

# FIRST SEMESTER

## Math 1 – Unit 1 – FUNCTION FAMILIES

**MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.**

- Represent functions using function notation.
- Graph the basic functions  $f(x) = x^n$ , where  $n = 1$  to  $3$ ,  $f(x) = x$ ,  $f(x) = |x|$ , and  $f(x) = -$ .
- Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the  $x$ - and  $y$ -axes.
- Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum values, and end behavior.
- Relate to a given context the characteristics of a function, and use graphs and tables to investigate its behavior.
- Recognize sequences as functions with domains that are whole numbers.
- Explore rates of change, comparing constant rates of change (i.e., slope) versus variable rates of change. Compare rates of change of linear, quadratic, square root, and other function families.

**MM1G2. Students will understand and use the language of mathematical argument and justification.**

- Use conjecture, inductive reasoning, deductive reasoning, counterexamples, and indirect proof as appropriate.
- Understand and use the relationships among a statement and its converse, inverse, and contrapositive.

## Math 1 – Unit 2 – ALGEBRA INVESTIGATIONS

**MM1A2. Students will simplify and operate with radical expressions, polynomials, and rational expressions.**

- Simplify algebraic and numeric expressions involving square root.
- Perform operations with square roots.
- Add, subtract, multiply, and divide polynomials.
- Expand binomials using the Binomial Theorem.
- Add, subtract, multiply, and divide rational expressions.
- Factor expressions by greatest common factor, grouping, trial and error, and special products limited to the formulas below.

$$(x + y)^2 = x^2 + 2xy + y^2$$

$$(x - y)^2 = x^2 - 2xy + y^2$$

$$(x + y)(x - y) = x^2 - y^2$$

$$(x + a)(x + b) = x^2 + (a + b)x + ab$$

$$(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$(x - y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$$

- Use area and volume models for polynomial arithmetic.

## Math 1 – Unit 3 – GEOMETRY GALLERY

**MM1G3. Students will discover, prove, and apply properties of triangles, quadrilaterals, and other polygons.**

- Determine the sum of interior and exterior angles in a polygon.
- Understand and use the triangle inequality, the side-angle inequality, and the exterior-angle inequality.
- Understand and use congruence postulates and theorems for triangles (SSS, SAS, ASA, AAS, HL).
- Understand, use, and prove properties of and relationships among special quadrilaterals: parallelogram, rectangle, rhombus, square, trapezoid, and kite.
- Find and use points of concurrency in triangles: incenter, orthocenter, circumcenter, and centroid

## SECOND SEMESTER

### Math 1 – Unit 4 – The Chance of Winning

**MM1D1. Students will determine the number of outcomes related to a given event.**

- Apply the addition and multiplication principles of counting.
- Calculate and use simple permutations and combinations.

**MM1D2. Students will use the basic laws of probability.**

- Find the probabilities of mutually exclusive events.
- Find the probabilities of dependent events.
- Calculate conditional probabilities.
- Use expected value to predict outcomes.

**MM1D3. Students will relate samples to a population.**

- Compare summary statistics (mean, median, quartiles, and interquartile range) from one sample data distribution to another sample data distribution in describing center and variability of the data distributions.
- Compare the averages of the summary statistics from a large number of samples to the corresponding population parameters.
- Understand that a random sample is used to improve the chance of selecting a representative sample.

**MM1D4. Students will explore variability of data by determining the mean absolute deviation (the average of the absolute values of the deviations).**

### Math 1 – Unit 5 – Algebra in Context

**MM1A1. Students will explore and interpret the characteristics of functions, using graphs, tables, and simple algebraic techniques.**

- Graph transformations of basic functions including vertical shifts, stretches, and shrinks, as well as reflections across the  $x$ - and  $y$ -axes.
- Investigate and explain the characteristics of a function: domain, range, zeros, intercepts, intervals of increase and decrease, maximum and minimum

values, and end behavior.

h. Determine graphically and algebraically whether a function has symmetry and whether it is even, odd, or neither.

i. Understand that any equation in  $x$  can be interpreted as the equation  $f(x) = g(x)$ , and interpret the solutions of the equation as the  $x$ -value(s) of the intersection point(s) of the graphs of  $y = f(x)$  and  $y = g(x)$ .

**MM1A3. Students will solve simple equations.**

a. Solve quadratic equations in the form  $ax^2 + bx + c = 0$ , where  $a = 1$ , by using factorization and finding square roots where applicable.

b. Solve equations involving radicals such as  $x + b = c$ , using algebraic techniques.

c. Use a variety of techniques, including technology, tables, and graphs to solve equations resulting from the investigation of  $x^2 + bx + c = 0$ .

d. Solve simple rational equations that result in linear equations or quadratic equations with leading coefficient of 1.

**Math 1 – Unit 6 – Coordinate Geometry**

**MM1G1. Students will investigate properties of geometric figures in the coordinate plane.**

a. Determine the distance between two points.

b. Determine the distance between a point and a line.

c. Determine the midpoint of a segment.

d. Understand the distance formula as an application of the Pythagorean theorem.

e. Use the coordinate plane to investigate properties of and verify conjecture related to triangles and quadrilaterals.