

**Sacred Heart School**  
Course Syllabus

**Class Subject:** Grade 7 Mathematics (Advanced)

**Teacher Information:** Barbara Hamanaka

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**Course Description:** The seventh grade advanced math program covers the standard topics for this grade level, and in addition, provides a very strong introduction to Algebra. When completed, the student should be able to solve any linear equation, including those with variables on both sides of the equation, those with fractional coefficients, etc. This prepares students for the eighth grade advanced math course which is a high school level Algebra course. There is also a strong component of geometry throughout the program.

**General Course Objectives:**

**ALGEBRA**

**Expressions**

The student will:

- Understand numerical and variable expressions
- Understand powers and square roots (exponents)
- Correctly use the order of operations in computation
- Simplify expressions
- Write verbal phrases as algebraic expressions

**Number Properties**

The student will:

- Understand the commutative properties of addition and multiplication
- Understand the associative properties of addition and multiplication
- Understand the distributive property

**Integers**

The student will:

- Understand the placement of integers on a number line
- Determine the absolute value of a number
- Order integers
- Add and subtract integers
- Multiply and divide integers

**Equations**

The student will:

- Solve addition and subtraction equations
- Solve multiplication and division equation

- Check a solution to an equation
- Write verbal sentences as algebraic equations
- Formulate an equation from a problem situation
- Solve multi-step equations
- Solve equations with variables on both sides
- Solve equations with fractional coefficients

## **DATA ANALYSIS AND PROBABILITY**

### **Graphing**

The student will:

- Become familiar with and be able to organize data with the following types of graphs:

Bar graph  
 Histograms  
 Line graphs  
 Circle graphs  
 Pictographs  
 Time lines  
 Line plots  
 Scatter plots

- Be able to discern which graphs are appropriate and which are misleading

### **Probability**

The student will:

- Be able to determine the probability of a simple event
- Compare theoretical and experimental probabilities

### **Decimals and Percents**

The student will:

- Compare and order decimals
- Add the subtract decimals
- Multiply and divide decimal
- Determine equivalent forms of decimals fractions and percents
- Determine percent of a number
- Solve percent equations
- Determine percent of increase or decrease
- Determine simple interest

### **Fractions and Mixed Numbers**

The student will:

- Represent a quotient as a fraction
- Determine equivalent forms of improper fractions and mixed numbers
- Determine common denominators

- Compare and order fractions
- Determine equivalent forms of decimals, fractions and percents
- Add and subtract fractions, mixed numbers and rational numbers
- Multiply and divide fractions mixed numbers and rational numbers
- Solve equations by applying inverse operations

#### Rational and Real Numbers

The student will be able to:

- Classify real numbers as rational or irrational
- Evaluate square roots

### **GEOMETRY**

#### **Geometry of a Plane**

The student will:

- Understand the definitions of points, lines, and planes
- Understand the definition of parallel lines
- Identify, Measure, and draw angles
- Know the definitions of acute, right, obtuse and straight angles
- Know the definition of supplementary and complementary angles
- Know how to classify polygons
- Understand the Venn diagram of quadrilateral relationships
- Know the definition of congruent and similar figures
- Know the properties of similar figures
- Use proportions to solve geometric problems
- Use the Pythagorean Theorem to solve geometric problems

#### **Geometry of Space**

The student will:

- Explore surface area
- Explore volume

#### **Coordinate Geometry**

The student will:

- Plot ordered pairs
- Recognize patterns in the coordinate plane
- Graph linear equations with two variables
- Be introduced to the slope-intercept form of a linear equation

### **MEASUREMENT**

#### **Length, Area, Volume**

The student will determine:

- Length in customary and metric systems
- Perimeter of polygons

- Circumference of circles
- Area of rectangles, triangles and circle
- Surface area of a prism
- Volume of a prism and sphere

### **Indirect Measurement**

The student will:

- Use the Pythagorean Theorem
- Use similar triangles

## **NUMBER SENSE AND NUMBER THEORY**

Numbers and Their Representations

The student will:

- Become familiar with exponents (positive and negative)
- Be introduced to scientific notation

### **Number Theory**

The student will:

- Determine factors of natural numbers
- Differentiate prime and composite numbers
- Make use of divisibility tests
- Express whole numbers as a product of prime numbers
- Understand prime factorization using exponents
- Identify common factors
- Identify common multiples
- Determine the greatest common factor & least common multiple of two numbers
- Recognize sequences

## **RATIOS AND PROPORTIONS**

The student will:

- Use ratios and rates and determine unit ratios and rates
- Use proportions to solve problems including scale drawings & similar figures

## **USING TECHNOLOGY**

### **Calculator**

The student will:

- Learn how to use calculator to calculate powers and square roots
- Learn how to calculate using numbers in scientific notation

### **Graphing Calculator** (supplied in class)

- Graph linear equations

**Instructional Strategies:** Include but are not limited to the following:

Formal instruction and questioning, continuous problem solving by students during class, collaborative learning, individual instruction

**Assessment:**

Written exams, homework, class participation, teacher observation

**Materials:**

Textbook – Passport to Algebra and Geometry, McDougal Littell, Boston, 1999,

Teacher generated materials

White boards and markers

Calculators

Protractors

Compasses

**Sacred Heart School**  
Course Syllabus

**Class Subject:** Grade 8 Mathematics (Advanced)

**Teacher Information :** Barbara Hamanaka

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**Course Description:** The eighth grade advanced math program consists of a high-school level Algebra course. This course prepares the student to step into the second year math program in high school.

