

**Michigan Center School District  
Math Department Curriculum**

Updated October 21, 2014

**Grade Level/Course** Algebra 2

**Sequence of Units**

- **Unit 1** Univariate Data
  - **Power Strands**
    1. **HSS-ID.A.1.** Represent data with plots on the real number line (dot plots, histograms, and box plots)
    2. **HSS-ID.A.2.** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation)
    3. **HSS-ID.A.4.** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages.
  - **Vocabulary/Key Concepts**
    1. Dotplots,
    2. Histograms
    3. boxplots
    4. Measures of center (mean, and median)
    5. Variance
    6. Standard Deviation
    7. Quartiles
    8. Range
    9. Interquartile Range
    10. Normal Distribution
  
- **Unit 2** Matrices
  - **Power Strands**
    1. **HSN-VM.C.8.** Add, subtract, and multiply matrices of appropriate dimensions.
    2. **HSA-REI.C.8.** Represent a system of linear equations as a single matrix equation.
    3. **HSA-REI.C.9.** Find the inverse of a matrix if it exists and use it to solve systems of linear equations (using technology for matrices of dimension  $3 \times 3$  or greater).
  - **Vocabulary/Key Concepts**
    1. Matrix
    2. Dimensions
    3. Determinant
    4. Inverses

**Michigan Center School District  
Math Department Curriculum**

Updated October 21, 2014

- **Unit 3: Polynomials**
  - **Power Strands**
    1. **A.APR.1** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
    2. **A.APR.2** Know and apply the Remainder Theorem. Use long division and synthetic division of polynomials
    3. **A.APR.3** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial
  - **Vocabulary/Key Concepts**
    1. Polynomial
    2. Leading coefficient
    3. degree
    4. Greatest Common Factor
    5. Trinomials
    6. Zeros
    7. Roots
    8. x-intercepts
  
- **Unit 4: Exponential and Log Functions**
  - **Power Strands**
    1. **HSF-IF.C.7e.** Graph exponential and logarithmic functions, showing intercepts and end behavior,
    2. **HSF-LE.A.4.** Solve exponential equations using logarithms
  - **Vocabulary/Key Concepts**
    1. Exponential Function
    2. Logarithmic Function
  
- **Unit 5 Rational Expressions and Functions**
  - **Power Strands**
    1. **HSA-APR.D.** Rewrite rational expressions (by simplifying, multiplying, dividing, adding, and subtracting)
    2. **HSA-REI.A.2.** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
    3. **HSF-IF.C.7d.** Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.
  - **Vocabulary/Key Concepts**
    1. Rational Expression/Function
    2. Vertical Asymptote
    3. Horizontal Asymptote
    4. hole

**Michigan Center School District  
Math Department Curriculum**

Updated October 21, 2014

- **Unit 6 Sequences and Series**
  - **Power Strands**
    1. **HSF-BF.A.2.** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
    2. **HSA-SSE.B.4.** Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.
  - **Vocabulary/Key Concepts**
    1. Arithmetic Sequence
    2. Geometric Sequence
    3. Common Difference
    4. Common Ratio
    5. Series
  
- **Unit 7 Conic Sections and Quadratic Relations**
  - **Power Strands**
    1. **HSN-CN.A.** Perform arithmetic operations with complex numbers.
    2. **HSN-CN.C.7.** Solve quadratic equations with real coefficients that have complex solutions.
    3. **HSN-CN.C.** Use complex numbers in polynomial identities and equations.
    4. **HSG-GPE.A.** Translate between the geometric description and the equation for a conic section
  - **Vocabulary/Key Concepts**
    1. Complex Number
    2. Complex Conjugate
    3. Parabola (focus, directrix)
    4. Circle (center, radius)
    5. Ellipse (major axis, minor axis)
    6. Hyperbola (transverse axis, conjugate axis)
  
- **Unit 8 Trigonometric Functions**
  - **Power Strands**
    1. **HSF-TF.A.** Extend the domain of trigonometric functions using the unit circle.
    2. **HSF-TF.B.5.** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
    3. **HSF-TF.C.8.** Prove the Pythagorean identity  $\sin^2(?) + \cos^2(?) = 1$  and use it to calculate trigonometric ratios.
  - **Vocabulary/Key Concepts**

Michigan Center School District  
Math Department Curriculum

Updated October 21, 2014

1. Sine,
2. Cosine
3. Tangent
4. Cosecant
5. Secant,
6. Cotangent
7. Period
8. Amplitude

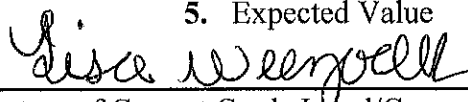
• **Unit 9 Probability**

○ **Power Strands**

1. **HSS-CP.A.1.** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).
2. **HSS-CP.B.6.** Find the conditional probability of A given B as the fraction of B’s outcomes that also belong to A and interpret the answer in terms of the model.
3. **HSS-CP.B.7.** Apply the Addition Rule,  $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.
4. **HSS-MD.B.5a.** Find the expected payoff for a game of chance.

