraic Formulas	Know the formulas $(a + b)^2 + (a - b)^2 = 2(a^2 + b^2)$ and $(a + b)^2 - (a - b)^2 = 4ab$.	✓		
	Find the values of $a^2 + b^2$ and ab when the values of $a + b$ and $a - b$ are known.			✓
	Know the formula $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$.	✓		
	Find the values of $a^2 + b^2 + c^2$ when the values of $a + b + c$, or $ab + bc + ca$ are given. Find the value of $a + b + c$ when the values of $a^2 + b^2 + c^2$ and $ab + bc + ca$ are given. Find the value of $ab + bc + ca$ when the values of $a^2 + b^2 + c^2$ and $a + b + c$ are given.			✓
	Know the formulas $(a + b)^3 = a^3 + 3ab(a + b) + b^3$ and $(a - b)^3 = a^3 - 3ab(a - b) - b^3$.	✓		
	Find the values of $a^3 \pm b^3$ or $x^3 \pm 1/x^3$ when the values of $a \pm b$ or $x \pm 1/x$ are given.			✓
	Know the formula $a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$.	✓		
	Find the product of: $x + 1/x$ and $x^2 + 1/x^2 - 1$ $x - 1/x$ and $x^2 + 1/x^2 + 1$ Find the continued product of: $(x + y)(x - y)(x^2 + xy + y^2)(x^2 - xy + y^2)$.			✓
3.3 Surds and their applications	Recognize the surds and their applications.	✓		
	Explain the surds of the second order and use basic operations on them to rationalize denominators and evaluate expressions.			✓
3.4 Rationalization	Explain rationalization (with precise meaning) of real numbers of the types $1/(a + b\sqrt{x})$, $1/(\sqrt{x} + \sqrt{y})$, and their combinations where x and y are natural numbers and a and b are integers.			✓

UNIT 4: FACTORIZATION

Content	Student Learning Outcomes (SLOs)	K	U	A
4.1 Factorization	Recall factorization of expressions of the following types: $ka + kb + kc$ (common factors in all terms) $ac + ad + bc + bd$ (common factors in pairs) $a^2 \pm 2ab + b^2$ (perfect squares) $a^2 - b^2$ (difference of squares) $a^2 \pm 2ab + b^2 - c^2$ $(\sqrt{a})^2 - (\sqrt{b})^2$	✓		

Content	Student Learning Outcomes (SLOs)	K	U	A
	Factorize the expressions of the following types: Type I: $a^4 + a^2b^2 + b^4$ and $a^4 + 4b^4$ Type II: $x^2 + px + q$ Type III: $ax^2 + bx + c$ Type IV: $(ax^2 + bx + c)(ax^2 + bx + d) + k$, $(x + a)(x + b)(x + c)(x + d) + k$, $(x + a)(x + b)(x + c)(x + d) + kx^2$ Type V: $a^3 + 3a^2b + 3ab^2 + b^3$, $a^3 - 3a^2b + 3ab^2 - b^3$ Type VI: $a^3 \pm b^3$			✓
4.2 Reminder and Factor Theorems	State and prove remainder theorem and explain through examples.		✓	
	Find remainder (without dividing) when a polynomial is divided by a linear polynomial.			✓
	Define zero of a polynomial.	✓		
	State and prove factor theorem.		✓	
4.3 Synthetic Division	Describe the method of synthetic division.		✓	
	Use synthetic division to: • Find quotient and remainder when a given polynomial is divided by a linear polynomial. • Find value(s) of unknown(s) if the zeros of the polynomial are given. • Find value(s) of unknown(s) if the factors of the polynomial are given.			✓
4.4 Factorization of Cubic Polynomial	Use factor theorem to factorize a cubic polynomial.			✓

UNIT 5: ALGEBRAIC MANIPULATION

Content	Student Learning Outcomes (SLOs)	K	U	A
5.1 Highest Common Factor (HCF)/ Greatest Common Divisor (GCD) and Least Common Multiple (LCM)	Find Highest Common Factor (HCF) and Least Common Multiple (LCM) of algebraic expressions by factorization method.			✓
	Use division method to determine highest common factor and least common multiple.			✓
	Know the relationship between HCF and LCM.	✓		
	Solve real-life problems related to HCF and LCM.			✓
5.2 Basic Operations on Algebraic Fractions	Use highest common factor and least common multiple to reduce fractional expressions involving addition, subtraction, multiplication, and division.			✓