**General Course Objectives:**

**ALGEBRA**

**Expressions**

The student will:

- Understand numerical and variable expressions
- Understand powers and square roots (exponents)
- Correctly use the order of operations in computation
- Simplify expressions by adding, subtracting, multiplying, dividing, and factoring
- Write verbal phrases as algebraic expressions
- Understand the use of formulas
- Be able to rewrite a formula for a specified variable
- Write polynomials in standard form
- Add and subtract polynomials
- Multiply polynomials
- Factor trinomials of the type  $x^2 + bx + c$
- Factor trinomials of the type  $ax^2 + bx + c$
- Factor by grouping
- Simplify rational expressions
- Multiply and divide rational expressions
- Divide polynomials
- Add and subtract rational expressions

**Integers**

The student will:

- Understand the placement of integers on a number line
- Determine the absolute value of a number
- Order integers
- Add and subtract integers
- Multiply and divide integers

**Number Properties**

The student will:

- Understand the commutative properties of addition and multiplication
- Understand the associative properties of addition and multiplication
- Understand the distributive property
- Understand the property of the additive inverse
- Understand the property of the multiplicative inverse

### **Linear Equations**

The student will:

- Solve equations by addition and subtraction
- Solve equations by multiplication and division
- Check a solution to an equation
- Write verbal sentences as algebraic expressions
- Formulate an equation from a problem situation
- Solve multistep equations
- Solve equations with variables on both sides
- Solve equations with fractional coefficients
- Solve systems of linear equations by graphical means
- Solve systems of linear equations by substitution
- Solve systems of linear equations by elimination
- Solve systems of linear inequalities by graphical means

### **Quadratic Equations**

The student will:

- Explore graphs of quadratic functions
- Solve quadratic equations by graphing
- Solve quadratic equations by factoring
- Solve quadratic equations using quadratic formula
- Understand the use of the discriminant

### **Inequalities**

The student will:

- Solve inequalities using addition and subtraction
- Solve inequalities using multiplication and division
- Solve multi-step inequalities
- Graph inequalities in one and two variables
- Solve systems of inequalities by graphical means

### **Graphing**

The student will:

- Graph linear functions
- Write equations for linear graphs
- Graph quadratic functions

## **Decimals and Percents**

The student will:

- Add and subtract decimals
- Multiply and divide decimals
- Determine equivalent forms of decimals, fractions and percents
- Determine percent of a number
- Solve percent equations

## **Fractions and Mixed Numbers**

The student will:

- Represent a quotient as a fraction
- Determine common denominators
- Compare and order fractions
- Determine equivalent forms of decimal, fractions, and percents
- Add and subtract rational numbers
- Multiply and divide rational numbers
- Solve equations by applying inverse operations
- Simplify rational variable expressions
- Add and subtract rational variable expressions with like denominators
- Add and subtract rational variable expressions with unlike denominators
- Multiply and divide rational variable expressions
- Divide polynomials
- Simplify mixed expressions and complex fractions
- Solve rational equations

## **Ratios, Proportions, and Percents**

The student will

- Use equivalent forms of ratios, decimals, and percents
- Calculate the percent of a number
- Use ratios and rates and determine unit ratios and rates
- Use proportions to solve problems including scale drawings & similar figures
- Solve percent equations
- Solve work problems
- Solve proportions involving variable expressions

## **GEOMETRY**

### **Geometry of a Plane**

The student will:

- Understand the definitions of points, lines, and planes
- Understand the definition of parallel lines
- Identify, measure, and draw angles
- Know the definitions of acute, right, obtuse and straight angles
- Know the definition of supplementary and complementary angles

- Know how to classify polygons
- Understand the Venn diagram of quadrilateral relationships
- Know the definition of congruent and similar figures
- Know the properties of similar figures
- Use proportions to solve geometric problems
- Use the Pythagorean Theorem to solve geometric problems
- Solve perimeter, area, and volume problems involving variable expressions

### **Geometry of Space**

The student will:

- Explore surface area
- Explore volume

### **Coordinate Geometry**

The student will:

- Plot ordered pairs
- Recognize patterns in the coordinate plane
- Graph equations with two variables
- Be introduced to linear functions
- Determine the slope of a linear graph
- Graph linear equation based on slope-intercept form
- Write a linear equation based on graphical representation

### **Rational and Real Numbers**

The student will be able to:

- Show that a number is rational
- Classify real numbers as rational or irrational
- Evaluate square roots
- Add and subtract radical expressions
- Multiply and divide radical expressions

## **MEASUREMENT**

### **Length**

The student will determine:

- Length in customary and metric systems
- Perimeter of polygons
- Circumference of circles

### **Area**

The student will determine:

- Area of square and rectangle
- Area of Triangle

- Area of circle
- Surface area of a prism

### **Volume**

The student will determine the volume of a

- Prism
- Sphere

### **Indirect Measurement**

The student will:

- Use the Pythagorean Theorem
- Use similar triangles

### **PROBLEM SOLVING**

The student will solve word problems in the following categories:

- Consecutive integers
- Cost, income, and value
- Rate – time –distance
- Area
- Percent
- Mixture
- Work
- Ratios & proportions
- Quadratic equations
- Involving more than one variable
- Wind & water current

### **USING TECHNOLOGY**

#### **Calculator**

In appropriate situations students will use the calculator to

- Calculate powers and square and cube roots
- Multiply and divide decimals with more than 4 digits
- Perform calculations in scientific notation

#### **Graphing Calculator**

The student will

- Graph linear equations
- Graph quadratic equations

**Instructional Strategies:** Include but are not limited to the following:

Formal instruction and questioning, continuous problem solving by students during class, collaborative learning, individual instruction

**Assessment:**

Written exams, homework, class participation, teacher observation

**Materials:**

Textbook – Algebra – Structure and Method – Book 1, McDougal Littell, Boston, 2000,

Teacher generated materials

White boards and markers

Scientific Calculators

Graphing Calculators (supplied in class)

Protractors

Compasses