



Matija Gubec International School Zagreb

# Subject Overviews

## MYP 0

# Mathematics



# **MYP0: MATHEMATICS**

## **Unit 1: Natural numbers**

Through the activities students will do their own research on history of Natural numbers. Students will use different forms of mathematical representation of large numbers. Students will develop graphing skills. Students will develop deductive and inductive reasoning: applying general rules to particular situations and developing general rules from particular data inductive reasoning.

Students will be communicating a mathematical way of thinking in solving problems using BODMAS.

**KEY CONCEPT:** Relationships

**RELATED CONCEPTS:** System, Quantity, Pattern

**GLOBAL CONTEXT:** Orientation in space and time

**STATEMENT OF INQUIRY:** The position of a numbers determines their place values.

### **Main Content Addressed:**

- Set of Natural numbers
- Identification of large numbers
- Comparing Natural numbers and Number line
- Rounding Natural numbers to the nearest ten, hundred, thousand
- Adding and basic properties of adding numbers
- Subtracting Natural numbers
- Multiplying Natural numbers and basic properties of multiplying numbers
- Distributivity of multiplication to addition
- Divisibility of Natural numbers
- Priority of operations

**Objectives A, C**

### **ATL skills:**

Communication – communication skills

Thinking – transfer skills

## **Unit 2: Divisibility of natural numbers**

Through the activities of finding rules for divisibility, students will built up much of the mathematical foundation.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** System, Change, Equivalence

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Different number systems just change the form of equivalent values.

### **Main Content Addressed:**

- Divisibility by 10,5,2,3 i 9
- Prime and composite numbers

- Prime factorization
- Divisors. Highest common divisor
- Multiples. Lowest common multiple

**Objectives A, B, C**

**ATL skills:**

Self-management – organization skills

Thinking – critical thinking skills

**Unit 3: Set of points in a plane**

Through the activities of finding differences between lines, line segments and planes students will get better understanding of basic geometry. Through the activities of finding links between geometry and art, students will learn about formulas for perimeter and area for special types of triangles and quadrilaterals.

**KEY CONCEPT:** Logic

**RELATED CONCEPTS:** Measurement, Justification

**GLOBAL CONTEXT:** Orientation in space and time

**STATEMENT OF INQUIRY:** Logic is a powerful tool for justifying what we discover through measurement and observation.

**Main Content Addressed:**

- Plane, line, semi-segment, segment
- Parallel and perpendicular lines
- Measuring unit for length
- Bisector of a segment
- Circle and circumference
- Types of angles
- Complementary and supplementary angles
- Symmetries
- Types of Triangles and formula and the description of the perimeter of a triangle
- Quadrilaterals and formula for the perimeter of a quadrilaterals
- Description of the surface area and measuring units
- Surface area of a rectangle and square

**Objectives A, B, C, D**

**ATL skills:**

Thinking – creative thinking skills

Thinking – transfer skills

**Unit 4: Fractions**

**KEY CONCEPT:** Form

**RELATED CONCEPTS:** Quantity, Representation

**GLOBAL CONTEXT:** Identities and Relationships

**STATEMENT OF INQUIRY:** Quantity and relationships between two numbers can be represented in a form of a fraction.

**Main Content Addressed:**

- Graphical representation of fractions
- Proper and improper fractions
- Mixed numbers
- Expanding and reducing fractions
- Fractions as a part of a group
- Comparing fractions with like denominators
- Adding and subtracting fractions with like denominators

**Objectives A, B, C, D**

**ATL skills:**

Communication – communications skills

Thinking – critical thinking skills

## **Unit 5: Decimal numbers**

Through the activities of graphing, converting and applying basic rules, students will learn why people created fractions and decimals.

**KEY CONCEPT:** Change

**RELATED CONCEPTS:** Equivalence, Representation, Change

**GLOBAL CONTEXT:** Identities and relationships

**STATEMENT OF INQUIRY:** Every number can be represented as a decimal number, and relationship between two numbers is equivalent to a decimal number.

**Main Content Addressed:**

- Decimal fractions
- Converting decimal into fractions and vice versa
- Decimals on the number line
- Comparing decimal numbers
- Rounding decimal numbers
- Adding and subtracting decimal numbers
- Multiplying decimals by the power of ten
- Multiplying decimal numbers
- Dividing decimal numbers

**Objectives A, D**

**ATL skills:**

Self-management – reflective skills

Thinking – transfer skills



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# Subject Overviews

## MYP 1

# Mathematics



# MYP1: MATHEMATICS

## Unit 1: Fractions

Through the activities students will do their own research on history of fractions. Students will use different forms of mathematical representation of fraction. Students will develop graphing skills. Students will develop deductive and inductive reasoning: applying general rules to particular situations and developing general rules from particular data inductive reasoning.

