TABLE OF CONTENT

MATHEMATICS:

The learning of Mathematics imparts many skills that contribute to the development of the human mind. It trains the learner to think methodically and rationally, analyze various types of situations, anticipate and plan, make decisions and solve problems. Mathematics also serves as a tool that facilitates the gaining of knowledge related to science and technology. Mathematical skills and knowledge are indeed essential to enhance our standard and quality of living in the modern area.

The Basic Education Core Curriculum aims to inculcate the following five key competencies among students:

- Communication Skill
- Thinking Skill
- Problem – Solving Skill
- Applying Life Skill
- Technological Application Skill

The learning areas in the study of mathematics in the middle School are designed to enable students to acquire mathematical skills and knowledge according to their utmost potential. The learning areas are as follows:

- **Numbers and Operations**:

Numerical concepts and sense of perception; real number system; properties of real numbers; operation of numbers; ratio; percentage; problem-solving involving numbers; and application of numbers in real life.

- **Measurement:**

Length; distance; weight; area; volume and capacity; money and time; measuring units; estimation for measurement; trigonometric ratio; problem-solving regarding measurement; and application of measurement in various situations

- **Geometry**:

Geometric figures and properties of one-dimensional geometric figures; visualization of geometric models; geometric theories; and geometric transformation through translation, reflection and rotation

- **Algebra**:

Pattern; relationship; function; sets and their operations; reasoning; expression; equation; equation system; inequality; graph; arithmetic order; geometric order; arithmetic series; and geometric series

- **Data Analysis and Probability**:

Determining an issue; writing questions; determining methods of study; study; data collection, systematization and presentation; central tendency and data distribution; data analysis and interpretation; opinion polling;

probability; application of statistical knowledge and probability; application of probability in explaining various situations as well as for facilitating decision-making in real life

- **Mathematical Skills and Processes**:

Problem-solving through diverse methods; reasoning; communication and presentation of mathematical concepts; linking mathematics with other disciplines; and attaining ability for creative thinking.

STRANDS AND LEARNING STANDARDS

Strand 1: Numbers and Operations

Standard M1.1: Understanding diverse methods of presenting numbers and their application in real life

Standard M1.2: Understanding results of operations of numbers, relationships of operations, and application of operations for problem-solving

Standard M1.3: Use of estimation in calculation and problem-solving

Standard M1.4: Understanding of numerical system and application of numerical properties

Strand 2: Measurement

Standard M2.1: Understanding of the basics of measurement; ability to measure and estimate the size of objects to be measured

Standard M2.2: Solving measurement problems

Strand 3: Geometry

Standard M3.1: Ability to explain and analyze two-dimensional and three dimensional geometric figures

Standard M3.2: Ability for visualization, spatial reasoning and application of geometric models for problem-solving

Strand 4: Algebra

Standard M4.1: Understanding and ability to analyze pattern, relation and function

Standard M4.2: Ability to apply algebraic expressions, equations, inequalities, graphs and other mathematical models to represent various situations as well as interpretation and application for problem-solving

Strand 5: Data Analysis and Probability

Standard M5.1: Understanding and ability to apply statistical methodology for data analysis

Standard M5.2: Application of statistical methodology and knowledge of probability for valid estimation

Standard M5.3: Application of knowledge of statistics and probability for decision-making and problem-solving

Strand 6: Mathematical Skills and Processes

Standard M6.1: Capacity for problem-solving, reasoning; communication and presentation of mathematical concept; linking various bodies of mathematical knowledge and linking mathematics with other disciplines; and attaining ability for creative thinking

For common understanding and correct interpretation, the curriculum prescribes various codes for learning standards and indicators. One example is shown below:

M 1.1 Gr 7/2	
M	Subject area of Mathematics
1.1	First subject area, Standard 1
Gr7/2	Indicator 2 for Grade7 (Mathayom1)

LEARNERS' QUALITY

- Understand concepts of numbers, ratio, proportion, percentage, and real numbers expressed in exponential notation with integer indices, square root and cube root of real numbers; can carry out operations involving integral numbers, fractions, decimals, exponents, square roots and cube roots of real numbers; can apply numerical knowledge in real life.
- Have knowledge and understanding of surface areas of prisms and cylinders, and volume of prisms, cylinders, pyramids, cones and spheres; can appropriately choose units of the various systems of measuring length, area, and volume; and can apply knowledge of measurement in real life.
- Can construct and explain stages of constructing two-dimensional geometric figures with compass and straight edge; can explain characteristics and properties of three- dimensional geometric figures, i.e., prisms, pyramids, cylinders, cones and spheres.
- Understand properties of congruence and similarities of triangles, parallels, Pythagoras' theorems and converse; can apply these properties for reasoning and problem-solving; and understand geometric transformation through translation, reflection and rotation.
- Can visualize and explain characteristics of two-dimensional and three- dimensional geometric figures.
- Can analyze and explain relationships of patterns, situations or problems; and can use single-variable linear equations, two-variable linear equation systems, single-variable linear inequality, and graphs in problem solving.
- Can determine an issue, write questions about a problem or a situation, determine methods of study and collect and present data by utilizing pie charts or any other forms of presentation.

- Understand concepts of the measures of central tendency, arithmetic mean, median, and mode of non-frequency distribution data that can be chosen appropriately for application, as well as apply knowledge in considering statistical data and information.
- Understand the concepts of random sampling and probability; can apply knowledge of probability for projecting and for decision-making in various situations.
- Can apply diverse methods for problem-solving; avail mathematical and technological knowledge, skills and processes appropriately to solve problems faced in various situations; can suitably provide reasoning for decision-making and appropriately present the conclusion reached; can use mathematical language and symbols for communication; can communicate and present mathematical concepts accurately and clearly; can link various bodies of mathematical knowledge; can link mathematical knowledge, principles and processes with other disciplines; and have attained ability for creative thinking.

