Malaysia Chinese Independent Secondary Schools

Curriculum Standard for Mathematics (Senior)

Unified Curriculum Committee of Malaysian Independent Chinese Secondary School (MICSS) Working Committee

2014

Contents

Curriculum Standard for Mathematics (Senior)

1) Learning Objectives

1. To help students acquire a level of mathematical knowledge and basic skills to apply in their daily life;
2. To cultivate student's computing, logical thinking and spatial imagination skills in order to generate the abilities of analysis and solving practical problems by using mathematical knowledge;
3. To build up students' expressive ability in numbers, computing and shapes;
4. To provide fundamental knowledge for other subjects; and
5. To make students understand the extent of Mathematics and the scope of Mathematics application to arouse their interest.

2） Time Allocation

Thirty-two academic weeks are allocated to each level on a yearly basis, with 6 periods per week and one period lasts 40 minutes.

3) Curriculum Contents

Senior One (Vol. 1)

Chapter	Curriculum Contents	Learning Objectives
Ch.1 Quadratic Equation in One Variable	1.1 Quadratic Equations in One Variable 1.2 Solve the Quadratic Equations in One Variable 1.3 Determinants of Roots for Quadratic Equations in One Variable 1.4 Relationship between Roots and Coefficients of Quadratic Equation in One Variable	1.a Solve the quadratic equations in one variable proficiently (factorisation methods, complete the squares, formula methods) 1.b Examine the determinants of roots of quadratic equations in one variable (two different real roots, same real roots, no real roots) 1.c Use the relationships between the roots of a quadratic equation and the coefficients to compute
Ch.2 Polynomial	2.1 Polynomial Function and Polynomial	2.a Master the operations of polynomials 2.b Master synthetic division, and

Chapter	Curriculum Contents	Learning Objectives
	2.2 Algoritm of Polynomials in One Variable 2.3 Algoritm of Polynomials in Multiple Variables 2.4 Synthetic division 2.5 Remainder Theorem 2.6 Factorisation of Polynomials in One Variable 2.7 Solve Higher Degree Polynomials in One Variable	using synthetic division to factorise 2.c Use remainder theorem to solve polynomials problems 2.d Master factorisation of polynomials in one variable and higher degree polynomials
Ch.3 Rational Expression	3.1 Fraction 3.2 Reduction to Its Lowest Terms and Reduction to Common Denominator 3.3 Algorithm of Rational 3.4 Rational Equation 3.5 Partial Fraction (+ Undetermined Coefficient)	3.a Master the basic properties of rational expression and its algorithm 3.b Master the solution of rational equation 3.d Understand the concept of partial fraction and master the simplification of partial fraction
Ch.4 Irrational Expression	4.1 Radical, Irrational Expression 4.2 Fractional Exponent 4.3 Simple Rationalising Denominator 4.4 Irrational Equation 4.5 Quadratic Surd	4.a Understand the definition of irrational expression and master the algorithm of radical 4.b Master the methods of rationalising denominator 4.c Master the solutions of irrational equation and able to examine roots 4.d Able to find square roots of quadratic surd
Ch.5 Angle and Its Unit	5.1 5.1 Definition of Angle and Its Unit 5.2 Radian and Degree 5.3 Arc Length and Area of	5.a Understand the difference between radian unit and degree unit, and master the conversion of radian unit and degree unit

Chapter	Curriculum Contents	Learning Objectives
	Sector	5.b Master the calculation of arc length and area of sector in radian unit
Ch.6 Trigonometric Functions of Acute angle	6.1 Definition of Acute Trigonometric Function 6.2 Values of Trigonometric Functions of Special Angles 6.3 Complementary Angle in Acute Trigonometric Function 6.4 Solve the Right Triangle 6.5 Right Triangle Measurement Problems	6.a Understand the definition of acute trigonometric function 6.b Master the values of trigonometric function of special angles 6.c Master the complementary angle in acute trigonometric function and its calculations 6.d Use accurately the trigonometric function to solve right triangle and related measurement problems

