Appendix (2)

Translation the mathematics curriculum in Jordan during the first period 1964– 1972.

This appendix includes a description of the documents of mathematics curriculum in Jordan during the first period (1964 - 1972). Also, this appendix includes a translation of The learning objectives and mathematical content translated from Arabic language to English.

During this period there are two documents for teaching mathematics credited by Ministry of Education in Jordan (M.O.E.), the first document for compulsory stage which includes (1–9 grades) ; and the second document for secondary stage which includes (10–12 grades).

Firstly: Mathematics Curriculum for compulsory stage (Elementary and preparatory)

The curriculum document for compulsory stage (M.O.E, 1965)includes the following aspects:
- The learning objectives of teaching mathematics for the compulsory stage.
- Mathematical content of topics for compulsory stage, includes three kinds of topics represented as follow:

1.   The first kind:
- Arithmetic skills for the first year
- Arithmetic skills for the second year
- Arithmetic skills for the third year
- Arithmetic skills for the fourth year
2.   The second kind:
- Arithmetic skills and Geometry principles for five year
- Arithmetic skills and Geometry principles for six year
3. The third kind:
- Arithmetic , Algebra and Geometry for first preparatory year
- Arithmetic , Algebra and Geometry for second preparatory year
- Arithmetic , Algebra and Geometry for third preparatory year
- Suggestions for teaching mathematics (Arithmetic, Algebra and Geometry) in compulsory stage.
- The distribution of periods for different grades ;
- General guidelines for Evaluation (student doing, and teacher doing).

1.1   The learning objectives of teaching mathematics for the compulsory stage.

Documents from the Ministry of Education for this period specify learning objectives for the compulsory stage, grades 1 through 9, as follow:
- To develop the numerical skills of students through understanding and then practice.

- To develop their ability to use the facts and concepts related to numbers in mathematical operations and real life situation.
- To develop their ability to understand mathematical problems, discuss them and express mathematical concepts accurately using the correct terms.
- To develop their mathematical thinking using numbers, comparison and comprehension of related concepts.
- To develop their skills in the use of abstract proof and drawing the correct conclusions from results, using geometric approaches.
- To develop their ability to use mathematical skills in other fields of study.
- To enable students to serve their society using their knowledge of mathematics.
- To develop the maxim of accuracy in all aspects of their personal and academic life.
- To develop a positive attitude in students towards mathematics.
- To develop the personal appreciation of the student as to the sense of beauty found in order, enthusiasm for accomplishment and patience developed through the search for facts.

1.2   The mathematical content of teaching mathematics for the compulsory stage.

The mathematical content of the document presented in the document as list of topics, but for grades one and two the mathematical content is presented in form of topics and guidelines, for example the document presents the content of mathematics for *second grade* according to the **Number topic** as follow :

Topic	Guidelines
Review - number concept, order counting - reading and writing the numbers from 1 to 20 - facts of addition and subtraction and multiplication and division within the number 20 mentally and writing	Remind the students in these topics and train them on it as a basic to use later on. may be the review needs from two to four weeks, it is dependent on the students capabilities on understanding

Number :
  numbers concepts from 20 to 29 as tens and units, also up to 100
 	
  Recognize 100 as a unit and counting using 100s up to 1000.
- reading and writing the numbers up to 100
	for example: we can say 37 is three tens and 7 units, or three units less than four tens
	Counting as : 100, 200, 300, … 1000
	
	As mention on reading and writing numbers within 20

Addition and subtraction: Recognize the meaning and using of the signs + , - , =	To be use in solving the exercises, not solving the writing (words) exercises, because this type will be later in order to proficient the reading and writing

The mathematical content for all the grades of compulsory stage translated from Arabic to English language, as a summary of the topics in the content. The following tables included on a summary describe the mathematical content for all grades (1 to 9) as follow:

Content	1st grade	2nd grade
Arithmetic	- Reading and writing natural numbers from 1 to 20. - Figures of numbers and ordered numeration. - The concepts of addition and subtraction within 20. - Using facts of addition and subtraction within 20 to solve mathematical problems. - Using illustrative figures for numerating and arithmetic Operations.	- Natural numbers: reading and writing natural numbers within 100. - Figures of numbers within 100. - Recognizing the significance of +,-, =. - Facts of addition and subtraction within 100. - The concepts of multiplication and division within 50. - Using rules of multiplication to solve mathematical and practical problems. - Using illustrative figures as circle and half circle and square to realize the idea of fractions.
Measurement	- Identifying measurement units: money, weight, time and length	- Using measurement units to solve mathematical problems.

