M2 Core Mathematics

Course Syllabus - 2026, Term 1

Teacher: Josh Pearl

Department: Mathematics **Subject Code**: MA22101

Periods per week: 4 **Credits**: 2.0

Course Description

Students will develop skills of recognizing irrational numbers and how it relates to square roots and cube roots of rational numbers. The course will then cover right triangles as students learn about Pythagoras' theorem and its useful real-world applications. Students will next be introduced to a deeper understanding of measurement, including concepts of area and volume. The course will finish with an exploration of linear equations, graphs of linear systems, and some real-world applications of these concepts as well.

Course Content

1. Rational and Irrational Numbers
   - 1.1. Rational numbers
   - 1.2. Square roots and cube roots
   - 1.3. Irrational numbers

2. Pythagoras' Theorem
   - 2.1. Triangle inequality theorem
   - 2.2. Pythagoras' Theorem
   - 2.3. Distance formula
   - 2.4. 45°- 45°- 90° triangles

3. Surface Area and Volume
   - 3.1. Properties of Three-Dimensional Figures
   - 3.2. Prisms and Cylinders
   - 3.3. Pyramids and Cones
   - 3.4. Spheres and Hemispheres
   - 3.5. Compound Solids

4. Graphs of Linear Equations
    4.1. Properties of linear graphs
    4.2. Forms of Lines
    4.3. Parallel and perpendicular lines.

5. Applications of Linear Equations
    5.1. Real-world Applications of Linear Equations

Learning Outcomes

Rational and Irrational Numbers

- Write rational numbers in the form a/b .
- Convert decimals into fractions.
- Classify rational numbers ($\mathbb{Q}$).
- Order rational numbers on a number line.
- Find square roots and cube roots.
- Use prime factorization to find square and cube roots.
- Estimate square roots and cube roots.
- Classify numbers in the set of real numbers ($\mathbb{R}$).
- Order irrational numbers on a number line.

Pythagoras' Theorem

- Use the Triangle Inequality Theorem.
- Identify parts of a right triangle.
- Use Pythagoras' Theorem.
- Use the converse of Pythagoras' theorem.
- Use Pythagorean Triples to find missing sides in a right triangle.
- Use the distance formula to find the distance between two points and specific coordinates.
- Use properties of isosceles triangles to determine the relationships of triangles.
- Use the relationships between the sides of a 45°- 45°- 90° triangle to find missing measurements.

Surface Area and Volume

- Identify the number of faces, edges and vertices of prisms and pyramids.
- Draw three-dimensional figures.
- Compare prisms and cylinders.
- Calculate the surface area and volume of prisms and cylinders.
- Compare pyramids and cones.
- Calculate the surface area and volume of pyramids and cones.

- Calculate the surface area and volume of spheres and hemispheres.
- Calculate the surface area and volume of compound solids.

Graphs of Linear Equations

- Write a linear equation in standard form: $Ax + By = C$.
- Draw the graph of a linear equation by making a table of values and using x- and y-intercepts.
- Identify the x- and y-intercepts of a line.
- Calculate the slope of a line.
- Graph horizontal and vertical lines.
- Know all different forms of a linear equation.
- For each form of a line: identify parts of the line, draw the graph, and write its equation.
- Use slope to determine if two lines are parallel, perpendicular or neither.
- Write the equation of a line that is parallel or perpendicular to a given line.

Applications of Linear Equations

- Use equations to solve:
    - distance/rate/time problems.
    - profit/loss and finance problems.
    - mixture problems.
    - problems involving multiple quantities and totals.

Learning Resources

ALEKS (online assessment and tracking software)

Khan Academy (Online learning site)

Desmos.com (graphing utility)

Other (handouts from Kuta software)

Powerpoint and PDF handouts

Homework Policy

All homework assignments must be submitted on time. Any late homework will have an automatic 10% subtracted from the total score, and 10% will be deducted per day after it is considered late. Therefore, if an assignment or project is ever more than 10 days late, the score will be a 0.