Senior One (Vol. 2)

Chapter	Curriculum Contents	Learning Objectives
Ch.7 Trigonometric Functions of Arbitrary angle	7.1 Quadrant 7.2 Definition of Trigonometric Functions of Arbitrary Angle 7.3 Value of Trigonemetric Functions of Arbitary Angle 7.4 Graph of Trigonemetric Functions	7.a Understand the definition of arbitrary trigonometric function 7.b Able to determine the signs of the value of trigonemetric functions of arbitary angle and find its value 7.c Recognise and understand the graph of trigonometric functions
Ch.8 Solutions of Arbitrary Triangle	8.1 Sine Rule 8.2 Cosine Rule 8.3 Solutions of Arbitrary Triangle 8.4 Area of Arbitrary Triangle	8.a Master sine rule and cosine rule, then use sine rule and cosine rule to solve arbitrary triangle and measurement problems 8.b Able to use the formula to solve arbitrary triangle area
Ch.9 Trigonometric Identity and	9.1 General Trigonometric Identity 9.2 Trigonometric Formula	9.a Master the basic relationship of same angle trigonometric functions and use them to

Chapter	Curriculum Contents	Learning Objectives
Solutions of Trigonometric	of Sum and Difference of Two Angles 9.3 Double Angles Formula 9.4 Solutions of Trigonometric Equation	simplify the trigonometric functions and prove the equalities of trigonometric functions 9.b Master the formula of trigonometric functions (sum of two angles, difference of two angles, double angles), then use these formulas to simplify trigonometric functions and prove the equalities of trigonometric functions 9.c Master trigonometric functions for given condition solutions
Ch.10 Cartesian Coordinate System and Area of Polygon	10.1 Cartesian Coordinate System 10.2 Distance Formula 10.3 Division of Line Segments Formula 10.4 Area of Triangle 10.5 Area of Polygon	10.a Able to use distance formula to calculate the distance between two points 10.b Master partition ratio theorem and calculating point of division and the ratio of line segment 10.c Able to use vertex point of a triangle to calculate triangle's area and prove three points collinear 10.d Able to use vertex point of a polygon to calculate polygon's area
Ch.11 Lines	11.1 Gradient 11.2 Different Forms of Line Equations 11.3 General Form of Line Equations 11.4 Intercection Point of Two Lines 11.5 Distance between Point and Line, Distance between Two Parallel Lines	11.a Understand the definition of gradient and angle of inclination 11.b Master the conditions of two lines being parallel and perpendicular 11.c Able to find the line equations when given different conditions 11.d Understand the location of intersection point from two lines and master the methods to find out intersection point 11.e Master the distance between point and line

Chapter	Curriculum Contents	Learning Objectives

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Chapter	Curriculum Contents	Learning Objectives
Ch.12 Sequence and Series	12.1 Concept of Sequence and Series 12.2 Arithmetic Sequence and Arithmetic Series 12.3 Geometric Sequence and Geometric Series (+ infinite series) 12.4 Sum of Basic Special Series	12.a Master the general formula of arithmetic sequence, summation formula of arithmetic series and their applications 12.b Master the general formula of geometric sequence, summation formula of geometric series and their applications 12.c Master the summation formula of infinite geometric series 12.d Able to find out the summation of basic special series
Ch.13 Simultaneous Equations	13.1 Simultaneous Equations in Two Variables 13.2 Simultaneous Equations in Two Variables	13.a Master the solutions for simultaneous equations in two variables (linear equations in two variables and quadratic equations in two variables) 13.b Master the solutions for simultaneous linear equations in three variables
Ch.14 Matrix	14.1 Matrix 14.2 Addition and Substraction of Matrix 14.3 Scalar Product of Matrix 14.4 Multiplication of Matrix 14.5 Determinant (+ Properties 1,2,3,4 of Determinant) 14.6 Inverse Matrix 14.7 Gauss Elimination Method	14.a Understand the concept of matrix 14.b Construct matrix calculations (addition and subtraction of matrix, scalar product of matrix, multiplication of matrix) 14.c Master the calculation of two order determinant and three order determinant 14.d Master the properties of determinant 14.e Master the methods of finding inverse two order matrix and three order matrix. 14.f Apply inverse matrix method or Gauss elimination method to