Content	3rd grade	4th grade
Arithmetic	- Natural numbers: - Reading and writing natural numbers within 1000. - Decimal representation in base 10. - Facts of addition and subtraction within 1000. - Multiplication and division within 1000. - Multiplying numbers by multiples of ten. - Dividing numbers within 1000 by multiples of ten. - Using the facts of operations on numbers to solve mathematical and practical problems. - Understanding the concepts of fractions using objects representations. - Reading and writing and comparing fractions 1/2, 1/3, 1/4	- Numbers: - reading and writing numbers up to 10,000. - Developing reading and writing numbers up to a million. - Using facts of the four fundamental operations of arithmetic to solve practical problems involving numbers up to a million. - Common fractions: the concepts of common fractions, reading and writing fractions and mixed numbers - Addition and subtraction of common fractions. - Converting mixed numbers into fractions and vice versa. - Decimal fractions: the concepts of decimal fraction: the concepts decimal fraction writing decimal fractions up to three decimal places. - Addition and subtraction within three decimal places. - Using units of measurement (length, money, and weight units) to solve practical problems involving decimal fractions.
Measurement	- Recognizing the relationships between measurement units: - Money : dinar and half, and quarter - Time : period of lesson started, and lunch. - Using the relationships between measurement units to solve mathematical problems.	- Reading the time (hour) within quarter and third of hour.
Geometry		- Drawing lines and elementary geometric figures (the square and rectangle) using the ruler and graph paper.

Content	5th grade	6th grade
Arithmetic	- Numbers: - divisibility by 2,3,5,9 and 10. - Prime number: prime numbers up to 100. Factors of the numbers. - Factorization of numbers: writing numbers (up to 100) as products of prime numbers. - The concepts of multiples, the common factors, the least	- Arithmetic means, squares of numbers up to 10. - finding out the square roots of numbers by means of factorization. Proportion. - the meaning of proportion, percentage, - converting, percentages into common and decimal fractions. - Simple profit, proportional division

	common multiple.
	- Using factorization to find out the common multiple of numbers.
	- Common fractions:
	- concept of Common fractions: and reduction fractions,
	- addition common fractions using the method of the least common denominator.
	- subtraction common fractions using the method of the least common denominator.
	- Multiplying common fractions with integer.
	- Multiplying two common fractions.
	- Division of integer number on common fractions.
	- Division of common fractions on integer number.
	- Dividing two common fractions.
	- Solving problems involving common fractions.
	- Decimal fractions:
	- the concept of decimal fractions, converting decimal fractions into common fractions.
	- Multiplication decimal fractions by multiples of ten.
	- Division of decimal fractions on multiples of ten.
Measurement	- Areas:
	- the concept of area according the geometrical shapes through counting the numbers of squares.
	- metric system of area: m2, cm2,donm(1000 m2).
	- Using geometric formulas to find the areas of square and rectangle..
	- Volumes:
	- the concept of volume and amplitude, metric system of volume: m3, cm3.
	- Calculating the volumes of rectangular solid and cube.

- Interpreting and Representing data by diagrams: bar graphs and charts.

Geometry	- The straight line, measuring the straight line practically, bisect the straight line by means of measurement. - Using geometry tools to draw geometric figures and use measurements to compare them. - The concept of angles. - Drawing elementary geometric figures: circles, square, and rectangle using geometry tools. - Triangle: six elements, types related to the sides and angles. - Drawing the triangle if given: three sides, or two sides and angle , or two angles and one side.	- Revision of drawing a triangle with given properties. - Drawing circles and calculating their circumferences and areas, - drawing quadrangles. - The map scale, finding out the actual distance between two points on a map.

