Star Chinese School, Rhode Island 罗得岛星星中文学校

<u>数学教学大纲 Math Syllabus (2017-2018 学年度)</u>

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THE GOLDEN RULE: *"ALWAYS TRY YOUR BEST"*

Class Requirements:

Student should come to class with the following materials:

o Textbook   o Notebook
o PENCIL   o Completed Assignments
o 1 Pocket Folder   o Graphing Calculator (only for Algebra II, III, and precalculus)

Class Hours: 11:30 am to 12:30 pm on Saturdays, Sept. 09, 2017-June 16, 2018

Expectations:

➢ We expect you to arrive to class on time.
➢ We expect you to take notes and keep a notebook or binder.
➢ We expect you to try your best on all assignments and tests.
➢ We expect you to participate CONSTRUCTIVELY in class.
➢ We expect you to follow instructions.
➢ **NO TALKING** is allowed unless given permission.
➢ **NO FOOD, DRINKS, and GUM** are allowed in the classroom.
➢ **NO CELL PHONES, I-PODS**, or other electronic devices are allowed in the classroom without teacher's permission.

All school rules are in effect at all times.

Grading Policy:

Your grade in Math course will be determined by your performance on **tests (40%), quizzes (25%), homework (20%), and exams (15%)**.

Make Up Policy

It is the students' responsibility to locate the teacher, determine what has been missed, and complete any make- up work.

Arithmetic I

Textbook: ARITHMETIC THE EASY WAY
Course Description
This is a yearlong course with a goal to improve students' skills in arithmetic at the beginners' level of mathematics. In this course, we will review and explain the basic ideas and skills of basic mathematics, such as counting numbers, addition, subtraction, multiplication, and division. We will have many examples to understand the concepts and to practice the skills. We would like to improve the students' confidence to handle more advanced mathematics problems.

Major Topics

Number
o *Numbers as symbols*
o *Counting*
o *Even and Odd numbers*
o *Old Systems of Numbering*

Addition
o *The Language of Addition*
o *The Number Line*
o *Unequal Addition*
o *Place value*
o *Know the Combinations*

Subtraction

o *The language of Subtraction*
o *Unequal Subtractions*
o *Exchanging in Subtraction*

Multiplication
o *Multiplying Whole Numbers;*
o *Combinations*
o *Multiplication Applied to Measuring*

Division
o *The Language of Division*
o *Zero as a Place Holder*
o *Carrying Remainders*
o *Dividing by More than a One-digit Number*

Arithmetic II

Text book: "Barron's Arithmetic - The easy way", 4th Edition
Scope: Arithmetic II is a class for third grade to fifth grade students who have learned the basic math concepts including four major math operations, namely addition, subtraction, multiplication and division. It covers the textbook contents from Chapter 6 to Chapter 15 involving fractions, decimals, percents and measurements as well as their applications.
Major Topics

First Class/New Student Enrollment
- Get to Know Each Other
- School and Class Policies
- Test to See What You Know about Math

Arithmetic I Review
- Test Review
- Recommendations to Students/Parents for Class Adjustment Upon Individual Student Knowledge Level

Chapter 6   The Important Parts – Fractions
- S6.1   What is a Fraction?
- S6.2   The Language of a Fraction
- S6.3   What Kinds of Fractions Are There?

Chapter 6   The Important Parts – Fractions

- S6.4   Simplifying Fractions
- S6.5   Equivalent Fractions
- S6.6   Which Fraction is Larger or Smaller?

Chapter 6   The Important Parts – Fractions
- S6.7   Changing Improper Fractions to Mixed Numbers
- S6.8   Changing Mixed Numbers to Improper Fractions
- Chapter Test 6

Chapter 7   Piece by Piece – Adding Fractions
- S7.1   Fractions Can be Added
- S7.2   After Adding, What Next?
- S7.3   Fractions Whose Sum is One

- S15.6   Word Problems Requiring Measures
- S15.7   Converting Metric Measures

Math Competition
Semester Review
Final Exam

Grade and Math Fun and Parents Meeting
Graduation Ceremony/Annual Picnic

Algebra Part I

Course Description

This course is for students who are currently in grade 5 to 6 at regular school. The goal of this course is to improve students' skills in pre-Algebra and part of algebra I, which is difficult time for all the beginners to learn Algebra. In this course, first we will review Arithmetic II, such as fraction, decimal, percent, and some examples in the real life. Then we'll learn pre-algebra and part of algebra I.

Reference book:
1. Barron's E-Z PRE-ALGEBRA. New
2. Barron's E-Z ALGEBRA. New
3. "Barron's Math - The easy way", 4th Edition. Old book, as reference.

