

**City Governments Of Addis Ababa Education Bureau
Curriculum Development and Implementation Directorate.**

Subject <u>Mathematics</u> GRADE <u>11</u> make up class						
No	Unit	Content	Sub content	No of periods (at normal condition)	No of condensi ng periods	Unit outcomes
1	1	Further on Relation and Functions	➤ Revision on relations	2	2	After completing this unit, students should be able to: ➤ Know specific facts about relations. ➤ Know additional concepts and facts about functions. ➤ understand methods and principles in composing functions
			➤ Some additional types of functions	4		
			➤ Classification of functions	2		
			➤ Composition of functions	3		
			➤ Inverse functions and their graphs	4		
2	2	Rational Expression s and Rational Functions	➤ Simplification of rational expressions	4	2	After completing this unit, students should be able to: ➤ Define rational expression. ➤ Identify the universal set of a given rational expression. ➤ Show the simplified form and the necessary steps to simplify a given rational expression. ➤ Perform the four fundamental operations on rational expressions. ➤ Decompose rational expressions
			➤ Rational equations	3		
			➤ Rational functions and their graphs	5		

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						into sums of partial fractions.
3	3	Coordinate Geometry	➤ Straight line	3	2	After completing this units, students should be able to:- ➤ Understand specific facts and principles about lines and circles. ➤ • know basic concepts about conic sections. ➤ • know methods and procedures in solving problems on conic sections
			➤ Conic sections	18		
4	4	Mathematical Reasoning	➤ Logic	13	2	After completing this unit, students should be able to: ➤ Know basic concepts about mathematical logic. ➤ Know methods and procedures in combining and determining the validity of statements. ➤ Know basic facts about argument and validity.
			➤ Arguments and validity	3		
5	5	Statistics and Probability	➤ Statistics	14	4	After completing this unit, students should be able to: ➤ Know specific facts about types of data. ➤ Know basic concepts about grouped data. ➤ Know principles of counting. ➤ Apply facts and principle in computation of probability.
			➤ Probability	17		
6	6	Matrices and Determinants	➤ Matrices	4	4	After completing this unit, students should be able to: ➤ Know basic concepts about matrices. ➤ Know specific ideas, methods and principles concerning matrices.
			➤ Determinants and their properties	6		
			➤ inverse of a square matrix	4		

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			➤ Systems of equations with two or three variables	5		➤ Perform operations on matrices. ➤ apply principles of matrices to solve problems
			➤ Cramer's rule	3		
7	7	The Set of Complex Numbers	➤ The concept of complex numbers	2	2	After completing this unit, students should be able to:
			➤ Operations on complex numbers	3		➤ Know basic concepts about complex numbers.
			➤ Complex conjugate and modulus	2		➤ Know the general principle of performing operation on complex numbers.
			➤ Simplification of complex numbers	3		➤ Understand facts and procedures in simplifying complex numbers.
			➤ Argand diagram and polar representation of complex numbers	3		➤ Show the geometric representation of complex numbers on the Argand plane.
8	8	Vectors and Transformation of the Plane(For Natural Science Students)	➤ Revision on vectors and scalars	3	2	After completing this unit, students should be able to:
			➤ Representation of vectors	1		➤ Know basic concepts and procedures about vectors and operation on vectors.
			➤ Scalar (inner or dot) product of vectors	3		➤ Know specific facts about vectors.
			➤ Application of vector	5		➤ Apply principles and theorem about vectors in solving problems involving vectors.
						➤ Know basic concepts about

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			➤ Transformation of the plane	8		transforming the plane. ➤ Apply methods and procedures in transforming plane figures.
9	9	Further on Trigonometric Functions (For Natural Science Students)	➤ The functions $y = \sec x$, $y = \csc x$ and $y = \cot x$	5	4	After completing this unit, students should be able to: ➤ Know basic concepts about reciprocal functions. ➤ Sketch graphs of some trigonometric functions. ➤ Apply trigonometric functions to solve related problems.
			➤ Inverse of trigonometric functions	4		
			➤ Graphs of some trigonometric functions	5		
			➤ Applications of trigonometric functions	6		
10	10	Introduction to Linear Programming (For Social Science Students)	➤ Revision on linear graphs	2	2	After completing this unit, students should be able to: ➤ Identify regions of inequality graphs. ➤ Create real life examples of linear programming problems using inequalities and solve them.
			➤ Graphical solutions of systems of linear inequalities	2		
			➤ Maximum and minimum values	5		
			➤ Real life linear programming problems	6		
11	11	Mathematical Application	➤ Basic mathematical concepts in	3	4	After completing this unit, students should be able to: ➤ Know common terms related to