Content	7th grade	8th grade
Arithmetic	- Revision: divisibility factorization, power, finding out the square roots of numbers by means of factorization, - the concepts of the greatest common divisor and the least common multiple, finding out the greatest common divisor and the least common multiple by means of factorization. - Common fractions; operations on common fractions. - Decimal fractions and approximation: arithmetic operations on decimal fractions. - converting fractions and representing them in different forms. - Approximating numbers, solving different problems concerning the four basic operations of arithmetic.	- Systems of measurement: Metric system and British system of measurement: - revision of measurement units, converting between the different units of length, area, volume, amplitude and weight. - Using units of measurement to solve mathematical and practical problems of volumes and areas. - The concept of Pythagoras theorem. - Using Pythagoras theorem to find the solution of a right-angle triangle. - Finding out the square roots of numbers.
Algebra	- Symbols and algebraic terms, factors of algebraic terms, calculating the numerical value of an algebraic expression. - The four fundamental operations of arithmetic on algebraic expressions, - Reducing common algebraic fractions. - Simple algebraic equations and how to solve them.	- Solving a system of linear equation. - Using different ways of factorization to reduce algebraic expression. - The four fundamental operations of arithmetic on algebraic expressions. - algebraic fractions: arithmetic operations on algebraic fractions. - Reducing algebraic fractions and solving algebraic fractional equations. - Representing points in the Cartesian plane.
Geometry	- Angles: recognizing the types of angles and the relationships between them. - Parallel lines and the relationships between the resultant angles.	- Proving geometric theories concerning the properties of isosceles triangle. - The parallelogram. The relationships between angles and sides of the triangle.

- Geometric theories concerning the angles of the triangle and polygon.	- Using theories to solve geometric problems.
- Proving theories using congruent triangles.	- Using geometry tools to draw geometric figures.
- Constructional geometry:	
- using geometry tools to copy a given angle, to draw line parallel to a given a line, bisect a given angle and	
- Drawing a line perpendicular to a given line from a point on the line or from a point outside the line, how to use the proof.	
- apply and use geometric tools to draw parallel lines, transfer and bisect angles to accurately.	
- Draw vertical line from a point outside and lies on a given line with accuracy.	

Content	9th grade
Arithmetic	- Proportion: percentage, using percentage to solve problems,
	- proportional division, gain and loss, simple interest, discount, compound interest.
	- - Solving mathematical and practical problems using units of units of money.
Algebra	- Factorization of algebraic expressions.
	- Factorizing the algebraic expression on the general form : $ax^2 + bx + c$.
	- Factorizing the difference between squares of two algebraic expressions.
	- Factorizing summation and difference cubic of two algebraic expressions.
	- Calculating the square root by means of factorization.
	- Reducing algebraic expression by means of factorization.
	- Solving practical problems by means of factorization.
	- Solving linear algebraic equations (degree one) and quadratic algebraic equations (degree two) by means of factorization.
	- sketching: providing sketches of linear functions.
	- Solving a system of linear equations by means of sketching.
Geometry	- The concept of locus, identifying locus.
	- Geometric theories concerning congruence and areas.
	- Using geometric facts to solve problems.
	- Pythagoras Theorem: using Pythagoras theorem to find out the solution of the right-angle triangle.
	- The concept of trigonometric expressions and calculating them.
	- Using mathematical formulas to calculate areas of geometric figures (two dimensions).
	- Proving geometric theories.
	- The concept of the circle and related theories, proving them using these theories to solve problems of geometry.

Secondly: Mathematics Curriculum for secondary stage.

The curriculum document for secondary stage (MOE, 1971) includes the following aspects;

- The learning objectives of teaching mathematics in secondary stage.
- Table of distributing periods for grades.
- Content of topics.
- Curriculum of plane geometry for first secondary year.
- Curriculum of Analytical and space(Solids) geometry for second and third secondary years.
- Trigonometric Curriculum for first, second and third secondary years.
- Algebra Curriculum for first, second and third secondary years.
- Mechanics curriculum for second and third secondary years.
- Statistics curriculum for third secondary year.
- The General mathematics curriculum (for the second and third literary stream).

