

FIRST SEMESTER

Math 2 – Unit 1 – Quadratics and Complex Numbers

MM2N1. Students will represent and operate with complex numbers.

- Write square roots of negative numbers in imaginary form.
- Write complex numbers in the form $a + bi$.
- Add, subtract, multiply, and divide complex numbers.
- Simplify expressions involving complex numbers.

MM2A3. Students will analyze quadratic functions in the forms $f(x) = ax^2 + bx + c$

and $f(x) = a(x - h)^2 + k$.

- Convert between standard and vertex form.
- Graph quadratic functions as transformations of the function $f(x) = x^2$.
- Investigate and explain characteristics of quadratic functions, including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, intervals of increase and decrease, and rates of change.
- Explore arithmetic series and various ways of computing their sums.
- Explore sequences of partial sums of arithmetic series as examples of quadratic functions.

MM2A4. Students will solve quadratic equations and inequalities in one variable.

- Solve equations graphically using appropriate technology.
- Find real and complex solutions of equations by factoring, taking square roots, and applying the quadratic formula.
- Analyze the nature of roots using technology and using the discriminant.
- Solve quadratic inequalities both graphically and algebraically, and describe the solutions using linear inequalities.

Math 2 – Unit 2 – Right Triangle Trigonometry

MM2G1. Students will identify and use special right triangles.

- Determine the lengths of sides of 30°-60°-90° triangles.
- Determine the lengths of sides of 45°-45°-90° triangles.

MM2G2. Students will define and apply sine, cosine, and tangent ratios to right triangles.

- Discover the relationship of the trigonometric ratios for similar triangles.
- Explain the relationship between the trigonometric ratios of complementary angles.
- Solve application problems using the trigonometric ratios.

Math 2 – Unit 3 – Circles and Spheres

MM2G3. Students will understand the properties of circles.

- Understand and use properties of chords, tangents, and secants as an application of triangle similarity.
- Understand and use properties of central, inscribed, and related angles.
- Use the properties of circles to solve problems involving the length of an arc and the area of a sector.

d. Justify measurements and relationships in circles using geometric and algebraic properties.

MM2G4. Students will find and compare the measures of spheres.

a. Use and apply surface area and volume of a sphere.

b. Determine the effect on surface area and volume of changing the radius or diameter of a sphere.

SECOND SEMESTER

Math 2 – Unit 4 – Statistics

MM2D1. Using sample data, students will make informal inferences about population means and standard deviations.

a. Pose a question and collect sample data from at least two different populations.

b. Understand and calculate the means and standard deviations of sets of data.

c. Use means and standard deviations to compare data sets.

d. Compare the means and standard deviations of random samples with the corresponding population parameters, including those population parameters for normal distributions. Observe that the different sample means vary from one sample to the next. Observe that the distribution of the sample means has less variability than the population distribution.

Math 2 – Unit 5 – Piecewise, Exponential, and Inverses

MM2A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.

b. Investigate and explain characteristics of a variety of piecewise functions including domain, range, vertex, axis of symmetry, zeros, intercepts, extrema, points of discontinuity, intervals over which the function is constant, intervals of increase and decrease, and rates of change.

MM2A2. Students will explore exponential functions.

a. Extend properties of exponents to include all integer exponents.

b. Investigate and explain characteristics of exponential functions, including domain and range, asymptotes, zeros, intercepts, intervals of increase and decrease, rates of change, and end behavior.

c. Graph functions as transformations of $f(x) = a^x$.

d. Solve simple exponential equations and inequalities analytically, graphically, and by using appropriate technology.

e. Understand and use basic exponential functions as models of real phenomena.

f. Understand and recognize geometric sequences as exponential functions with domains that are whole numbers.

g. Interpret the constant ratio in a geometric sequence as the base of the associated exponential function.

MM2A5. Students will explore inverses of functions.

a. Discuss the characteristics of functions and their inverses, including one-to-oneness, domain, and range.

- b. Determine inverses of linear, quadratic, and power functions and functions of the form $f(x) = xa$, including the use of restricted domains.
- c. Explore the graphs of functions and their inverses.
- d. Use composition to verify that functions are inverses of each other.

Math 2 – Unit 6 – Linear and Quadratic Regressions

MM2A1. Students will investigate step and piecewise functions, including greatest integer and absolute value functions.

- a. Write absolute value functions as piecewise functions.
- c. Solve absolute value equations and inequalities analytically, graphically, and by using appropriate technology.

MM2D2. Students will determine an algebraic model to quantify the association between two quantitative variables.

- a. Gather and plot data that can be modeled with linear and quadratic functions.
- b. Examine the issues of curve fitting by finding good linear fits to data using simple methods such as the median-median line and “eyeballing.”
- c. Understand and apply the processes of linear and quadratic regression for curve fitting using appropriate technology.
- d. Investigate issues that arise when using data to explore the relationship between two variables, including confusion between correlation and causation.