Content	Student Learning Outcomes (SLOs)	K	U	A
5.3 Square Root of an Algebraic Expression	Find square root of an algebraic expression by factorization and division methods.			✓

UNIT 6: LINEAR EQUATIONS AND INEQUALITIES

Content	Student Learning Outcomes (SLOs)	K	U	A
6.1 Linear Equations	Recall linear equations in one variable.	✓		
	Solve linear equations with rational coefficients.			✓
	Reduce equations involving radicals to simple linear form and find their solutions.			✓
6.2 Equations involving absolute values	Define absolute value.	✓		
	Solve equations involving absolute values in one variable.			✓
6.3 Linear Inequalities	Define inequalities ($>$, $<$) and ($\geq$, $\leq$).	✓		
	Recognize properties of inequalities (trichotomy, transitive, additive, and multiplicative).		✓	
6.4 Solving Linear Inequalities	Solve linear inequalities with rational coefficients.			✓

UNIT 7: LINEAR GRAPHS AND THEIR APPLICATIONS

Content	Student Learning Outcomes (SLOs)	K	U	A
7.1 Cartesian Plane and Linear Graphs	Identify pair of real numbers as an ordered pair.	✓		
	Recognize an ordered pair through different examples (e.g., representing a seat at intersection of 2nd row and 3rd column).		✓	
	Describe rectangular and Cartesian plane consisting of two number lines intersecting at right angles at point O.	✓		
	Identify origin O and coordinate axes (x-axis and y-axis) in the rectangular plane.	✓		
	Locate an ordered pair (a, b) as a geometrical point in the rectangular plane and recognize a as x-coordinate and b as y-coordinate.		✓	
	Draw different geometrical shapes (e.g., line segment, triangle, rectangle) by joining given points.			✓
	Construct a table for pairs of values satisfying a linear equation in two variables.			✓
	Plot pairs of points to obtain the graph of a given expression.			✓

Content	Student Learning Outcomes (SLOs)	K	U	A
	Choose an appropriate scale to draw a graph.			✓
	Draw the graph of equations of the forms $y = c$, $x = a$, $y = mx$, and $y = mx + c$.			✓
	Draw a graph from the given table of (discrete) values.			✓
	Solve allied real-life problems.			✓
7.2 Conversion Graphs	Interpret conversion graph as a linear graph relating two quantities in direct proportion.		✓	
	Read a given graph to know one quantity corresponding to another.			✓
	Read conversion graphs for relationships such as miles↔kilometers, acres↔hectares, °C↔°F, and currency conversions.			✓
7.3 Graphic Solution of Equations in two variables	Solve simultaneous linear equations in two variables by graphical method.			✓

UNIT 8: QUADRATIC EQUATIONS

Content	Student Learning Outcomes (SLOs)	K	U	A
8.1 Quadratic Equations and their Solutions	Elucidate, then define a quadratic equation in its standard form.	✓		
	Solve a quadratic equation in one variable by factorization.			✓
	Solve a quadratic equation in one variable by completing the squares.			✓
8.2 Quadratic Formula	Use method of completing the squares to derive the quadratic formula.		✓	
	Use quadratic formula to solve quadratic equations.			✓
8.3 Equations Reducible to Quadratic Form	Solve equations reducible to quadratic form of the type $ax^4 + bx^2 + c = 0$ (quartic or bi-quadratic equations).			✓
	Solve equations of the type $a \cdot p(x) + b/p(x) = c$, where a , b , and c are constants.			✓
	Solve reciprocal equations of the type $a(x^2 + 1/x^2) + b(x + 1/x) + c = 0$, where a , b , and c are rational constants.			✓
	Solve exponential equations in which the variable occurs in exponents.			✓
	Solve equations of the type $(x + a)(x + b)(x + c)(x + d) = k$, where $a + b = c + d$ and $k \neq 0$.			✓
8.4 Radical Equations	Solve equations of the type $\sqrt{ax + b} = cx + d$.			✓
	Solve equations of the type $\sqrt{x + a} + \sqrt{x + b} = \sqrt{x + c}$.			✓