Major Topics

Pre-algebra part:

I. Numbers and Order of Operations

- *Numbers and Sets*
- *Properties of numbers*
- *Order of operations*

II. Fractions

- Equivalent Fractions
- Common Factors (*GCF and LCM)*
- Operation of Rational Numbers
- Operation of Mixed Numbers
- Word Problems

III. Decimals

- Rounding off Decimals
- Terminating and Repeating Decimals
- Operation of Decimals
- Word Problems

IV. Integers

- Definition of Integers
- Operation of Negative Numbers

V. Ratios and Proportions

- Definition of Ratio?
- Writing and Solving Ratios
- What is a Rate?
- Rates (Unit Rate, Unit price, Best price)
- What is a Proportion?
- Solving proportions
- Word Problems

VI. Percents and Percentages

- Definition of Percent
- Calculate a Percent
- Word Problems (Percent Increase or Decrease)

VII. Converting of Fractions, Decimals,

VIIII. Roots and Real Numbers

- The Square Roots
- Irrational Numbers
- Fractional Exponents

Algebra I part:

I. The Language and Tools of Algebra

- *Variables and Expressions*
- *Order of Operations*
- *Identity and Equality Properties*
- *The Distributive, Commutative and Associative Property*
- *Basic Expressions and Equations*
- *Verbal Expressions into algebraic Expressions*
- *Substitution Property of Equality*

Algebra Part II

Reference: Barron's E-Z ALGEBRA. Plus the instructor copied material.

Major Topics

1. Exponents
- *Exponents and Scientific Notation*
- *Law of Exponents*

2. Roots and Real Number
- *Square root and Pythagorean Theorem*

II. Solving Linear Equations

- *Write Equations*
- *Solving Equations by Using Addition and Subtraction*
- *Solving Equations by Using Multiplication and Division*
- *Solving MultiStep Equations*
- *Solving Equations with variables on Both sides*
- *Ratio and Proportions*
- *Percent of Change*
- *Solving for a Specific Variable*
- *Solving Absolute Value Equations*
- *Word Problems*

III. Algebra-More on Equations

- **Inequalities**
- **Graphs of Equations**
- **Slope of a Line**

- *Fraction square root*
- *Square root properties*
- *Higher index roots*

3. Algebraic Expressions
- *Monomials, Binomials, and Trinomials*
- *Simplifying Algebraic Expressions*
- *Multiplying Binomials*

4. Functions
- *Function Notation*
- *Calculating a Function*

5. Graphs
- *Domain and Range of a Function*

- o *Independent and Dependent Variables*
- o *Points and Distance*
- o *Linear Equation Graphing*
- o *The Slope of a Line*
- o *Graphing Inequalities*
- o *Graphing Relationships*

6. System of Equations
- o *Solving one Variable Equation*
- o *Two Equation System*
- o *Solving Two Equation System*

7. Quadratic Equations
- o *Solving by Inspection*
- o *Solving by Quadratic Formula*
- o *Solving by Completing the Square*

Algebra Part III

Reference: Barron's E-Z ALGEBRA

MajorTopics

Solving Linear Inequalities Systems
- o *Solving Systems of Equations*
- o *Solving Systems of Inequalities by Graphing*
- o *Linear Programming*
- o *Solving Systems of Equation in Tree Variables*

Matrices
- o *Operations with Matrices*
- o *Multiplying Matrices*
- o *Transformations with Matrices*
- o *Determinants*
- o *Cramer' Rule*
- o *Identity and Inverse Matrices*
- o *Using Matrices to Solve System of Equations*

Polynomials
- o *Roots of Real Number*
- o *Radical Expression*
- o *Rational Exponents*
- o *Radical Equations and Inequalities*
- o *Complex Number*

Quadratic Functions and Inequalities
- o *Graphing Quadratic Functions*
- o *Solving Quadratic Equations by Graphing*
- o *Solving Quadratic Equations by Factoring*
- o *Complete the Square*
- o *The Quadratic Formula and Discriminant*
- o *Analyzing Graphs of Quadratic Function*
- o *Graphing and Solving Quadratic Inequalities*

Polynomials Functions
- o *Graphing Polynomials Functions*
- o *Solving Equations Using Quadratic Techniques*
- o *The Remainder and Factor Theorems*
- o *Roots and Zeros*
- o *Rational Zero Theorem*
- o *Operations on Functions*
- o *Inverse Functions and Relations*
- o *Square Root Functions and Inequalities*

Trigonometric
- o *Right Triangle Trigonometry*
- o *Angles and Angle Measurement*
- o *Trigonometric Function of General Angle (Unit Circle)*