Chapter	Curriculum Contents	Learning Objectives
	14.8 Cramer's Rule	solve simultaneous linear equations in two or three variables
Ch.15 Inequality	15.1 Inequality and Its Properties 15.2 Linear Inequality in One Variable (+ System of Linear Inequalities) 15.3 Quadratic Inequality in One Variable (+ System of Quadratic Inequalities) 15.4 Higher Order Inequanlity in One Variable 15.5 Fractional Inequaltiy 15.6 Absolute Value Inequality 15.7 Linear Equality in Two Variables 15.8 Linear Programming	15.a Master the properties of inequalities 15.b Master the solutions of linear inequality in one variable, quadratic inequality in one variable and their inequality system 15.c Master the solution of higher degree inequality 15.d Master the solution of fractional inequality 15.e Master the solution of absolute value equality 15.f Master the solution of linear equality in two variables and their inequality system 15.g Apply graph method to solve linear programming problems
Ch.16 Circle	16.1 Standard Equation of Circle 16.2 General Equation of Circle 16.3 Problems Related to Circle	16.a Master the solution of circle equation 16.b Apply circle equation to find out the center of a circle and its radius 16.c Master the solution of problems related to circle (line tangent to circle, length of tangent, the longest and shortest distance from point to circle)
Ch.17 Solid Geometry , Meridian and Parallels of Latitude	17.1 Solid Geometry 17.2 Angle between Line and Plane 17.3 Angle between Two Planes 17.4 Meridian, Parallels of	17.a Able to find angle between line and plane, and angle between two planes 17.b Understand the concept of meridian and parallels of latitude 17.c Able to calculate the distance between two places in the same

Chapter	Curriculum Contents	Learning Objectives
	Latitude and Longitude, Latitude(+ Introduction of Standard Time and Local time) 17.5 Distance between Two Places in the Same Meridian 17.6 Distance between two places in same parallels of latitude	meridian or two places in the same parallels of latitude

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Chapter	Curriculum Contents	Learning Objectives
Ch.18 Statistics	18.1 Basic Concept of Statistics 18.2 Data Prosess 18.3 Measurement of Central Tendency 18.4 Measurement of Dispersion 18.5 Coefficient of Variation 18.6 Correlation and Correlation Coefficient 18.7 Statistical Index	18.a Able to construct accumulate frequency distribution table, frequency polygon and cumulative frequency polygon 18.b Master the measurement of central tendency 18.c Master the measurement of dispersion 18.d Master the concept of coefficient of variation and its calculation 18.e Master the concept of correlation coefficient and its calculation 18.f Master the concept of statistical index and its calculation
Ch.19 Permutation and Combination	19.1 Addition Principle and Multiplication Principle 19.2 Permutation and Its Formula 19.3 Circular Permutation 19.4 Permutation with Not All Distinct Elements 19.5 Permutation with Repeating Elements	19.a Master addition principle and multiplication principle 19.b Master permutation formula and the solution of its related problems 19.c Master the solution of circular permutation problems 19.d Master the solution of permutation with not all distinct

Chapter	Curriculum Contents	Learning Objectives
	19.6 Combination and Its Formula	elements 19.e Master the solution of permutation with repeating distinct elements 19.f Master the solution of combination and its related problems
Ch.20 Binomial Theorem	20.1 Binomial Theorem with Rational Exponent (+ Properties of Biniomial Expansion) 20.2 General Formula for Binomial Expansion	20.a Able to expand binomial expansion with rational exponent 20.b Master the general formula for binomial expansion
Ch.21 Probability	21.1 Sample Space and Event 21.2 Definition of Probability 21.3 Addition Principle 21.4 Multiplication Principle 21.5 Expected Value 21.6 Normal Distribution	21.a Understand the concept of sample space, event and probability 21.b Understand the concept of mutually exclusive event and master addition principle 21.c Understand the concept of independent event and master multiplication principle 21.d Master the concept of expected value and its calculation 21.e Master the application of normal distribution