MATHAYOM SUKSA 1

FUNDAMENTAL MATHEMATICS 1&2:

Course Description

Fundamental Mathematics 1and 2 is the continuation of the Math Course studied in elementary school . The aim is to prepare students for Algebra I in the 8th grade (M.2). Fundamental Mathematics 1and 2 provides a strong foundation for success in Algebra I and future math courses. The topics conform to the Basic Education Curriculum issued by the Ministry of Education of Thailand. The five major units of course content are number and operations, algebra, geometry and measurement, data analysis and probability, and problem solving. Each lesson is followed by skill practice and multi-step problem solving problems to prepare students for standardized tests. Since there are many overlapping materials with Algebra I, the students should be in an excellent position to succeed in the Algebra I upon completion of Fundamental Mathematics 1and 2.

Course Objectives

1. To present appropriate mathematics in an intellectually honest and mathematically correct manner.
2. To express positive attitudes towards, and exhibit an appreciation for mathematics.
3. To use problem solving as an integral part of mathematics.
4. To approach mathematics in a sequence that instills confidence, and then challenges students.
5. To offer communication problems to develop writing skills and allow students to practice explanation.
6. To encourage integration of technology tools.

7. To provide core mathematics that allows instructors to use methods integrated with content.
8. To have fun learning mathematics.

Textbook

FOCUS SMART MATHEMATICS: TEXTBOOK (MATHAYOM 1)

FUNDAMENTAL MATHEMATICS INDICATORS AND LEARNING AREA FOR MATHAYOM SUKSA 1

Subject : Fundamental Mathematics 1& 2 **Mathayom Suksa 1**

Subject Code : Ma21101

Credit(s):1.5 **Number of Period : 60**

Indicators	**Learning Area**
1. Properties of Counting Numbers	
M1.4 Gr6/2 Find the highest common factor (H.C.F) and the lowest common multiples (L.C.M) of a cardinal numbers	1.1 Factors of counting numbers 1.2 Prime numbers of counting numbers 1.3 Factorization of counting numbers 1.4. Finding Highest Common Factor (H.C.F) 1. 5. Finding Least Common Multiple (LCM)

Indicators	**Learning Area**
2. Integers	
M1.1 Gr7/1 Specify or give examples and compare added integral numbers, subtracted integral number.	2.1 Integer Comparison
M1.2 Gr7/1 Add, subtract, multiply and divide integral numbers for the purpose of problem-solving; be aware of validity of the answers; explain the results obtained from the addition, subtraction, multiplication, and division, and explain the relationship between addition and subtraction, and between multiplication and division of integral numbers. M1.2 Gr7/3 Explain results of expression in exponential notation of integral numbers, ratios and decimals. M1.3 Gr7/1 Use estimation appropriately in various situations, as well as for considering validity of answers reached through calculation. M1.4 Gr7/1 Apply knowledge and properties of integers for problem-solving	2.2 Positive integer, negative integer, and zero 2.3 Integer Comparison 2.4 Addition 2.5 Subtraction 2.6 Multiplication 2.7 Division Properties of integer and application

Indicators	Learning Area
3. Exponential	
M1.1 Gr7/2 Have concept of real numbers expressed in exponential notation with integral indices and write numbers in scientific notation.	3.1 Definition of Exponential
M1.2 Gr7/4 Multiply and divide real numbers in the form of exponents with the same bases and integral indices	3.2 Writing large numbers using scientific notation 3.3 Writing small numbers using scientific notation 3.4 Multiplication of exponential having the same base with integer exponent Division of exponential having the same base with integer exponent
4. Fundamental Geometry	
M3.1 Gr7/1 Construct and explain steps of basic geometric construction. M3.1 Gr7/2 Construct two-dimensional geometric figures by using basic geometric construction, and explain steps of construction without emphasizing proof.	4.1 Creating geometric figures using compasses and straightedge 4.2 Creating simple geometric figures using fundamental creation 4.3 Investigation of properties of geometry

Indicators	Learning Area
5. Decimals and Fractions	

M1.1 Gr7/1 Specify or give examples and compare added integral numbers, subtracted integral numbers, , fractions and decimals.	5.1 Comparing decimals
M1.2 Gr7/2 : Add, subtract, multiply and divide fractions and decimals for the purpose of problem solving; be aware of validity of the answers; explain the results of the addition, subtraction, multiplication and division; and explain relationships between addition and subtraction, and between multiplication and division of fractions and decimals. M1.2 Gr7/3: Explain results of expression in exponential notation of integral numbers, ratios and decimals. M1.3 Gr7/1: Use estimation appropriately in various situations, as well as for considering validity of answers reached through calculation.	5.2. Addition and subtraction of decimals and Fractions 5.3.Multiplication and division of decimals and Fractions 5.4 Combined operations of decimals and Fractions

Indicators	Learning Area
6 Estimation	
M1.3 Gr6/1 Make approximate estimates of various integers of cardinal members M1.3 Gr6/2 Make estimates of decimals of not more than 3 places	6.1 Estimated values 6.2 Rounding off 6.3 Estimation
7 Ordered Pairs and Graphs	
M4.2 Gr7/4 Draw a graph on the plane of the rectangular coordinate system showing the relationship of the two sets of quantities given.	7.1 Ordered pairs and graphs of ordered pairs
M4.2 Gr7/5 Read and interpret the meaning of the graph on the plane of the rectangular coordinate system given.	7.2 Graphs and the application
8 Linear Equations with One variable	
M4.2 Gr7/2 Write linear equations with one variable from simple situations or problems.	8.1 Patterns and relations 8.2 Answers of linear equations with one variable
M4.2 Gr7/1 Solve simple linear equations with one variable. M4.2 Gr7/3 Solve problems involving simple linear equations with one variable, as well as be aware of the validity of the answer.	8. 3 Solutions of linear equations with one variable 8.4 Linear equation problems