Students will be communicating a mathematical way of thinking in solving problems using BODMAS.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** System, Change, Equivalence

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Fraction is a form of a number, equivalent to a certain decimal number.

### Main Content Addressed:

- Mixed numbers and improper fractions
- Comparing and ordering fractions
- Adding, subtracting, multiplying and dividing fractions
- Order of operations; Fractions in equations

**Objectives A, C**

### ATL skills:

Self-management – reflection skills

Thinking – critical thinking skills

## Unit 2: Triangle

Through the activities of finding links between geometry and art, students will learn about different types of angles and special types of triangles.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** Pattern, Equivalence

**GLOBAL CONTEXT:** Personal and cultural expressions

**STATEMENT OF INQUIRY:** Understanding form and shape patterns enhance creativity.

### Main Content Addressed:

- Vertices, sides and angles of a triangle
- Special types of triangles
- The interior and exterior angles of a triangle
- Constructing a line (axis) of symmetry
- Constructing of some angles
- Three basic constructions of triangles
- Triangle congruence
- Area of a triangle

## Objectives A, B

### ATL skills:

Self-management – organization skills

Thinking – creative thinking skills

## Unit 3: Integers

Through the activities of measuring time through history students will research the development of concept of a negative number.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** System, Change, Quantity

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Recognizing and classifying numbers give a deeper understanding of different number systems.

### Main Content Addressed:

- Positive and negative numbers
- Graphing on a number line
- Opposite numbers
- Absolute value of an integer
- Comparing integers
- Adding, subtracting, multiplying and dividing integers
- Extracting the common factor
- Using brackets in algebra
- Solving equations

## Objectives A, B, C, D

### ATL skills:

Research – media literacy skills

Communication – communication skills

## Unit 4: Rational Numbers

Through the activities of graphing, converting and applying basic rules with rational numbers, students will learn why people created fractions and decimals.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** Representation, Equivalence

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Form of rational numbers represents quantities in real-world context.

**Main Content Addressed:**

- Positive and negative rational numbers
- Graphing on a number line
- Opposite numbers
- Absolute value of a rational number
- Comparing rational numbers
- Adding, subtracting, multiplying and dividing rational numbers

**Objectives A, D**

**ATL skills:**

Social – collaboration skills

Thinking – critical thinking skills

### Unit 5: Linear Equation with One Unknown

Through the activities of solving word problems, students will research why people created linear equations.

**KEY CONCEPT:** Relationships

**RELATED CONCEPTS:** Model, Representation, Simplification

**GLOBAL CONTEXT:** Scientific and technical innovation

**STATEMENT OF INQUIRY:** Modelling using a logical process helps us to understand the world.

**Main Content Addressed:**

- Solving linear equations with one unknown
- Modelling real-life problems through linear equations
- Problem solving

**Objectives A, D**

**ATL skills:**

Thinking – transfer skills

### Unit 6: Quadrilateral

Through the activities of constructing tangram, puzzles students will research about different types of quadrilaterals.

**KEY CONCEPT:** Logic

**RELATED CONCEPTS:** Measurement, Justification

**GLOBAL CONTEXT:** Orientation in space and time



**STATEMENT OF INQUIRY:** Logic is a powerful tool for justifying what we discover through measurement and observation.

**Main Content Addressed:**

- Vertices, sides, angles and diagonals of a quadrilateral
- Special types of quadrilaterals
- The interior angles in a quadrilateral
- Parallelogram
- Area of a parallelogram
- Trapezoid
- Area of a trapezoid

**Objectives A, B, C**

**ATL skills:**

Self-management – organization skills

Thinking – creative thinking skills



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# Subject Overviews

## MYP 2

# Mathematics



## **MYP2: MATHEMATICS**

### **Unit 1: Coordinate system, Ratio, Proportion**

Through the activities of communicating with geographic coordinate system, students will understand Cartesian coordinate system. They will be able to develop graphing skills.

**KEY CONCEPT:** Forms of Mathematical Representation

**RELATED CONCEPTS:** Space, Model

**GLOBAL CONTEXT:** Orientation in space and time

**STATEMENT OF INQUIRY:** Forms of mathematical representation expand the understanding of orientation in space and time (*geographic coordinate system*).