Content	Student Learning Outcomes (SLOs)	K	U	A
	Solve equations of the type $\sqrt{x^2 + px + m} + \sqrt{x^2 + px + n} = q$.			✓

UNIT 9: CONGRUENT TRIANGLES

Content	Student Learning Outcomes (SLOs)	K	U	A
9.1 Congruent Triangles	Understand the following theorems along with their corollaries and apply them to solve allied problems:		✓	
	In any correspondence of two triangles, if one side and any two angles of one triangle are congruent to the corresponding sides and angles of the other, the two triangles are congruent.		✓	
	If two angles of a triangle are congruent, then the sides opposite to them are also congruent.		✓	
	In the correspondence of two triangles, if three sides of one triangle are congruent to the corresponding three sides of the other, the two triangles are congruent.		✓	
	If in the correspondence of two right-angled triangles, the hypotenuse and one side of one are congruent to the hypotenuse and the corresponding side of the other, then the triangles are congruent.		✓	

UNIT 10: PARALLELOGRAMS AND TRIANGLES

Content	Student Learning Outcomes (SLOs)	K	U	A
10.1 Parallelograms and Triangles	Understand the following theorems along with their corollaries and apply them to solve allied problems: a) In a parallelogram: • The opposite sides are congruent, • The opposite angles are congruent, • The diagonals bisect each other. b) If two opposite sides of a quadrilateral are congruent and parallel, it is a parallelogram. c) The line segment joining the midpoints of two sides of a triangle is parallel to the third side and equal to half its length. d) The medians of a triangle are concurrent, and their point of concurrency is the point of trisection of each median. e) If three or more parallel lines make congruent intercepts on a transversal, they also intercept congruent segments on any other line that cuts them.		✓	

UNIT-11: LINE BISECTORS AND ANGLE BISECTORS

Content	Student Learning Outcomes (SLOs)	K	U	A
11.1 Line Bisectors and Angle Bisectors	Understand the following theorems along with their corollaries and apply them to solve allied problems: a) Any point on the right bisector of a line segment is equidistant from its endpoints. b) Any point equidistant from the endpoints of a line segment lies on its right bisector. c) The right bisectors of the sides of a triangle are concurrent. d) Any point on the bisector of an angle is equidistant from its arms. e) Any point inside an angle, equidistant from its arms, lies on its bisector. f) The bisectors of the angles of a triangle are concurrent.		✓	

UNIT 12: SIDES AND ANGLES OF A TRIANGLE

Content	Student Learning Outcomes (SLOs)	K	U	A
12.1 Sides and Angles of a Triangle	Understand the following theorems along with their corollaries and apply them to solve allied problems: a) If two sides of a triangle are unequal in length, the longer side has an angle of greater measure opposite to it. b) If two angles of a triangle are unequal in measure, the side opposite the greater angle is longer than the side opposite the smaller angle. c) The sum of the lengths of any two sides of a triangle is greater than the length of the third side. d) From a point outside a line, the perpendicular is the shortest distance from the point to the line.		✓	

UNIT-13: PRACTICAL GEOMETRY - TRIANGLES

Content	Student Learning Outcomes (SLOs)	K	U	A
13.1 Construction of Triangle	Construct a triangle having given: • Two sides and the included angle. • One side and two of the angles • Two of its sides and the angle opposite to one of them (with all three possibilities)			✓
	Draw angle bisectors, altitudes, perpendicular bisectors, and medians of a given triangle and verify their concurrency.			✓
13.2 Figures with Equal Areas	Construct a triangle equal in area to a given quadrilateral.			✓
	Construct a rectangle equal in area to a given triangle.			✓
	Construct a square equal in area to a given rectangle.			✓

Content	Student Learning Outcomes (SLOs)	K	U	A
	Construct a triangle of equivalent area on a base of given length.			✓