Indicators	Learning Area
9 **Relations between two-dimensional and three-dimensional geometric figures**	
M3.1 Gr7/4 Explain characteristics of three dimensional geometric figures from a given image	9.1 Two-dimensional geometric figures unfolded from three-dimensional geometric figures
M3.2 Gr7/5 Identify two-dimensional images from front view and side view of a given three-dimensional geometric figure. M3.2 Gr7/6 Draw or create a three-dimensional figure from a cube, when given two-dimensional image from front view, side view and top view.	9.2 Two-dimensional pictures from the front view, side view, or top view of three-dimensional geometric figures 9. 3 Drawing or making geometric figures constructed from cubes

FUNDAMENTAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 1 SEMESTER 1

Subject: Fundamental Mathematics 1 **Mathayom Suksa 1**

Subject Code : Ma21101

4 Chapters **60 Periods**

Learning area	**(Periods)**
1. Properties of Counting Numbers 1.1 Factors of counting numbers 1.2 Prime numbers of counting numbers 1.3 Factorization of counting numbers 1.4 Finding Greatest Common Divisor (GDC) 1.5 Finding Least Common Multiple (LCM)	10
2. Integer 2.1 Positive integer, negative integer, and zero 2.2 Integer Comparison 2.3 Addition 2.4 Subtraction 2.5 Multiplication 2.6 Division 2.7 Properties of integer and application	11
3. Exponential 3.1 Definition of Exponential 3.2 Writing large numbers using scientific notation 3.3 Writing small numbers using scientific notation 3.4 Multiplication of exponential having the same base with integer exponent 3.5 Division of exponential having the same base with integer exponent	21

4. Fundamental Geometry 4.1 Creating geometric figures using compasses and straightedge 4.2 Creating simple geometric figures using fundamental creation 4.3 Investigation of properties of geometry	18

FUNDAMENTAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 1 SEMESTER 2

Subject : Fundamental Mathematics 2

Subject Code : Ma21102

Mathayom Suksa 1

5 Chapters

60 Periods

Learning Areas	Periods
5. Decimals and Fractions 1.1 Decimals and decimal comparison 1.2 Fractions and fraction comparison 1.3 Addition, subtraction, multiplication, and division of decimals 1.4 Addition, subtraction, multiplication, and division of fractions 1.5 Relation between decimals and fractions	15
6. Estimation 2.1 Estimated values 2.2 Rounding off 2.3 Estimation	8
7. Ordered Pairs and Graphs 3.1 Ordered pairs and graphs of ordered pairs 3.2 Graphs and the application	10
8. Linear Equations with One variable 4.1 Patterns and relations 4.2 Answers of linear equations with one variable	12

4.3 Solutions of linear equations with one variable 4.4 Linear equation problems	
9. Relations between two-dimensional and three-dimensional geometric figures 5.1 Two-dimensional geometric figures unfolded from three-dimensional geometric figures 5.2 Two-dimensional pictures from the front view, side view, or top view of three-dimensional geometric figures 5.3 Drawing or making geometric figures constructed from cubes	15

ADDITIONAL MATHEMATICS 1&2 :

The learning areas in advanced mathematics Mathayom Suksa 1 are designed to enable students to acquire mathematical skills and knowledge according to their utmost potential. The learning areas are as follows:

- **Numbers and Operations**:

Read and write Roman numerals, specify the value of the digit in base numbers, and write the given base number to other base numbers. Use the knowledge about integers and exponents to solve problems, and recognizing the reasonableness of the answer. Find summation and difference of monomial and polynomials, and find the multiplication and division of the monomial and polynomials

- **Geometry**:

Observe, give the forward-looking statements, and simple mathematical reasoning.

- **Mathematical Skills and Processes**:

Arrange the experience to the students who can study, make concept, practice skills to develop calculated process skills. Capacity for problem-solving with the various methods, reasoning and communication; communication and presentation of mathematical concepts. Creative, and linking various bodies of mathematical knowledge with other disciplines. Use positively in daily life, including appreciating and having a good attitude to mathematics. Be able to work in a good, disciplined and careful system. Be responsible, critical and self-confident.

Learning Outcomes:

Numbers and Operations

1. Be able to read and write the Roman number.
2. Be able to specify the digit in given base numbers.

3. Be able to write the given base number to other base numbers.
4. Be able to find the summation and difference of monomial and polynomials.
5. Be able to find the multiplication and division of the monomial and polynomials.

Geometry

1. Observation, the forward-looking statements, and simple mathematical reasoning
2. Be able to use the basic creation to create more complex

Mathematical Skills and Processes

Capacity for problem-solving, reasoning; communication and presentation of mathematical concept; linking various bodies of mathematical knowledge and linking mathematics with other disciplines; and attaining ability for creative thinking

For common understanding and correct interpretation, the curriculum prescribes various codes for learning standards and indicators. One example is shown below:

ADDITIONAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 1 SEMESTER 1

Subject: Advanced mathematics 1 **Mathayom Suksa 1**

Subject Code : Ma21201 **40 periods**

Learning Areas	Learning outcomes	No Periods
1. **1.1 Geometrics Figures** 1.1.1 Curves 1.1.2 Triangle 1.1.3 Tangram 1.2 Counting Numbers 1.2.1 Prime Numbers 1.2.2 Number patterns : Euclidean Algorithm, The Sieve of Eratosthenes 1.2.3 Problems to ponder 1.3 Percent ,Interest, Bonus problem	1. Use knowledge and skills to solve the mathematical problem 2. Be aware of the validity of the answer obtained.	10
2. Numbers and Numerals **2.1** Ancient numeration system **2.2** Base number system **2.3** Base number conversion	3. Be aware of the validity of the answer obtained. 4. Be able to read and write the Roman number. 5. Be able to specify the digit in given base numbers. 6. Be able to write the given base number to other base numbers	12

Subject: Advanced mathematics 1 **Mathayom Suksa 1**

Subject Code : Ma21201 **40 periods**

Learning Areas	Learning outcomes	No Periods
3. Application of integers and exponentials 3.1 Counting numbers, whole numbers, odd and even numbers, prime numbers, and integers 3.2 Properties of integers and operation 3.3 Definition of exponentials 3.4 Properties of exponentials	1. Be able to use the knowledge about integers and exponents to solve problems. 2. Be aware of the validity of the answer obtained.	10
4. Geometric Construction 4.1 Division of lines and construction of different sizes of angles 4.2 Construction of triangles and parallelograms 4.3 Median , Centroid, Circumcentre	3. Be able to use the basic creation to create more complex	8

ADDITIONAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 1 SEMESTER 2

Subject : Advanced mathematics 2 **Mathayom Suksa 1**

Subject Code : Ma21202 **40 Periods**

Learning Areas	Learning Outcomes	No Periods
1. Preparation for reasoning 1.1. Conjectures 1.2. Conditional statements 1.3. Mathematical reasoning 1.4. Deductive and inductive reasoning	1 Observation, the forward-looking statements, and simple mathematical reasoning.	18
2. Polynomials 2.1. Monomials 2.2. Addition and subtraction of monomials 2.3. Polynomials 2.4. Addition and subtraction of polynomials 2.5. Multiplication of polynomials by monomials 2.6. Division of polynomials by monomials	1. Be able to find the summation and difference of monomial and polynomials. 2. Be able to find the multiplication and division of the monomial and polynomials.	12
3. Mathematical Application 3.1. Geometric Figures 3.2. Relation of two-dimensional and three –dimensional geometric figures 3.3. Number patterns 3.4. Network	3. Be able to use knowledge and skills to solve the mathematical problem 4. Be aware of the validity of the answer obtained.	10

MATHAYOM SUKSA 2

FUNDAMENTAL MATHEMATICS 3& 4:

Course Description

The Fundamental Mathematics 3and 4 course consists of a formal introduction to the study of algebra. It is a mandatory class for Mathayom 2 level students; this course is required by the Ministry of Education (Thailand). The Fundamental Mathematics 3 and 4 course studies real numbers and their properties, statistics, and liner equations with two variables.

Course Objectives

1. Prepare students for Mathayom 3 level Mathematics courses
2. Review and expand on concepts regarding real numbers and linear equations
3. Prepare students for future standardized tests, such as the SAT (Standardized Academic Test)
4. Students will be proficient with real numbers, statistics, and linear equations with two variables

Textbooks

FOCUS SMART MATHEMATICS: TEXTBOOK (MATHAYOM 2)

FUNDAMENTAL MATHEMATICS INDICATORS AND LEARNING AREAS FOR MATHAYOM SUKSA 2 SEMESTER 1

Subject : Fundamental Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22101 **60 Periods**

Indicators	Learning Areas
1. Ratio, Proportion and percentage	
M1.1 Gr8/4 : Apply knowledge of ratio, fraction and percentage to solve problems	1.1 Ratio of two quantities 1.2 Proportion 1.3 Ratio of three quantities 1.4 Relationship between percentages, fractions and decimals 1.5 Computation and problems involving percentages
2. Length and Area	
M2.1 Gr8/1 : Compare measuring units for length and area of the same and different systems and choose appropriate measuring units.	2.1 Measurement Length 2.2 Measurement Area
M2.1 Gr8/2. Appropriately estimate time, distance, area, volume and weight, and explain the method used for estimation. M2.1 Gr8/3 Appropriately choose estimation for measurement in various situations.	2.3 Estimations of measurements
M2.2 Gr8/1 Apply knowledge of length and area for problem-solving in various situations.	2.1 Measurement Length 2.2 Measurement Area 2.4. Measurement of Time

Indicators	Learning Areas
3. Pie Graphs	
M5.1 Gr8/1 Read and present data by using pie-charts.	3.1 Pie charts 3.2 Obtaining and interpreting information from pie charts 3.3 Solving problems involving pie charts
4.Transformations	
M3.2 Gr8/3 Understand and apply geometric transformation through translation, reflection and rotation. M3.2 Gr8/4 Identify images from translation, reflection and rotation of models, and explain the method of obtaining the images when given such models and images. M4.2 Gr8/2 Find coordinates of points and explain characteristics of geometric figures obtained from translation, reflection and rotation on the plane of the rectangular coordinate system.	4.1 Transformation 4.2 Translation 4.3 Reflection 4.4 Rotation 4.5 Isometric 4.6 Enlargement
5. Congruent Triangles	
M3.2 Gr8/1 Use properties of congruence of triangles and those of parallels for reasoning and problem solving.	5.1 Congruence of Geometric Figures 5.2. Congruent Triangles

Indicators	Learning Areas
Extension : Semester1 project	
M6.1 Gr8/1: Apply diverse methods for problem-solving. M6.1 Gr8/2: Appropriately apply mathematical and technological knowledge, skills and processes for problem-solving in various situations. M6.1 Gr8/3: Suitably provide reasoning for decision-making and appropriately present the conclusions. M6.1 Gr8/4: Accurately and use mathematical language and symbols for communication, communication of Concepts and presentation. M6.1 Gr8/5: Link various bodies of mathematical knowledge, and link mathematical knowledge, principles and processes with those of other disciplines M6.1 Gr8/6: Attain ability for creative thinking.	

FUNDAMENTAL MATHEMATICS INDICATORS AND LEARNING AREAS FOR MATHAYOM SUKSA 2 SEMESTER 2

Subject : Fundamental Mathematics 4 **Mathayom Suksa 2**

Subject Code : Ma22102 **60 Periods**

Indicators	Learning Areas
1. Fundamental of Real Numbers	
M1.1 Gr8/1 Write fractions in the form of decimals and write circulating decimals in form of fractions.	1.1 Rational Numbers
M1.1 Gr8/2 Distribute prescribed real numbers and give examples of rational and irrational numbers.	1.1 Rational Numbers 1.2 Real numbers
M1.4 Gr8/1 Explain relationships between real numbers, rational numbers, and irrational numbers	1.1Rational Numbers 1.2 Real numbers 1.3 Operation involving surds
M1.1 Gr8/3 Explain and specify square roots and cube roots of real numbers. M1.2 Gr8/1 Find square root and cube root of integral numbers by separating factors for the purpose of problem-solving as well as be aware of validity of the answers. M1.2 Gr8/2 Explain results of finding square root and cube root	1.3 Square Root 1.4 Cube Root