2.1   The learning objectives of teaching mathematics for the secondary stage.

The mathematics curriculum for secondary stage includes on the following learning objectives:

- To develop a logical thought process by familiarizing students with the knowledge of mathematical structure which encompasses definite and indefinite terms, axioms and theories,
- To enable students to use the basis of mathematical thinking in other fields and in dealing with real life situation.
- To familiarize students with mathematical terms such as, opposite theory, if .... then will be ...... and enable them to use these terms properly.
- To introduce the approaches of direct and indirect proof to solve mathematical problems.
- To develop their ability to use symbols, be aware of their significance to generalize and abbreviate, and enable them to grasp mathematical rules and solve problems.
- To develop positive social, religious and scientific concepts in students like accuracy, organization and patience through the use of mathematics.
- To keep students abreast of modern achievements in the field of technology.
- To familiarize students with mathematical knowledge needed in other fields.
- To prepare them to pursue college education.
- To highlight the role of consecutive civilizations in passing on knowledge to current generations, especially with regard to the Islamic civilization.
- To develop particular skills in students like accuracy, flexibility and speed while solving mathematical problems.
- To enable students to explore the aspects of beauty and harmony found in mathematics.
- To expand their perception of space in its three dimensions.
- To develop their ability to estimate and approximate, and to prove.

- To provide them with the mathematical skills necessary for real life, work and college education.

2.2 The mathematical content of teaching mathematics for the secondary stage.

The mathematical content for secondary stage is translated to English language, and the topics of the content included in the document is organized as a summary in tables for all grades (10 to 12), also the topics which display in the table for 11th and 12th grades are for scientific stream as follow:

Content	10th grade
Plane geometry	- Circles:circle Angles: definitions, - theorems: the relation between the central angle and the angle lies on the circle on the same arc. - The angle in front of the diameter - the relation between angles lies on the circle and have the same arc. - Numerical application on circle angles. - Arcs of the circle: - Definitions of biggest and smallest arc - Theorem and results of theorem - Numerical application on arcs of the circles - tangents of the circle: - Definitions of tangent and tangent point. - Theorem and results of theorem - Numerical application on circle tangents. - circles tangency , - Definitions of circles tangency from internal and from outside, and tangent point. - Theorem and results of theorem - Numerical application on circle tangency - Tangency angles: - Definitions of angle tangent, sector . - Theorem and results of theorem - Numerical application on circle tangency - laws of circle: - area, and perimeter of circle - Numerical application on circle laws - Proportion: - Definitions of ratio, terms of the ratio. - proportionality Rules.

	- The ratio between areas of two triangles have the same high as the ratio between their bases.
	- Numerical application on ratio and proportional.
	- proportional division:
	- Definitions and theorems and numerical applications.
	- Properties of operations of distribution addition on multiplication on natural and rational numbers.
	- Similarity:
	- Similarity of shapes
	- Similarity of triangles
	- Numerical applications
	- squares of sides, the triangle:
	- projection of lines on other line
	- numerical applications on squares of, triangle sides.
	- Solving general exercises.
Analytical and Solid Geometry	= = = == == == ==
Algebra	- introduction about Sets theory:
	- concept of set
	- examples
	- elements of a set
	- representation by Venn Diagrams
	- universal set
	- subsets and operations on sets
	- De Morgan laws
	- Function:
	- linear functions and quadratic functions,
	- graphing linear and quadratic functions.
	- Linear and quadratic equations and inequalities,
	- solving quadratic equations using the algebraic methods.
Trigonometry	- Trigonometry expressions of acute angles: definitions and calculation of $\tan(x)$, $\cos(x)$, $\sec(x)$, $\csc(x)$, $\cot(x)$
	- Trigonometry expressions for angles (30, 45, 60).
	- Solving real life problems.
	- fundamental relationships among them.
	- Trigonometry identities and equations
Mechanics	= = = == == == ==
Statistics and probability	- = = = == == == ==

Content	11th grade
Plane geometry	= = = == == == ==
Analytical and Solid Geometry	- Analytical Geometry:
	- The Cartesian coordinates,
	- the distance between two points,
	- the concept of slope
	- the slope of a straight line,
	- condition of lines parallel
	- condition of lines perpendicular
	- the forms of straight line equations
	- $y = ax + c$, $y - y1 = a (x - x1)$, $ax + by + c = 0$
	- lines intersection and Fundamental theorems on their
	- solid Geometry:
	- Fundamental theorems of studying solids.
	- Definitions and general principles,: the plane, parallel, perpendicular, the relation between line and plane , also plane with plane
	- Fundamental Theorems related to the relation between line and plane in parallel, intersection and perpendicular cases.
	- Fundamental Theorems related to the relation between two planes.
	- Studying the solids:
	- Definitions of prism and cylinder ,
	- Fundamental Theorems related to the prism and cylinder.
Algebra	- Relations and functions:
	- Relations: type of relations (reflexive, symmetric, transitive, equivalence).
	- Graphing of relations with two pairs of coordinates.
	- Functions: the concepts of domain and range
	- polynomials and algebraic functions.
	- exponential functions, and logarithmic functions.
	- Number system: set of Natural numbers and integer,
	- Properties of addition and multiplication operations as a groups and ring natural
	- Rational numbers and properties of addition and multiplication operations as a group and ring and field
	- Set of Real number
	- Using the Mathematical induction to prove the summation of sequences and geometrical sequences.
	- Numerical systems to base other than ten, and simple mathematical operations.