#### **Main Content Addressed:**

- Coordinate system on a line
- Ordered pair
- Rectangular coordinate system in a plane
- Ratio
- Proportion
- Proportional quantities and its graph
- Solving proportion problems
- Inverse proportion
- Solving inverse proportion problems
- Graph of inverse proportion

**Objectives A, D**

#### **ATL skills:**

Thinking – creative thinking skills

Thinking – transfer skills

### **Unit 2: Percentages, Data analysis, Probability**

Through the researches on different topics, students will learn how to create charts, diagrams and interpret data and possible outcomes in future events.

**KEY CONCEPT:** Logic

**RELATED CONCEPTS:** Quantity, Model

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Data analysis and probability are powerful models for developing and simplifying global perspectives and relationships.

**Main Content Addressed:**

- Percentages, converting percentages to fraction and decimal numbers and vice versa
- Solving problems involving percentages
- Graphical analysis and representation (pie charts, histogram, line graphs, scatter plots)
- Concept of a probability
- Simple probability problems

**Objectives A, B, C, D****ATL skills:**

Research – information literacy skills

Thinking – critical thinking skills

**Unit 3: Polygons**

Through the activities of drawing polygons using drawing instruments, students begin to broaden their knowledge on different types of polygons. Students will research tangram puzzles.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** Pattern, Generalization

**GLOBAL CONTEXT:** Identities and relationships

**STATEMENT OF INQUIRY:** Patterns and geometric relationships in different regular polygons can be generalized into formulae.

**Main Content Addressed:**

- Diagonals of polygons. Number of diagonals
- Sum of all interior and exterior angles of a polygon.
- Regular polygons. Measure of an interior and exterior angle in regular polygons
- Constructing regular polygon
- Perimeter and area of polygons

**Objectives A, B, C****ATL skills:**

Thinking – critical thinking skills

**Unit 4: Similar triangles**

By finding patterns and applying the rules of similar triangles, students will calculate missing lengths in geometric tasks and in real-life problems, such as: finding height of a building or a person, using lengths of their shadows.

**KEY CONCEPT:** Forms

**RELATED CONCEPTS:** Pattern, Generalization

**GLOBAL CONTEXT:** Identities and relationships

**STATEMENT OF INQUIRY:** Relationships between patterns in similar triangles can help calculate unknown lengths of different forms.

**Main Content Addressed:**

- Similarity theorems: Angle-angle theorem, Side-angle-side theorem, Side-side-side theorem
- Calculating unknown sides in similar triangles
- Applying similarity theorems in real-life problems

**Objectives A, B, D**

**ATL skills:**

Social – collaboration skills

Thinking – transfer skills

### **Unit 5: System of two equations with two unknowns**

Through the activities of graphing, students begin to broaden their knowledge of some word problems from a real life. Students will research how to use linear equations to predict real life situations.

**KEY CONCEPT:** Relationships

**RELATED CONCEPTS:** Model, Equivalence

**GLOBAL CONTEXT:** Scientific and technical innovation

**STATEMENT OF INQUIRY:** Modelling using a logical process helps us understand the world and lead to scientific and technical innovation.

**Main Content Addressed:**

- All possible solutions of a system of linear equations with two unknown
- Method of substitution
- Method of the opposite coefficients

**Objectives A, C**

**ATL skills:**

Thinking – creative thinking skills

Self-management – reflection skills

### **Unit 6: Linear function**

Through the activities of communicating with graphical representation of linear function in physics students will research linear model. Students will research the properties of a line in a coordinate plane.

**KEY CONCEPT:** Relationships

**RELATED CONCEPTS:** Representation, Model, Change

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Linear models represent correlation between variables.

**Main Content Addressed:**

- The concept of linear function
- Input and output values
- Graph of linear function
- Falling and growing function
- Slope formula
- Point-slope formula
- Implicit and explicit form of equation of a line
- Parallel lines
- Intersection of two lines
- Solving the system of two linear equations with two unknown graphically

**Objectives A, C, D**

**ATL skills:**

Communication – communication skills

Thinking – critical thinking skills

### **Unit 7: Circle and circumference**

Through the activities students will investigate the origin of number  $\pi$  and its calculation methods through history.