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		s in Business (For Social Science Students)	business			business.
			➤ Compound interest and depreciation	4		➤ Know basic concepts in business.
			➤ Saving, investing and borrowing money	7		➤ Apply mathematical principles and theories in practical situations.
			➤ Taxation	4		

Subject <u>Mathematics</u> GRADE <u>12</u> make up class						
No	Unit	Content	Sub content	No of periods (at normal condition)	No of condensing periods	Unit outcomes
1	1	Sequences and Series	➤ Sequences of numbers ➤ Arithmetic sequence and Geometric sequence ➤ The sigma notation and partial sums ➤ Infinities series ➤ Applications of arithmetic progressions and geometric	3 3 6 4 2	2	After completing this unit, students should be able to: ➤ Revise the notions of sets and functions. ➤ Grasp the concept of sequence and series. ➤ Compute any terms of sequences from given rule. ➤ Find out possible rules (formula) from given terms. ➤ Identify the types of sequences and series. ➤ Compute partial and infinite sums of sequences. ➤ Apply the knowledge of sequence

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			progressions			and series to solve practical and real life problems.
2	2	Introduction to Limits and Continuity	➤ Limits of sequence of numbers	12	4	After completing this unit, students should be able to: ➤ Define upper and lower bound of number sequences. ➤ Find out the least upper (greatest lower) bound of sequences. ➤ Define limit of a number sequence. ➤ Consolidate their knowledge on the concept of sequences stressing on the concept of null sequence. ➤ Apply theorems on the convergence of bounded sequences. ➤ Prove theorems about the limit of the sum of two convergent sequences. ➤ Apply theorems on the limit of the difference, product, and quotient of two convergent sequences.
			➤ Limits of functions	6		
			➤ Continuity of a function	5		
			➤ Exercises on the application of limits	3		
3	3	Introduction to Differential Calculus	➤ Introduction to Derivatives	10	3	After completing this units, students should be able to:- ➤ Find the rate of change of one quantity with respect to another. ➤ Sketch different straight lines and curved graphs and find out slopes at different points of each graph. ➤ Define differentiability of a function at a point x_0. ➤ Explain the geometrical and mechanical meaning of derivative.
			➤ Derivatives of some functions	3		
			➤ Derivatives of combinations and compositions of functions	14		

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						➤ Set up the equation of tangent line at the point of tangency, using the concept of derivative. ➤ Find the derivative of elementary functions over an interval.
4	4	Application of Differential calculus	➤ Extreme values of a function	13	4	After completing this unit, students should be able to: ➤ Find local maximum or local minimum of a function in a given interval. ➤ Find absolute maximum or absolute minimum of a function. ➤ Apply mean-value theorem. ➤ Solve simple problems in which the studied theorems, formulae and ➤ Procedures of differential calculus are applied. ➤ solve application problems
			➤ Minimization and maximization Problems	6		
			➤ Rate of change	6		
5	5	Introduction to Integral calculus	➤ Integration as a reverse process of differentiation	7	3	After completing this unit, students should be able to: ➤ Understand the concept of definite integrals. ➤ Integrate different polynomial functions, simple trigonometric functions, ➤ Exponential and logarithmic functions. ➤ Use the various techniques of integration to evaluate a given integral. ➤ Use the fundamental theorem of calculus for computing definite
			➤ Techniques of integration	9		
			➤ Definite integrals, area and the fundamental theorem of calculus	8		

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			➤ Applications of Integral calculus	6		integrals. ➤ Apply the knowledge of integral calculus to solve real life mathematical problems
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