○ **Vocabulary/Key Concepts**

1. Union
2. Intersection
3. Compliment
4. Conditional Probability
5. Expected Value



\_\_\_\_\_  
Signature of Current Grade Level/Course Representative



\_\_\_\_\_  
Signature of Prior Grade Level/Course Representative



\_\_\_\_\_  
Signature of Next Grade Level/Course Representative

# Michigan Center School District

## Math Department Curriculum

Updated 11/19/14

Grade Level/Course Calculus

The Michigan Center High School course in calculus is primarily concerned with developing the students' understanding of the concepts of calculus and providing experience with its methods and applications. This course emphasize a multi-representational approach to calculus with problems, concepts, and results, expressed graphically, numerically, analytically, and verbally.

At Michigan Center High School, calculus is a full-year course that designed to be challenging, demanding, and effective in preparing students for a college level course of this nature. The various topics of calculus (e.g. limits, approximation, derivatives, integrals, applications, modeling) are presented as a coherent and interconnected body of knowledge and a human accomplishment, rather than a collection of disparate ideas.

### Sequence of Units

- **Unit 1 Properties of Limits (Chapter 2)**

---

  - **Power Strands**
    1. Limits of Functions
    2. Analysis of Graphs
    3. Continuity and Discontinuity as a Property of Functions
    4. Limits Involving Infinity
    5. The Intermediate Value Theorem
  - **Vocabulary/Key Concepts**
    1. Limit
    2. Indeterminate Form
    3. Undefined Form
    4. Continuity/Types of Discontinuity
    5. Cusp
    6. Piecewise Function
  
- **Unit 2 Derivative Calculus (Chapter 3 and 4)**

---

  - **Power Strands**
    1. Average/Instantaneous Rate
    2. Graphical and Algebraic Approaches to the Definition of Limit
    3. Difference Quotients and One Definition of Derivative
    4. Derivative Functions, Numerically and Graphically
    5. Derivative of the Power Function and Another Definition of Derivative
    6. Displacement, Velocity, and Acceleration
    7. Introduction to Sine, Cosine, and Composite Functions
    8. Derivatives of Composite Functions – The Chain Rule
    9. Proof and Application of Sine and Cosine Derivatives

**Michigan Center School District  
Math Department Curriculum**

Updated 11/19/14

10. Exponential and Logarithmic Functions
  11. Combinations of Two Functions
  12. Derivative of a Product of Two Functions
  13. Derivative of a Quotient of Two Functions
  14. Derivatives of the Other Trigonometric Functions
  15. Derivatives of the Inverse Trigonometric Functions
  16. Differentiability and Continuity
  17. Derivatives of Parametric Functions (Optional ← Not a Power Strand)
  18. Graphs and Derivatives of Implicit Relations
- **Vocabulary/Key Concepts**
    1. Difference quotient
    2. Derivative at a point
    3. Derivative as a function
    4. Tangent
    5. Power/Exponential function
    6. Differentiation
    7. Antiderivative
    8. Composite function
    9. Natural exponential function
    10. Logarithmic function
    11. Position/Displacement, Velocity, and Acceleration
    12. Amplitude, Vertical displacement, Horizontal translation, Horizontal/Vertical dilation
    13. Even and odd function
    14. Inverse of a function
    15. Implicit differentiation
- **Unit 3 Integral Calculus (Chapter 5)**

---

    - **Power Strands**
      1. Linear Approximations and Differentials
      2. Formal Definition fo Antiderivative and Indefinite Integral
      3. Riemann Sums and the Definition of Definite Integral
      4. The Mean Value Theorem and Rolle's Theorem
      5. The Fundamental Theorem of Calculus
      6. Definite Integral Properties
      7. Definite Integrals Applied to Area
      8. Volume of a Solid by Plane Slicing
      9. Definite Integrals Numerically by Graphing Calculator and by Simpson's Rule

Michigan Center School District  
Math Department Curriculum

Updated 11/19/14

**Vocabulary/Key Concepts**

1. Riemann sum
2. Differential
3. Integrand
4. Integral
5. Power function
6. Natural exponential function
7. Base-b exponential functions
8. Partition
9. Even/odd functions

• **Unit 4 Exponential and Logarithmic Calculus (Chapter 6)**

○ **Power Strands**

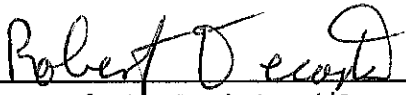
1. Antiderivative of the Reciprocal Function
2. Another Form of the Fundamental Theorem of Calculus
3. The Uniqueness Theorem and Properties of Logarithmic Functions
4. The Number  $e$ , Exponential Functions, and Logarithmic Differentiation
5. Limits of Indeterminate Forms, l'Hospital's Rule

○ **Vocabulary/Key Concepts**

1. Reciprocal
2. Exponential
3. Logarithmic
4.  $e$
5.  $\ln$



Signature of Current Grade Level/Course Representative



Signature of Prior Grade Level/Course Representative

N/A

Signature of Next Grade Level/Course Representative