UNIT-14: THEOREMS RELATED WITH AREA

Content	Student Learning Outcomes (SLOs)	K	U	A
14.1 Theorems Related with Area	Understand the following theorems along with their corollaries and apply them to solve allied problems: a) Parallelograms on the same base and lying between the same parallel lines (or of the same altitude) are equal in area. b) Parallelograms on equal bases and having the same altitude are equal in area. c) Triangles on the same base and of the same altitude are equal in area. d) Triangles on equal bases and of the same altitude are equal in area.			✓

UNIT-15: PROJECTION OF A SIDE OF A TRIANGLE

Content	Student Learning Outcomes (SLOs)	K	U	A
15.1 Projection of a side of a Triangle	Understand the following theorems along with their corollaries and apply them to solve allied problems. a) In an obtuse-angled triangle, the square on the side opposite to the obtuse angle equals the sum of the squares on the sides containing the obtuse angle together with twice the rectangle contained by one of the sides and the projection on it of the other. b) In any triangle, the square on the side opposite to an acute angle equals the sum of the squares on the sides containing that acute angle diminished by twice the rectangle contained by one of those sides and the projection on it of the other. c) The sum of the squares on any two sides is equal to twice the square on half the third side together with twice the square on the median which bisects the third side.			✓

UNIT-16: INTRODUCTION TO COORDINATE ANALYTICAL GEOMETRY

Content	Student Learning Outcomes (SLOs)	K	U	A
16.1 Distance Formula	Explain and define coordinate geometry.	✓		
	Derive distance formula to calculate distance between two points given in Cartesian plane.		✓	

Content	Student Learning Outcomes (SLOs)	K	U	A
	Use distance formula to find distance between two given points.			✓
16.2 Collinear Points	Define collinear points and distinguish between collinear and non-collinear points.		✓	
	Use distance formula to show that three (or more) given points are collinear.			✓
	Use distance formula to show that the given three non-collinear points form: an equilateral, isosceles, right-angled, or scalene triangle.			✓
	Use distance formula to show that four given non-collinear points form: a square, a rectangle, or a parallelogram.			✓
16.3 Mid- Point Formula	Recognize the formula to find the midpoint of the line joining two given points.	✓		
	Apply distance and midpoint formulas to solve/verify different standard results related to geometry.			✓

Ziauddin University Examination Board

Scheme of Assessment

Maximum marks: 75

Section “A”

Multiple Choice Questions (MCQs)

(15 x 1 = 15)

Attempt 15 MCQs. Each MCQ carries equal marks.

Section “B”

Short Answer Questions

(6 x 5 = 30)

Attempt any 6 out of 10 questions. Each question carries equal marks.

Section “C”

Detailed Answer Questions

(3 x 10 = 30)

Attempt any 3 out of 5 questions. Each question carries equal marks.

Ziauddin University Examination Board
Table of Specification
(TOS)

S.No	Units	Weightage in assessment 100%	MCQs 1 mark each	Short Answer Questions 5 marks each	Detailed Answer Questions 10 marks each
1	Real and Complex Numbers	5%	1	1	-
2	Logarithms	5%	1	1	-
3	Algebraic Expressions and Formulas	5%	1	1	-
4	Factorization	5%	1	1	-
5	Algebraic Manipulation	5%	1	1	-
6	Linear Equation and Inequalities	5%	1	1	-
7	Linear Graphs and their Applications	10%	1	-	1
8	Quadratic Equations	10%	1	-	1
9	Congruent Triangles	5%	1	1	-
10	Parallelograms and Triangles	5%	1	1	-
11	Line Bisectors and Angle Bisectors	4%	-	1	-
12	Sides and Angles of a Triangle	1%	1	-	-
13	Practical Geometry-Triangles	5%	1	1	-
14	Theorems related with Area	10%	1	-	1
15	Projection of a side of a Triangle	10%	1	-	1
16	Introduction to Coordinate Geometry/Analytical Geometry	10%	1	-	1
Total # of Questions asked			15	10	5
Total # of Questions to be attempted			15	6	3
Maximum marks attainable			15 marks	30 marks	30 marks

DEFINITIONS OF COGNITIVE LEVELS

Remember

Remembering is the act of retrieving knowledge and can be used to produce things like definitions or lists. The student must be able to recall or recognise information and concepts. The teacher must present information about a subject to the student, ask questions that require the student to recall that information and provide written or verbal assessment that can be answered by remembering the information learnt.