of integral numbers, fractions and decimals, and express the relationship between exponents and roots of real numbers M1.3 Gr8/1 Find estimates of square root and cube root of real numbers, which can be applied for problem solving, as well as be aware of validity of the answers	
2. Pythagoras' Theorem (Pythagorean Theorem)	
M3.2 Gr8/2 Use Pythagoras' Theorem and converse for reasoning and problem-solving.	2.1 Pythagoras' Theorem 2.2. Converse of Pythagoras' Theorem 2.3. Solving Problems and Situations using Pythagoras' Theorem and Converse of Pythagoras' Theorem
3. Applications of Linear Equations with Single Variable	
M4:2 Gr8/1 Solve problems of linear equation with one variable be aware of the validity of the answer M4:2 Gr8/2, Gr8/3, Gr8/4, Gr8/5	3.1 Solving Linear Equations with Single Variable 3.2 Solving Problems of Linear Equations with Single Variable 3.4 Applications of Equations for Solving Problems
4. Parallel Lines	
M3:2 Gr8/1	4.1 Definition and Properties of Parallel Lines 4.2 Triangles and Parallel Lines 4.3 Reasoning and Solving Problems Using Properties of Parallel Lines and Congruence of Triangles

FUNDAMENTAL MATHEMATICS
TEACHING PLAN FOR
MATHAYOM SUKSA 2 SEMESTER 1

Subject : Fundamental Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22101 **60 Periods**

Learning Area	Periods
1: Ratio, Proportion and Percentages 1.1 Ratio of two quantities 1.2 Proportion 1.3 Ration of three quantities 1.4 Relationship between percentages, fractions and decimals 1.5 Computations and problems involving percentages	11
2: Length and Area 2.1 Measurement of Length 2.2 Measurement of Area 2.3 Estimation and Measurement of Volumes and Weight 2.4 Measurements of Time	13
3: Pie Graphs 3.1 Pie charts 3.2 Obtaining information from pie charts 3.3 Solving problems involving pie charts	8

Subject : Fundamental Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22101 **60 Periods**

Learning Area	Periods
4: Transformations 4.1 Transformation 4.2 Translation 4.3 Reflection 4.4 Rotation 4.5 Isometric 4.6 Enlargement 4.7 Creativity of Art Works Using Geometric Transformations and Designing of Art Works Using Geometric Transformations	21
5. Congruent Triangles 5.1 Congruence of Geometric Figures 5.2. Congruent Triangles	7

FUNDAMENTAL MATHEMATICS TEACHING PLAN FOR

MATHAYOM SUKSA 2 SEMESTER 2

Subject : Fundamental Mathematics 4 **Mathayom Suksa 2**

Subject Code : Ma22102 **60 Periods**

Learning Area	Periods
1: Fundamental Real Numbers 1.1 Rational Numbers 1.2 Irrational Numbers 1.3 Square Root 1.4 Cube Root	11
2: Pythagoras' Theorem (Pythagorean Theorem) 2.1 Pythagoras' Theorem 2.2 Converse Pythagoras' Theorem 2.3 Solving Problems and Situations using Pythagoras' Theorem and Converse of Pythagoras' Theorem	12
3: Applications of Linear Equations with Single Variable 3.1 Solving Linear Equations with Single Variable 3.2 Solving Problems of Linear Equations with Single Variable 3.4 Applications of Equations for Solving Problems	18
4: Parallels line 4.1 Definition and Properties of Parallel Lines 4.2. Triangles and Parallel Lines 4.3. Reasoning and Solving Problems Using Properties of Parallel Lines and Congruence of Triangles	18

ADDITIONAL MATHEMATICS 3&4

Course Description

The Additional Mathematics course is a body of supplemental algebra topics designed to better prepare students for further study in mathematics. It is a mandatory class for Mathayom 2 level students. . The Additional Mathematics course studies linear equations and inequalities, systems of linear equations, and systems of linear inequalities.

Learning Outcomes:

Numbers and Operations

1. Multiply and divide a number which written in power form that has exponents and is the integer by using definition and properties of the power and use these to problem-solve
2. Be able to calculate and use the power in writing to demonstrate the small number or great number in scientific notation form.
3. Be aware of the validity of the answer obtained.
4. Be able to add, subtract, multiply and divide polynomial
5. Be able to add, subtract, multiply and divide the fraction of polynomial at not over one degree.
6. Be able to use the knowledge about ratio, proportion and percentage for problem-solving or a different situation.

Geometry

7. Ability to explain and analyze two-dimensional and three-dimensional geometric figures
8. Ability for visualization, spatial reasoning and application of geometric models for problem-solving

ADDITIONAL MATHEMATICS LEARNING OUTCOMES AND LEARNING AREAS FOR MATHAYOM SUKSA 2 SEMESTER2

Subject : Additional Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22201 **40 Periods**

Learning Outcomes	Learning Areas
1: **Indices and Standard forms**	
1. Multiply and divide a number which written in power form that has exponents and is the integer by using definition and properties of the power and use these to problem-solve 2. Be able to calculate and use the power in writing to demonstrate the small number or great number in scientific notation form.	1.1 Index Notation 1.2 Addition of indices 1.3 Subtraction of Indices 1.4 Multiplication of Indices 1.5 Products and fractions of Index forms 1.6 The Zero Index 1.7 The negative Index 1.8 Fractional Indices 1.9 Standard Form 1.10 Use of prefix for a very large and very small Numbers 1.11 Rounding off and Truncation Errors. 1.12 .Extension : Project][
2: **Fractional Polynomial**	
1. Be able to add, subtract, multiply and divide polynomial **2.** Be able to add, subtract, multiply and divide the fraction of polynomial at not over one degree.	2.3 Operations with Polynomials 2.3.1 Addition of polynomials 2.3.2 Subtraction of Polynomials 2.3.3 Multiplication of polynomials 2.3.4 Division of polynomials 2.4 Factorings Polynomials