If students are absent when assignments are given or on an assignment due date, then it is the responsibility of the student to contact the teacher to make arrangements for submission.

Assessment Methods

Assignments, quizzes, and unit tests will be used to assess students' skills and understanding of basic concepts within each unit. Assignments will be graded based on accuracy, but will also be graded for completion, effort, and submission by assigned deadlines. The unit tests will typically be short in duration and will be able to assess students' ability to complete basic problems without the need to memorize formulas required to finish problems.

Final exams will include a wide range of problems. About half of the exam will consist of problems that will cover the fundamental skills within the unit(s). The remainder of the exam will consist of problems that will require a deeper understanding of each topic and will require students to combine skills from several topics and also apply those skills and concepts to real-world application problems. All problems on exams will be graded on both methodology and accuracy, and partial credit will be awarded for demonstrating an understanding of the concept being tested.

Evaluation Breakdown Total 100%

Assessment **30%**

- Tests (20%)
- Quizzes (10%)

Student Work **50%**

- Homework / Classwork Assignments (30%)
- Notebook Checks (20%)

Final Exam **20%**

Thai National Curriculum Standards (for teacher reference)

Strand 1: Numbers and operations

Standard M1.1: Understanding diverse methods of presenting numbers and their application in real life

> M1.1 Gr8/1: Write fractions in the form of decimals and write circulating decimals in form of fractions.
>
> M1.1 Gr8/2: Distribute prescribed real numbers and give examples of rational and irrational numbers.
>
> M1.1 Gr8/3: Explain and specify square roots and cube roots of real numbers.
>
> M1.1 Gr8/4: Apply knowledge of ratio, fraction and percentage to solve problems.

Standard M1.2: Understanding results of operations of numbers, relationships of operations, and application of operations for problem-solving

> M1.2 Gr8/1: Find square root and cube root of integral numbers by separating factors for the purpose of problem-solving as well as be aware of validity of the answers.
>
> M1.2 Gr8/2: Explain results of finding square root and cube root of integral numbers, fractions and decimals, and express the relationship between exponents and roots of real numbers.

Standard M1.3: Use of estimation in calculation and problem-solving

> M1.3 Gr8/1: Find estimates of square root and cube root of real numbers, which can be applied for problem-solving, as well as be aware of the validity of the answers.

Standard M1.4: Understanding of numerical system and application of numerical properties

> M1.4 Gr8/1: Explain relationships between real numbers, rational numbers, and irrational numbers.

Strand 2: Measurement

Standard M2.1: Understanding the basics of measurement; ability to measure and estimate the size of objects to be measured

> M2.1 Gr8/1: Compare measuring units for length and area of the same and different systems and choose appropriate measuring units.
>
> M2.1 Gr8/2: Appropriately estimate time, distance, area, volume and weight, and explain the method used for estimation.
>
> M2.1 Gr8/3: Appropriately choose estimation for measurement in various situations.

Standard M2.2: Solving measurement problems

M2.2 Gr8/1: 1. Apply knowledge of length and area for problem-solving in various situations

Strand 3: Geometry

Standard M3.2: Ability for visualization, spatial reasoning and application of geometric models for problem-solving

M3.2 Gr8/2: Use Pythagoras' Theorem and converse for reasoning and problem-solving.

Strand 6: Mathematical Skills and Processes

Standard M6.1: Capacity for problem-solving, reasoning, and communication; communication and presentation of mathematical concepts; linking various bodies of mathematical knowledge and linking mathematics with other disciplines; and attaining ability for creative thinking.

M6.1 Gr8/4: Accurately and succinctly use mathematical language and symbols for communication, communication of concepts and presentation.

M6.1 Gr8/5: Link various bodies of mathematical knowledge, and link mathematical knowledge, principles and processes with those of other disciplines.

M6.1 Gr8/6: Attain ability for creative thinking.

[Total 16 indicators]