Question Stems

- Can you name all the ...?
- Describe what happens when ...?
- How is (are) ...?
- How would you define ...?
- How would you identify ...?
- How would you outline ...?
- How would you recognise...?
- List the ... in order.
- What do you remember about ...?
- What does it mean?
- What happened after?
- What is (are) ...?
- What is the best one?
- What would you choose ...?
- When did ...?
- Where is (are) ...?
- Which one ...?
- Who spoke to ...?
- Who was ...?
- Why did ...?

Understand

The next level in the taxonomic structure is Understanding, which is defined as the construction of meaning and relationships. Here the student must understand the main idea of material heard, viewed, or read and interpret or summarise the ideas in their own words. The teacher must ask questions that the student can answer in their own words by identifying the main idea.

Question Stems

- Can you clarify...?
- Can you illustrate ...?
- Condense this paragraph.
- Contrast ...
- Does everyone think in the way that ... does?
- Elaborate on ...
- Explain why ...
- Give an example
- How can you describe...?
- How would you clarify the meaning...?
- How would you compare ...?
- How would you differentiate between ...?
- How would you describe...?
- How would you generalise...?
- How would you identify ...?
- Is it valid that ...?
- Is this the same as ...?
- Outline ...
- Select the best definition...
- State in your own words...
- This represents ...
- What are they saying?
- What can you infer from ...?
- What can you say about ...?
- What could have happened next?
- What did you observe?

	• What does this mean? • What expectations are there? • What information can you infer from...? • What is the main idea of ...? • What restrictions would you add? • What seems likely? • What seems to be ...? • What would happen if ...? • What might happen if ...? • Which are the facts? • Which statements support ...?
Apply The third level in Bloom's taxonomy, Applying, marks a fundamental shift from the pre-Bloom's learning era because it involves remembering what has been learnt, having a good understanding of the knowledge, and applying it to real-world exercises, challenges or situations. Students must apply an abstract idea in a concrete case to solve a problem or relate it to prior experience. The teacher must provide opportunities for students to use theories and problem-solving techniques in new situations and review and check their work. Assessment questions should be provided that allow students to define and solve problems. Question Stems • Can you group by characteristics such as ...? • Choose the best statements that apply... • Clarify why ... • Do you know of another instance where ...? • Draw a story map... • Explain why a character acted in the way that he did... • From the information given, can you develop a set of instructions about ...? • How would you develop ...? • How would you change ...? • How would you demonstrate...?	Analyse Analysing is the cognitive level where students can take the knowledge they have remembered, understood and applied, then delve into that knowledge to make associations, discernments or comparisons. Students should break down a concept or idea into parts and show relationships between these parts. Teachers must give students time to examine concepts and their requisite elements. Students are required to explain why they chose a solution. Question Stems • Can you distinguish between ...? • Can you explain what must have happened when ...? • Determine the point of view, bias, values, or intent underlying the presented material... • Discuss the pros and cons of ... • How can you classify ... according to ...? • How can you compare the different parts? • How can you sort the different parts...? • How is ... connected to ...? • How is ... similar to ...? • How would you categorise...? • How would you explain...?

• How would you develop? • How would you explain ...? • How would you modify ...? • How would you present...? • How would you solve ... ? • Identify the results of ... • Illustrate the ... • Judge the effects of ... What would result ...? • Predict what would happen if ... • Tell how much change there would be if ... • Tell what would happen if ... • What actions would you take to perform ...? • What do you think could have happened next? • What examples can you find that ? • What other way would you choose to ...? • What questions would you ask of ...? • What was the main idea ...? • What would the result be if ...? • Which factors would you change if ...? • Who do you think...? • Why does this work? • Write a brief outline ... • Write in your own words ...	• What could the ending have been if ... had taken place? • State the point of view of ... • What are some of the problems of ...? • What assumptions ...? • What can you infer about...? • What can you point out about ? • What conclusions ...? • What do you see as other possible outcomes? • What does the author assume? • What explanation do you have for ...? • What ideas justify the conclusion? • What ideas validate...? • What is the analysis of ...? • What is the function of ...? • What is the problem with ...? • What motive is there? • What persuasive technique is used? • What statement is relevant? • What was the turning point? • What were some of the motives behind ...? • What's fact? Opinion? • What's the main idea? • What's the relationship between? • Which events could not have happened? • Why did ... changes occur? • Why do you think ?
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BLOOM'S TAXONOMY WITH EXAMPLES