Subject : Advanced Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22201 **40 Periods**

Learning Outcomes	Learning Areas
3: **Ratio, Proportion and percentage**	
10. Be able to use the knowledge about ratio, proportion and percentage for problem-solving or a different situation	3.1 Ratio 3.2 Percentages 3.3 Proportions 3.3 Golden ration 3.4 Golden Triangle 3.5 Golden Rectangle
4: **Transformations**	
M3.2 Gr8/3 Understand and apply geometric transformation through translation, reflection and rotation. M3.2 Gr8/4 Identify images from translation, reflection and rotation of models, and explain the method of obtaining the images when given such models and images. M4.2 Gr8/2 Find coordinates of points and explain characteristics of geometric figures obtained from translation, reflection and rotation on the plane of the rectangular coordinate system.	4.1 Transformation 4.2 Translation 4.3 Reflection 4.4 Rotation 4.5 Isometric 4.6 Enlargement

ADDITIONAL MATHEMATICS LEARNING OUTCOMES AND LEARNING AREAS FOR MATHAYOM SUKSA 2 SEMESTER 2

Subject : Additional Mathematics 4 **Mathayom Suksa 2**

Subject Code : Ma22202 **40 Periods**

Learning outcomes	Learning Areas
1. Factorization of Polynomials Degree Two	
1. Be able to factorize the quadratic polynomial 2. Be able to solve the quadratic polynomial factorization.	1.1. Polynomials Review - Multiplication of Polynomials by Polynomials - Division of Polynomials by Polynomials 1.2. Factorization Using Distributive Property 1.3 Factorization of Polynomials Degree Two with One Variable 1.4. Factorization of Polynomials Degree Two written in the Form of Perfect Square 1.5. Factorization Polynomials Degree Two written in the Form of Difference of Squares 1.6. Factorization of High-Degree Polynomials Having Integer Coefficient Using Perfect Square 1.7. Factorization of Polynomials Degree Exceeding Two Having Integer Coefficient 1.8. Factorization of Polynomials Having Integer Coefficient Using Remainder Theorem
2. Quadratic Equations	
3. Be able to solve the single-variable quadratic equation by factorization	2.1. Quadratic Equations with One Variable 2.2. Word Problems Involving Quadratic Equations with One Variable

Subject : Advanced Mathematics 4 **Mathayom Suksa 2**

Subject Code : Ma22202 **40 Periods**

Learning outcomes	Learning Areas
4. Variations	
4. Be able to write an equation for the variation between the two quantities	3.1. Direct Variation 3.2. Inverse Variation 3.3. Joint Variation 3.4. Applications

ADDITIONAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 2 SEMESTER 1

Subject : Additional Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22201 **40 Periods**

Learning Area	Periods
1: Indices and Standard forms 1.1 Index Notation 1.2 Addition of indices 1.3 Subtraction of Indices 1.4 Multiplication of Indices 1.5 Products and fractions of Index forms 1.6 The Zero Index 1.7 The negative Index 1.8 Fractional Indices 1.9 Standard Form 1.10 Use of prefix for a very large and very small Numbers 1.11 Rounding off and Truncation Errors. 1.12Extension : Project	10

2: Fractional Polynomial 2.1. Operations with Polynomials 2.2. Addition of polynomials 2.3 .Subtraction of Polynomials 2.4 Multiplication of polynomials 2.5 Division of polynomials 2.6 Factorings Polynomials	9
3: Ratio, Proportion and percentage 3.1 Ratio 3.2 Percentages 3.3 Proportions 3.3 Golden ration 3.4 Golden Triangle 3.5 Golden Rectangle	10

Subject : Additional Mathematics 3 **Mathayom Suksa 2**

Subject Code : Ma22201 **40 Periods**

Learning Area	Periods
Chapter 4: Transformations 4.1 Transformation 4.2 Translation 4.3 Reflection 4.4 Rotation 4.5 Isometric 4.6 Enlargement	11

ADDITIONAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 2 SEMESTER 2

Subject : Additional Mathematics 4 **Mathayom Suksa 2**

Subject Code : Ma22202 **40 Periods**

Learning Area	Periods
1. Factorization of Polynomials Degree Two 1.1. Polynomials Review 1.1.1 Multiplication of Polynomials by Polynomials 1.1.2 Division of Polynomials by Polynomials 1.2. Factorization Using Distributive Property 1.3 Factorization of Polynomials Degree Two with One Variable 1.4. Factorization of Polynomials Degree Two written in the Form of Perfect Square 1.5. Factorization Polynomials Degree Two written in the Form of Difference of Squares 1.6. Factorization of High-Degree Polynomials Having Integer Coefficient Using Perfect Square 1.7. Factorization of Polynomials Degree Exceeding Two Having Integer Coefficient 1.8. Factorization of Polynomials Having Integer Coefficient Using Remainder Theorem	19
2. Quadratic Equations 2.1. Quadratic Equations with One Variable 2.2. Word Problems Involving Quadratic Equations with One Variable	13
3. Variation 3.1. Direct Variation 3.2. Inverse Variation 3.3. Joint Variation 3.4. Applications 3.4 Golden Triangle	8

MATHAYOM SUKSA 3

FUNDAMENTAL MATHEMATICS5&6:

Course Description:

Fundamental Mathematics 5 and 6 is required of all students in Mathayom 3. The material to be covered during the semester was selected in accordance with the Basic Education Curriculum issued by the Ministry of Education Thailand (BE2551). During the term the material covered will meet and exceed all educational benchmarks and standards. The primary focus in this term will be the study of Advanced Algebra, Quadratic Equations, Polynomials, and other Pre-calculus topics.

The course, along with Additional Mathematics, is designed to provide students with the background needed for further study of Pre-calculus, Calculus and college mathematics.

Course Objectives

1. To provide a solid introduction to mathematical theory.
2. To develop analytical and critical thinking skills through investigative work.
3. To develop Information Technology skills related to mathematical topics.
4. To develop practical skills for solving a wide variety of mathematical problems.
5. To provide the students with useful estimation and mental calculation skills.
6. To provide the students with a number of problem solving techniques that can be applied to mathematics and other intellectual pursuits.