**KEY CONCEPT:** Logic

**RELATED CONCEPTS:** Pattern, Generalization

**GLOBAL CONTEXT:** Identities and relationships

**STATEMENT OF INQUIRY:** There is logic in creative constructions around us.

**Main Content Addressed:**

- Radius and diameter
- Relations of two circumferences of the same plane
- Relations of a circumference and a line of the same plane
- Circle slices: sector and segment
- Central and inscribed angle. Inscribed/central angle theorem
- Thales theorem
- Perimeter of a circle
- Area of a circle. Arc length

**Objectives: A**

**ATL skills:**

Thinking – transfer skills



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# Subject Overviews

## MYP 3

# Mathematics



## **MYP3: MATHEMATICS**

### **Unit 1: Squaring, Powers, Roots**

Through the activities students will learn how to find squares, roots and powers of numbers

-using table of squares of the numbers from 1 to 100

-using calculator to speed things up

Students will discuss patterns for multiplying and dividing by powers 10.

**KEY CONCEPT:** Relationships

**RELATED CONCEPTS:** Model, Generalization, Simplification

**GLOBAL CONTEXT:** Identities and relationships

**STATEMENT OF INQUIRY:** Using a model to represent relationships can enable recognizing patterns in different situations.

#### **Main Content Addressed:**

- Squaring numbers. Table of squares.
- Graph and properties of the quadratic function
- Squaring sum and difference. The difference of two squares
- Quadratic equation
- Extracting the root
- Partial rooting
- The graph of the function of extracting the root
- Operations with square roots
- Rationalization of the denominator
- Powers

**Objectives** A, B, C

#### **ATL skills:**

Social – collaboration skills

Thinking – creative thinking skills

### **Unit 2: Pythagoras's theorem**

Through the activities of researching and investigating patterns, students get to know how people made use of mathematical concepts to solve practical problems in ancient times Students will learn how to recognize simple patterns in different situations.

**KEY CONCEPT:** Logic

**RELATED CONCEPTS:** Measurement, Justification

**GLOBAL CONTEXT:** Orientation in space and time

**STATEMENT OF INQUIRY:** Mathematics' involvement in architecture and nature can be justified through measurements and logic (calculations).



**Main Content Addressed:**

- Right triangle. Pythagoras's theorem.
- Applying the Pythagoras's theorem on isosceles, equilateral and scalene triangle
- Applying the Pythagoras's' theorem on square, rectangle, rhombus and isosceles trapezoid

**Objectives A, B, D**

**ATL skills:**

Thinking – transfer skills

**Unit 3: Real numbers**

Students will research the origin of rational numbers with periodic decimal expansion and irrational numbers with non-repeating expansion.

**KEY CONCEPT:** Relationships

**RELATED CONCEPTS:** Pattern, Generalization

**GLOBAL CONTEXT:** Globalization and sustainability

**STATEMENT OF INQUIRY:** Recognizing and classifying numbers give a deeper understanding of different number systems.

**Main Content Addressed:**

- Natural numbers. Integers.
- Finite and infinite periodical rational numbers. Irrational numbers.
- Real numbers.
- Graphing on the number line

**Objectives A, C, D**

**ATL skills:**

Research – information literacy skills

**Unit 4: Sets of points in space**

Through the activities students begin to broaden their knowledge on different types of symmetries. Students will research the links between motion geometry and art-architecture.

**KEY CONCEPT:** Form

**RELATED CONCEPTS:** Pattern, Space

**GLOBAL CONTEXT:** Personal and cultural expression

**STATEMENT OF INQUIRY:** Understanding form and shape enhances creativity.

**Main Content Addressed:**

- Line symmetry

- Central symmetry
- Rotation
- Vectors
- Translation
- Adding and subtracting vectors.
- Composition of translation of a plane

**Objectives A, B**

**ATL skills:**

Thinking – critical thinking skills

Thinking – transfer skills

**Unit 5: Three-dimensional shapes**

Students will find out which dimension (*radius and height*) has the greatest effect on surface area and volume.

**KEY CONCEPT:** Form

**RELATED CONCEPTS:** Space, Measurement

**GLOBAL CONTEXT:** Fairness and development

**STATEMENT OF INQUIRY:** Designing new structures responsibly can minimize waste of material.

**Main Content Addressed:**

- Surface area of a parallelepiped (cube and cuboids)
- Surface area of a prism
- Surface area of a pyramid
- Surface area of a cylinder and a cone
- Surface area of a sphere
- Volume of a parallelepiped
- Volume of a prism and a pyramid
- Volume of a cylinder and a cone
- Volume of a sphere

**Objectives A, B, C, D**

**ATL skills:**

Social – collaboration skills

Thinking – transfer skills