If you are a teacher looking for ways to engage your students in learning, this LIST of questions might be interesting for your classroom practice. Bloom's Taxonomy question stems can help elicit higher-order thinking skills and promote critical thinking among learners at different taxonomy levels. These question stems can also encourage students to think about their knowledge through reflection before answering questions.

ACTION WORDS FOR COGNITIVE LEVELS

Knowledge	Understand	Apply	Analyze	Evaluate	Create
					
define	explain	solve	analyze	reframe	design
identify	describe	apply	appraise	criticize	compose
describe	interpret	illustrate	judge	evaluate	create
label	paraphrase	modify	support	order	plan
list	summarize	use	compare	compare	combine
name	classify	calculate	decide	classify	formulate
state	compare	change	discriminate	contrast	invent
match	differentiate	choose	recommend	distinguish	hypothesize
recognize	discuss	demonstrate	summarize	infer	substitute
select	distinguish	discover	assess	separate	write
examine	extend	experiment	choose	explain	compile
locate	predict	relate	convince	select	construct
memorize	associate	show	defend	categorize	develop
quote	contrast	sketch	estimate	connect	generalize
recall	convert	complete	grade	differentiate	integrate
reproduce	demonstrate	construct	measure	divide	modify
tabulate	estimate	dramatize	predict	order	organize
tell	express	interpret	rank	prioritize	prepare
Copy	identify	manipulate	score	survey	produce

discover	indicate	paint	select	calculate	rearrange
duplicate	infer	prepare	test	conclude	rewrite
enumerate	relate	teach	argue	correlate	adapt
listen	restate	act	conclude	deduce	anticipate
observe	select	collect	consider	devise	arrange
omit	translate	compute	critique	diagram	assemble
read	ask	explain	debate	dissect	choose
recite	cite	list	distinguish	estimate	collaborate
record	discover	operate	editorialize	evaluate	facilitate
repeat	generalize	practice	justify	experiment	imagine
retell	group	simulate	persuade	focus	intervene
visualize	illustrate	transfer	rate	illustrate	make
	judge	write	weigh	organize	manage
	observe			outline	originate
	order			plan	propose
	report			question	simulate
	represent			test	solve
	research				support
	review				test
	rewrite				validate
	show				

SSC PART I EXAMINATION
MARKS BREAKUP GRID FOR EXAMINATION 2025

SCIENCE GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	75	-	75
ISLAMIYAT / RELIGIOUS STUDIES	75	-	75
PHYSICS	60	15	75
CHEMISTRY	60	15	75
BIOLOGY	60	15	75
MATHEMATICS	75	-	75
TOTAL	505	45	550

COMPUTER SCIENCE GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	75	-	75
ISLAMIYAT / RELIGIOUS STUDIES	75	-	75
PHYSICS	60	15	75
CHEMISTRY	60	15	75
COMPUTER SCIENCE	60	15	75
MATHEMATICS	75	-	75
TOTAL	505	45	550

GENERAL GROUP:

SUBJECT	THEORY	PBA	TOTAL
ENGLISH	100	-	100
URDU NORMAL / SINDHI NORMAL	75	-	75
ISLAMIYAT / RELIGIOUS STUDIES	75	-	75
GENERAL SCIENCE	75	-	75
GENERAL MATH	75	-	75
EDUCATION	75	-	75
ECONOMICS	75	-	75
CIVICS	75	-	75
ISLAMIC STUDIES	75	-	75
TOTAL	550	-	550