Textbooks

FOCUS SMART MATHEMATICS: TEXTBOOK (MATHAYOM 3)

FUNDAMENTAL MATHEMATICS INDICATORS AND LEARNING AREA FOR MATHAYOM SUKSA 3 SEMESTER 1

Subject : Fundamental Mathematics 5 **Mathayom Suksa 3**

Subject Code : Ma23101 **60 Periods**

Indicators	**Learning Area**
1. Volume and Surface Area	
M3.3.Gr9/1 Explain characteristics and properties of prisms, pyramids, cylinders, cones and spheres.	1.1 Prisms, pyramids, cylinders, cones and spheres
M2.1 Gr9/1 Find the surface area of prisms and cylinders M2.1 Gr9/4 Appropriately use estimation for measurement in various situations. M2.2 Gr9/1 Apply knowledge of area, surface area, length and volume for problem-solving in various situations M2.1 Gr9/2 Find the volume of prisms, cylinders, pyramids, cones and spheres. M2.2 Gr9/3 Compare units for measuring volume or capacity of the same or different systems and choose appropriate units of measure. M2.2 Gr9/4 Appropriately use estimation for measurement in various situations. M2.2 Gr9/1	1.1 Finding surface area and volume of prism. 1.2 Finding surface area and volume of pyramid 1.3 Finding surface area and volume of cylinder. 1.4 Finding surface area and volume of cone. 1.5 Finding surface area and volume of sphere 1.6 Comparing units of volume. 1.7 Solving problem questions or situation about surface area and Volume

Apply knowledge of area, surface area, length and volume for problem-solving in various situations.	

Subject : Fundamental Mathematics 5 **Mathayom Suksa 3**

Subject Code : Ma23101 **60 Periods**

Indicators	**Learning Area**
2. Linear Equation system	
M4.2 Gr9/5 Solve systems of linear equations with two variables which can be applied for problem solving, as well as be aware of the validity of the answer.	2.1 Linear equation with two variables 2.2 Graph of linear equation with two variables 2.3 Linear equation system with two variables 2.4 Solving linear equation system with two variables. 2.5 Solving problem questions about linear equation system with two variables.
3. Equation System	
M4:2 Gr9/4 M4:2 Gr9/5	3.1 Solving equation system with two variables no higher than two degrees. 3.2 Solving problem questions about equation system with two variables no higher than two degrees.
4. Similarities	
M3.2 Gr9/1 Use properties of similar triangles for reasoning and problem-solving.	4.1 Similar images 4.2 Similar triangles 4.3 Properties of similar triangles 4.4 Application

FUNDAMENTAL MATHEMATICS INDICATORS AND LEARNING AREAS FOR MATHAYOM SUKSA 3 SEMESTER 2

Subject : Fundamental Mathematics 6 **Mathayom Suksa 3**

Subject Code : Ma23102 **60 Periods**

Indicators	**Learning's area**
1. Linear Inequality	
M4.2 Gr9/1 Apply knowledge of linear inequalities with one variable for problem-solving, as well as be aware of the validity of the answer.	1.1 Solutions and graphs demonstrating solutions of linear inequalities with single variable 1.2 Solving linear equations with single variable. 1.3 Solving problem questions about linear equations with single variable.
2. Probability	
M5.2 Gr9/1 Find probability of events from random sampling with equal probability for each result, and apply knowledge of probability for valid projection of events. M5.3 Gr9/1 Apply knowledge of statistics and probability for decision-making in various situations.	2.1 Random experiment and events 2.2 Finding probability of events. 2.3 Application

Subject : Fundamental Mathematics 6 **Mathayom Suksa 3**

Subject Code : Ma23102 **60 Periods**

Indicators	**Learning's area**
3. Statistics	
M5.1 Gr9/1 Determine an issue and write questions about various problems or situations, as well as set appropriate methods for study and for data collection. M5.1 Gr9/3 Present data in appropriate forms.	3.1 Setting topic, writing question statement, setting methods for the study, and collecting data.
M5.1 Gr9/4 Read, interpret and analyze the data obtained from presentations. M5.3 Gr9/1 Apply knowledge of statistics and probability for decision-making in various situations. M5.3 Gr9/2 Discuss possible errors in presenting statistical data.	3.2 Presenting data. Reading, interpreting meaning, analyzing data and applying information data.
M5.1 Gr9/2 Find arithmetic mean, median and mode of non-frequency distribution data, and make appropriate selection for utilization. M5.3 Gr9/1 Apply knowledge of statistics and probability for decision-making in various situations.	3.3 Finding mean of data. 3.4 Selecting application of mean of data.

Sbject : Fundamental Mathematics 6 **Mathayom Suksa 3**

Subject Code : Ma23102 **60 Periods**

Indicators	**Learning's area**
4. Trigonometric ration and application	
M6:1 Gr9/1 M6:1 Gr9/2 M6:1 Gr9/3 M6:1 Gr9/4 M6:1 Gr9/5 M6:1 Gr9/6	4.1 Trigonometric ratios 4.2 Trigonometric ratios of 30o, 45o and 60 o angles 4.3 Read trigonometric ratios from the table or by using calculator. 4.4 Apply trigonometric ratios in solving problems about distance and height.

FUNDAMENTAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 3 SEMESTER 1

Subject : Fundamental Mathematics 5 **Mathayom Suksa 3**

Subject Code : Ma23101 **60 Periods**

Learning Area	**(Periods)**
1. Volume and Surface Area 1.1 Finding surface area and volume of prism. 1.2 Finding surface area and volume of pyramid 1.3 Finding surface area and volume of cylinder. 1.4 Finding surface area and volume of cone. 1.5 Finding surface area and volume of sphere 1.6 Comparing units of volume. 1.7 Solving problem questions or situation about surface area and Volume	16
2. Linear Equation system 2.1 Linear equation with two variables 2.2 Graph of linear equation with two variables 2.3 Linear equation system with two variables 2.4 Solving linear equation system with two variables. 2.5 Solving problem questions about linear equation system with two variables.	14
3. Equation System 3.1 Solving equation system with two variables no higher than two degrees. 3.2 Solving problem questions about equation system with two variables no higher than two degrees.	15
4. Similarities 4.1 Similar images 4.2 Similar triangles 4.3 Properties of similar triangles 4.4 Application	15

FUNDAMENTAL MATHEMATICS TEACHING PLAN FOR MATHAYOM SUKSA 3 SEMESTER 2

Subject : Fundamental Mathematics 6 **Mathayom Suksa 3**

Subject Code : Ma23102 **60 Periods**

Learning Area	**(Periods)**
1. Linear inequality 1.1 Solutions and graphs demonstrating solutions of linear inequalities with single variable 1.2 Solving linear equations with single variable. 1.3 Solving problem questions about linear equations with single variable.	18
2. Probability 2.1 Random experiment and events 2.2 Finding probability of events. 2.3 Application	13
3. Statistics 3.1 Setting topic, writing question statement, setting methods for the study, and collecting data. 3.2 Presenting data. 3.3 Reading, interpreting meaning, analyzing data and applying information data. 3.4 Finding mean of data. 3.5 Selecting application of mean of data.	18
4. Trigonometric ration and application 4.1 Trigonometric ratios 4.2 Trigonometric ratios of 30o, 45o and 60 o angles 4.3 Read trigonometric ratios from the table or by using calculator. 4.4 Apply trigonometric ratios in solving problems about distance and height.	11

ADDITIONAL MATHEMATICS 5&6

Course Description

Additional mathematics is designed to supplement the core learning of Fundamental mathematics course. This course emphasizes on logic, mathematical reasoning, and conjecturing, inventing, problem solving and promotes discovery and active learning. The topics for the first semester of this course focus on polynomials, exponents, power and roots, radicals, square root, solving equations with radicals and exponents, and fractional exponents.

Course Objectives

1. To present appropriate mathematics in an intellectually honest and mathematically correct manner.
2. To express positive attitudes towards, and exhibit an appreciation for mathematics, and to have fun in learning math.
3. To use problem solving as an integral part of mathematics.
4. To approach mathematics in a sequence that instills confidence, and then challenges students.
5. To offer communication problems to develop writing skills and allow students to practice explanation.
6. To encourage integration of technology tools.
7. To provide core mathematics that allows instructors to use methods integrated with content.

Textbooks

ADDITIONAL MATHEMATICS LEARNING OUTCOMES AND LEARNING AREAS FOR MATHAYOM SUKSA 3 SEMESTER 1

Subject : Additional Mathematics 5 **Mathayom Suksa 3**

Subject Code : Ma23201 **40 Periods**

Learning Outcomes	**Learning Areas**
1: **Powers and Roots**	
3. Multiply and divide a number which written in power form that has exponents and is the integer by using definition and properties of the power and use these to problem-solve 4. Be able to calculate and use the power in writing to demonstrate the small number or great number in scientific notation form.	1.1 Principals of Roots and Radicals 1.2 Roots with Variables 1.3 Product Rule for radicals 1.4 Quotient Rule for Radicals 1.5 Rationalizing the Denominator 1.6 Simplified form of square Root 1.7 Adding and subtracting Radicals 1.8 Multiplying and dividing Radicals
2: **Factorization of Polynomial**	
3. Be able to add, subtract, multiply and divide polynomial **4.** Be able to add, subtract, multiply and divide the fraction of polynomial at not over one degree.	2.1 Difference of two perfect square 2.2 Factorization of Polynomials 2.3 Remainder Theorem

Subject : Additional Mathematics 5 **Mathayom Suksa 3**

Subject Code : Ma23201 **40Periods**

Learning Outcomes	**Learning Areas**
3: **Quadratic Equation**	
10. Be able to use the knowledge about ratio, proportion and percentage for problem-solving or a different situation	3.1 Solve quadratic equations with single variable by using the formula 3.2 Solve problem questions about quadratic equations with single variable.
4: **Parabola**	
	4.1 Parabola Equations 4.2 Graph of parabola in the form $y = ax2+bx+c$ when $a \neq 0$
5. Volume and Surface Area	
	5.1 Finding surface area and volume of prism. 5.2 Finding surface area and volume of pyramid 5.3 Finding surface area and volume of cylinder. 5.4 Finding surface area and volume of cone. 5.5 Finding surface area and volume of sphere 5.6. Comparing units of volume. 5.7. Solving problem questions or situation about surface area and Volume

ADDITIONAL MATHEMATICS LEARNING OUTCOMES AND LEARNING AREAS FOR MATHAYOM SUKSA 3 SEMESTER 2

Subject : Additional Mathematics 6 **Mathayom Suksa 3**

Subject Code : Ma23202 **40 Periods**

Learning outcomes	Learning Areas
6. Geometry Reasoning	
5. Be able to factorize the quadratic polynomial 6. Be able to solve the quadratic polynomial factorization.	5.1 Geometric proof 5.2 Flowchart and paragraph proofs
7.Equation System	
3. Be able to solve the single-variable quadratic equation by factorization	7.1 Solving equation system with two variables no higher than two degrees. 7.2 Solving problem questions about equation system with two variables no higher than two degrees.
8.Circles	
	8.1 Line that Intersect Circles 8.2 Arcs and Chords 8.3 Sector Area and Arc Length 8.4 Inscribed Angles 8.5 Angle Relationships in Circles 8.6 Segment Relationships in Circles 8.7 Circles in the Coordinate Plane

Subject : Additional Mathematics 6 **Mathayom Suksa 3**

Subject Code : Ma23202 **40 Periods**

Learning outcomes	Learning Areas
9. Fractional Polynomial	
4. Be able to write an equation for the variation between the two quantities	9.1. Direct Variation 9.2. Inverse Variation 9.3. Joint Variation 9.4. Applications