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

Subject Mathematics GRADE 11 make up class

No	Unit	Content	Sub content	No of periods (at normal condition)	No of condensing 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 Expressions 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		

						into sums of partial fractions.
3	3	Coordinate Geometry	➢ Straight line ➢ Conic sections	3 18	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
4	4	Mathematical Reasoning	➢ Logic ➢ Arguments and validity	13 3	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.
5	5	Statistics and Probability	➢ Statistics ➢ Probability	14 17	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.
6	6	Matrices and Determinants	➢ Matrices ➢ Determinants and their properties ➢ inverse of a square matrix	4 6 4	4	After completing this unit, students should be able to: ➢ Know basic concepts about matrices. ➢ Know specific ideas, methods and principles concerning matrices.

			➢ 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: ➢ Know basic concepts about complex numbers. ➢ Know the general principle of performing operation on complex numbers. ➢ Understand facts and procedures in simplifying complex numbers. ➢ Show the geometric representation of complex numbers on the Argand plane.
			➢ Operations on complex numbers	3		
			➢ Complex conjugate and modulus	2		
			➢ Simplification of complex numbers	3		
			➢ Argand diagram and polar representation of complex numbers	3		
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: ➢ Know basic concepts and procedures about vectors and operation on vectors. ➢ Know specific facts about vectors. ➢ Apply principles and theorem about vectors in solving problems involving vectors. ➢ Know basic concepts about
			➢ Representation of vectors	1		
			➢ Scalar (inner or dot) product of vectors	3		
			➢ Application of vector	5		

			➢ 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

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

Subject Mathematics GRADE 12 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	3	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
			➢ Arithmetic sequence and Geometric sequence	3		
			➢ The sigma notation and partial sums	6		
			➢ Infinities series	4		
			➢ Applications of arithmetic progressions and geometric	2		

			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 xo. ➢ Explain the geometrical and mechanical meaning of derivative.
			➢ Derivatives of some functions	3		
			➢ Derivatives of combinations and compositions of functions	14		

						➢ 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		

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