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Chapter	Curriculum Contents	Learning Objectives
Ch.22 Function	22.1 Definition of Function 22.2 Domain and Range of Function 22.3 Graph of Function and Its Transformation 22.4 Composite Function 22.5 One to One Function, onto Function, One-one onto Function 22.6 Inverse Function	22.a Master the definition of function and its expression 22.b Able to find the domain and range of function 22.c Recognise the graph of basic function 22.d Master the concept of composite function and its calculation 22.e Understand one-to-one function, onto function and one-one onto function 22.f Master the concept of inverse function and the methods of finding inverse function
Ch.23 Exponent and Longarithm	23.1 Exponent 23.2 Logarithm 23.3 Algotirhm of Exponent and Change Base Formula 23.4 Exponential Equation 23.5 Logarithm Equation 23.6 Compound Interest and Annuity	23.a Master the properties of exponent and logarithm and their algorithm rules 23.b Master logarithm change base formula 23.c Able to solve exponential and logarithm equation 23.d Apply exponential and logarithm to solve compound interest and annuity problems
Ch.24 Limit	24.1 Concept of Limit 24.2 Function Limit 24.3 Arithmetic of Function Limit	24.a Understand the concept of limit 24.b Master the calculation of function limit
Ch.25 Differential	25.1 Gradient of Tangent Line on Curve 25.2 Gradient of Tangent Line and Derivative 25.3 Principle of Differential 25.4 Chain Rule – Differential of Composite Function	25.a Master the concept of differential 25.b Master the differential of basic function 25.c Master the principle of differential 25.d Apply chain rule to different composite function

Chapter	Curriculum Contents	Learning Objectives
	25.5 Higher order Derivative 25.6 Differential of Implicit Function 25.7 Two Basic Limit 25.8 Differential of Trigonometric Function 25.9 Differential of Logarithm Function 25.10 Differential of Exponential Function	25.e Able to find high order differential 25.f Master the differential of implicit function 25.g Master two basic limit: $\lim_{x\to 0}\frac{\sin x}{x}$ and $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^{x}$. 25.h Master the differential of trigonometric function, exponential function and logarithm function

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Chapter	Curriculum Contents	Learning Objectives
Ch.26 Application of Differential	26.1 Tangent Line and Normal Line 26.2 Increasing and Decreasing Function 26.3 Relative Maximum Value and Relative Minimum Value 26.4 Absolute Maximum Value and Absolute Minimum Value 26.5 Convex of Curve and Inflection Point 26.6 Graph of Curve 26.7 Rate of Change 26.8 Approximate Calculation	26.a Able to find tangent line and normal line to points on curve 26.b Able to determine increasing or decreasing function 26.c Able to find local maximum value and local minimum value 26.d Determine convex of curve and its inflection point 26.e Master the methods of drawing polynomial function 26.f Master the concept of rate of change and its application 26.g Master approximate calculation of increment
Ch.27 Indefinite Integral	27.1 Indefinite Integral – Inverse of Differentiation 27.2 Algorithm of Indefinite Integral 27.3 Integration by Substitution 27.4 Integration by Partial Fractions	27.a Master the concept of indefinite integral 27.b Master the integral formula of basic function 27.c Master the algorithm law of integration 27.d Master integration by substitution 27.e Master integration by partial

Chapter	Curriculum Contents	Learning Objectives
	27.5 Implication of Indefinite integral	fractions
Ch.28 Definite Integral	28.1 Concept of Integral and Its Relationship with Indefinite Integral 28.2 Properties and Arithmatic of Definite Integral 28.3 Area 28.4 Volume of Solid Revolution	28.a Understand the concept of definite integral 28.b Master the relationship between definite integral and indefinite integral 28.c Master the properties of definite and its calculation 28.d Able to apply definite integral to find the area and the volume of solid revolution