Trigonometry	- Trigonometry ratio:
	- Definition of positive and negative angle
	- Trigonometry ratio by Cartesian coordinates
	- Trigonometry ratio for angles (0 and 90 and multiples)
	- trigonometry expressions of any angle,
	- graphing the Trigonometry functions.
	- circular measure: concept of circular unit (radius angle),
	- exchanging from grade to radius measures.
	- Founding the circular arc, piece and sectors area.
	- compound angles.
	- Trigonometry ratio for sum and difference angles
	- Trigonometry ratio for multiple angles
	- Exchanging from sum and difference ratio to multiplication product.
Mechanics	- Speed, velocity and acceleration
	- Vectors and operations on defined on vectors
	- Compound motion
	- projectiles, force, and motion laws
	- circular motion: velocity circular and acceleration circular
Statistics and probability	= = = == == == ==

Content	12th grade
Plane geometry	= = = == == == ==
Analytical and Solid	- Analytical Geometry
Geometry	- Circle: the equation of circle if center and radius known , the general form of circle equation,
	- the relationship between a line and a circle and founding the length of tangent
	- the relationships between two circles in cases tangency and intersection .
	- Solid Geometry
	- Review of prism and cylinder.
	- The concepts of Pyramid and cone, and fundamental theorems on their.
	- The concept of sphere, and Fundamental theorems on it.
	- Calculating areas and volumes of Pyramid, sphere and cone
Algebra	- Introduction on :
	- Permutations and combinations,
	- Binomial theory with integers and natural exponential ,

	- Number system: include reviewing to the topics in the previous class.
	- complex numbers and De Moviere's Theorem.
	- Representing the complex numbers by polar coordinates.
	- Properties of addition and multiplication operations on real number as a field.
	- - Calculus:
	- differential:
	- Limits
	- The first derivative
	- Founding the first derivative using the limits
	- Rules of differential
	- Applications of differential: speed, and acceleration, maximum and minimum values.
	- Integration
	- Definition of integral calculus (limited and unlimited),
	- applications of integral calculus(areas and volume)
Trigonometry	- Trigonometry
	- The relationship between sides and angles of a triangle,
	- finding the general solution of a right triangle
	- Applying the trigonometric expressions on finding the distance and height.
Mechanics	- Newton's laws of motion,
	- momentum,
	- work, power, energy,
	- Friction and equilibrium.
Statistics and probability	- Statistics,
	- Statistics data, graphing of statistic data,
	- measurement of central tendency,
	- deviation measurements,
	- Normal distribution.
	- Coefficient of correlation
	- Probability
	- Concept of probability and, random variable, expectation,
	- Sample space and experimental
	- laws of probability,
	- independent events and
	- Binomial distribution.

Content of 11th grade (literary)	Content of 12th grade (literary)
- Algebra:	- Algebra
- Number system:	- Probability theory:
- set of Natural numbers and integer, properties of addition and multiplication operations as a groups and ring natural	- introduction in Permutations and combinations,
	- binomial theory with integers and natural exponential ,
- Rational numbers and properties of addition and multiplication operations as a group and ring and field	- Concept of probability and, random variable, expectation,
- Set of Real number	- Sample space and experimental
- Using the Mathematical induction to prove the summation of sequences and geometrical sequences.	- laws of probability,
	- independent events and
- Numerical systems to base other than ten, and simple mathematical operations.	- binomial distribution.
- Mechanics	- Statistics and Probability:
- Speed, velocity and acceleration	- Statistics,
- motion in the plane	- Statistics data, graphing of statistic data,
- Compound motion in the plane	- measurement of central tendency,
- projectiles,	- deviation measurements,
- force,	- normal distribution.
- work	- Coefficient of correlation
- motion laws	
- frictions	