

# 10th Grade American Online School

## MATHEMATICS CURRICULUM

### Logical Thinking and Problem Solving

Version Mar/2025

## 1. Introduction

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### The Role of Mathematics in 10th Grade

Mathematics in 10th grade is essential for problem-solving, logical reasoning, and real-world applications. This curriculum provides students with a strong foundation in numbers, algebra, geometry, and general mathematical concepts that are critical for advanced studies and everyday life.

By the end of this course, students will:

- ✓ Master fundamental arithmetic operations and number concepts.
  - ✓ Develop algebraic thinking to solve equations and inequalities.
  - ✓ Apply geometric principles to analyze shapes, angles, and measurements.
  - ✓ Strengthen problem-solving and logical reasoning skills.
  - ✓ Use mathematical models to interpret and solve real-world problems.
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## 2. Core Competence Areas

### MTH.1 Use of Numbers and Arithmetic Operations

#### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Understand number properties, incl. whole numbers, fractions, decimals, and percentages.
- ✓ Perform arithmetic operations (addition, subtraction, multiplication, and division) with accuracy.
- ✓ Use ratios, proportions, and percentages in problem-solving situations.

#### Competencies

##### MTH.1.A.1 – Mastering basic number concepts and operations.

- Understand whole numbers, integers, fractions, decimals, and percentages.
- Perform operations with positive and negative numbers.
- Use order of operations (PEMDAS/BODMAS) to simplify expressions.

##### MTH.1.A.2 – Applying arithmetic to real-world contexts.

- Solve word problems using fractions, ratios, and proportions.
- Convert between fractions, decimals, and percentages.
- Understand and apply financial literacy concepts like discounts, interest, and budgeting.

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### MTH.2 Algebra and Equations

#### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Understand and use algebraic expressions, variables, and equations.
- ✓ Solve linear and quadratic equations and inequalities.
- ✓ Graph linear functions and interpret their meaning.

## Competencies

### **MTH.2.A.1 – Understanding algebraic expressions and operations.**

- Learn how to simplify and evaluate algebraic expressions.
- Use variables, coefficients, and exponents correctly.
- Apply the distributive, associative, and commutative properties.

### **MTH.2.A.2 – Solving equations and inequalities.**

- Solve linear equations and inequalities step by step.
- Work with quadratic equations and factorization techniques.
- Graph and interpret linear and nonlinear functions.

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## **MTH.3 Geometry and Measurement**

### **Learning Outcomes**

By the end of this unit, students will be able to:

- ✓ **Analyze shapes, angles, and geometric relationships.**
- ✓ **Apply formulas for perimeter, area, and volume.**
- ✓ **Understand and work with coordinate geometry.**

### **Competencies**

#### **MTH.3.A.1 – Understanding geometric properties and relationships.**

- Identify and classify triangles, quadrilaterals, and polygons.
- Explore angles, parallel lines, and transversals.
- Work with congruence and similarity in geometric figures.

#### **MTH.3.A.2 – Applying measurement and spatial reasoning.**

- Use formulas to calculate area, perimeter, surface area, and volume.
- Apply Pythagorean theorem and trigonometric ratios.
- Work with coordinate plane transformations (translations, reflections, rotations).

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## MTH.4 General Mathematics and Problem-Solving

### Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Apply logical reasoning to solve word problems and puzzles.
- ✓ Interpret data using tables, charts, and graphs.
- ✓ Understand the basics of probability and statistics.

### Competencies

#### MTH.4.A.1 – Strengthening logical reasoning and problem-solving skills.

- Use pattern recognition and mathematical logic to solve problems.
- Break down complex word problems into manageable steps.
- Apply trial-and-error and estimation strategies.

#### MTH.4.A.2 – Understanding basic data analysis and probability.

- Read and interpret bar graphs, line graphs, and pie charts.
- Calculate mean, median, mode, and range.
- Understand basic probability concepts and real-world applications.

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## 3. Assessment and Evaluation

### Formative Assessments – Checking Progress Through Interactive Learning

- ✓ Quick quizzes and math drills to reinforce concepts.
- ✓ Problem-solving discussions and step-by-step reasoning exercises.
- ✓ Peer-reviewed error analysis to identify and correct mistakes.

### Summative Assessments – Final Projects and Exams

- ✓ Unit tests covering arithmetic, algebra, geometry, and problem-solving.
- ✓ Cumulative math portfolio showcasing student progress.
- ✓ Final project applying math skills to a real-world scenario.

### **Authentic Assessment – Real-World Applications**

- ✓ Students calculate the cost of a trip using percentages and currency conversion.
  - ✓ Math in careers: exploring how professionals use math daily.
  - ✓ Data-driven decision-making exercises, such as analyzing trends in sports statistics.
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## **4. Instructional Strategies for Online Learning**

### **Inquiry-Based and Problem-Based Learning**

- ✓ Case studies on real-world mathematical applications.
- ✓ Collaborative problem-solving challenges in small groups.

### **Project-Based Learning (PBL)**

- ✓ Students design a blueprint of a house using geometric principles.
- ✓ Business simulation projects involving budgeting and financial planning.

### **Technology-Integrated Learning**

- ✓ Use of graphing calculators and math software (Desmos, GeoGebra).
- ✓ Interactive online math games and quizzes.