Statistics and Probability
- o *Sampling and Bias*
- o *Counting Outcomes*
- o *Permutations and Combinations*

o *Probability of Compound Events*
o *Probability Distributions*

o *Probability Simulations*

PreCalculus

Textbook: Pre-Calculus The Easy Way
Reference:
1. Fred Safier, Schaum's Outlines: Theory and Problems of Precalculus
(2nd edition), McGrawHill, 2009
2. Ron Larson & Robert Hostetler, Precalculus, Houghton Mifflin Company, 2007

Topics and time schedule:

Chapter 1 Preliminaries (Oct)
o *Standard form of polynomials*
o *Factoring polynomials*
o *Operations on exponents*
o *Rational expressions*
o *Radical expressions*

Chapter 2 Graph of Linear & Quadratic Equations (Oct. –Nov.)
o *Coordinate systems*
o *Slope, intercept, midpoint & distance formula*
o *Graph of linear equations*
o *Complex numbers & quadratic formula*
o *Graph of quadratic equations*

Chapter 3 Functions and Graphs (Dec.-Jan.)
o *Functions and Their Properties*
o *Twelve Basic Functions*
o *Building Functions from Functions*
o *Graphical Transformations*
o *Modeling and Equation Solving*

Chapter 4 Exponential and Logarithmic (Feb.-Mar.)

Chapter 6 Conic Sections (May-June)
o *Midpoint and Distance Formula*
o *Parabolas*
o *Circles*
o *Ellipses*

o *Exponential Functions*
o *Logarithms and Logarithmic*
o *Properties of Logarithms*
o *Common Logarithms*
o *Base e and Natural Logarithms Functions*

Chapter 5 Rational Expressions and Equations (Mar.-Apr.)
o *Operations of Rational Expressions*
o *Graphing Rational Functions*
o *Direct, Joint and Inverse Variation*
o *Solving Rational Equations and Inequalities*

Chapter 5 Sequences and Series (May)
o *Arithmetic Sequence & Series*
o *Geometric Sequence & Series*
o *Basic Combinatory*
o *Probability*
o *The Binomial Theorem*
o *Recursion and Special*
o *Proof and Mathematical Induction*

o *Hyperbolas*
o *Conic Sections*
o *Solving Quadratic*

Geometry

Course Goals:

This course is for students who is currently taking or is going to take their first course in Geometry at regular school. It deals with questions of size, shape, and relative position of figures. This is an introduction of important concepts and principles in Geometry. The goal is to develop a logical structure in which mathematical relationships are proved as well as applied.

Course Objectives:

1. Appreciate fundamental concepts and principles in Geometry

2. Solve problems using these principles

3. Identify a wide range of topics related to Geometry

4. Address specific Geometry problems

Teaching Methods and Assignments corresponding to Objectives:

1. Generously using drawings and examples in descriptions of Geometry concepts

2. Including all steps in proving theorems to help students understanding the way to

   prove a mathematical relationship

3. Presenting a wide range of example problems

5. Group discussions on some relative complex problems

6. Assignments for each week

7. A total of four tests

Text book:

"E-Z Geometry" by Lawrence S. Leff

Lectures Schedule:

	Class	Title
Fundamental Definitions and Postulates		
	1	Fundamental definitions and postulates
	No Class	

Measure and Congruence		
	2	Measuring segments and angles
	3	Properties of equality and congruence
Angle Pairs and Perpendicular Lines		
	4	Angle pairs and theorems relating to angle pairs
	5	Perpendicular lines and right angles
Parallel lines		
	6	Properties of parallel lines
	7	Parallel postulates
	8	Review
	9	Test I
Angles of Polygon		
	10	Theorems relating to angles of triangles
Thanksgiving Holiday		
	11	Theorems relating to angles of polygons
Proving Triangles are Congruent		
	12	Proving triangles congruent
	13	Proving overlapping triangles congruent
Christmas holiday		
New year holiday		
Applying Congruent Triangles		
	14	Using congruent triangle to prove segments and angles congruent
	15	Using congruent triangle to prove special properties of lines
	16	Isosceles triangle and double congruence proofs
	17	Review
	18	Test II

Special Quadrilaterals

	19	Properties of parallelogram
	20	Proving parallelogram
	21	Application of parallelogram

Ratio, Proportion, and Similarity

	22	Ration and proportion
	23	Proving triangles similar
	24	Proportions in similar triangles
	25	Proportions in right triangles
	26	Proportions in right triangles-continue
	27	Review
	28	Test III

Circles and Angle Measurement

	29	Properties of circles
	30	Angle measurement theorems
	31	Continue angle measurement theorems

Chord, Tangent, and Secant Segment

	32	Concepts of chords, tangent, and secant
	33	Chord and tangent relationship

Area and Volume

	No class, Math Competition	
	34	Areas of polygon
	35	Areas of circle and sector
	36	Review
	37	Test IV
	38	Review