

INDIAN HILL EXEMPTED VILLAGE SCHOOL DISTRICT
Mathematics Curriculum - May 2009
High School – Pre-Calculus

Main Idea/ Essential Questions:

- How has man historically used algebra to represent problems with symbols

Skills & Objectives:

- Students will convert between decimals and fractions, write inequalities, apply the basic principles of algebra and work with exponents and scientific notation.
 - Students will graph points, find distances and midpoints on a number line and in a coordinate plane, and write the standard form equation of a circle.
 - Students will solve linear equations and inequalities in one variable.
 - Students will use the concept of slope and y-intercept to graph and write linear equations in 2 variables.
 - Students will solve equations in the form of quadratics, absolute value, and fractional expressions by finding the x-intercepts on graphs, algebra techniques and numerical techniques.
 - Students will solve inequalities involving absolute value, quadratics, and fractional expressions
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Main Idea/Essential Questions:

- How do numerical, algebraic, and graphical models of real data provide different methods to visualize, analyze and understand that data?

Skills & Objectives:

- Students will use numerical, algebraic, and graphical models to solve problems and be able to translate from one model to the other.
 - Students will represent functions numerically, algebraically, and graphically to determine the domain and range of those functions so extraneous data can be eliminated from real-life situations.
 - Students will find extreme values of a model, symmetry, and analyze asymptotic behavior.
 - The student will recognize 7 of the 12 basic functions and combine them in ways to create new functions.
 - Students will create new functions from old by adding, subtracting, multiplying, dividing, and composing functions.
 - Students will represent translations, reflections, stretches and shrinks algebraically and graphically.
 - Students will read a problem and determine which basic function to use to model the real world problem. They will then develop to model to represent the problem
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Main Idea/Essential Questions:

- How are business and economic trends modeled by linear functions?
- How are quadratic used to model manufacturing applications?

Skills & Objectives:

- Students will graph linear and quadratic functions to model application problems.
 - Students will sketch and solve power functions.
 - Students will find zeros of a function algebraically and graphically and predict their end behavior.
 - Students will divide polynomials using long division and synthetic division.
 - Students will apply the Remainder Theorem, Factor Theorem, and Rational Roots Theorem.
 - Students will add, subtract, multiply, and divide complex numbers
 - Students will find complex zeros of quadratics.
 - Students will factor polynomials with real coefficients and complex roots.
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Main Idea/Essential Questions:

- How do we model growth and decay over time such as radioactive substances or population?
- How do we solve logarithmic and exponential equations?
- What are the commonalities of all the different types of growth and decay functions?

Skills & Objectives:

- Apply factorials and exponents, including fractional exponents, to solve practical problems.
 - Analyze functions by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior.
 - Use the quadratic formula to solve quadratic equations that have complex roots.
 - Use recursive functions to model and solve problems; e.g., home mortgages, annuities.
 - Create and analyze tabular and graphical displays of data using appropriate tools, including spreadsheets and graphing calculators.
 - Design and perform a statistical experiment, simulation or study; collect and interpret data; and use descriptive statistics to communicate and support predictions and conclusions.
 - Connect statistical techniques to applications in workplace and consumer situations.
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Main Idea/Essential Questions:

- How did engineers use right triangles to solve engineering problems they encountered?
- How is circular/periodic motion modeled?

Skills & Objectives:

- Apply factorials and exponents, including fractional exponents, to solve practical problems.
- Explain differences among accuracy, precision and error, and describe how each of those can affect solutions in measurement situations.
- Apply various measurement scales to describe phenomena and solve problems.
- Estimate and compute areas and volume in increasingly complex problem situations.
- Use trigonometric relationships to verify and determine solutions in problem situations.

Main Idea/Essential Questions:

- How can we use our knowledge of the unit circle to find trig functions of common angles?
- How can we use trig functions to calculate missing sides and angles of NON-right triangles?

Skills & Objectives:

- Explain differences among accuracy, precision and error, and describe how each of those can affect solutions in measurement situations.
- Estimate and compute areas and volume in increasingly complex problem situations.
- Solve problem situations involving derived measurements; e.g., density, acceleration.

Main Idea/Essential Questions:

- How do we solve systems to determine mixtures that have price as a parameter?
- How can we use permutation and combination techniques to determine if we have listed all the possible outcomes in a situation?
- How can we use permutations and combinations to determine if an outcome is worth any personal "risk"?

Skills & Objectives:

- Explain differences among accuracy, precision and error, and describe how each of those can affect solutions in measurement situations.
- Estimate and compute areas and volume in increasingly complex problem situations.
- Solve problem situations involving derived measurements; e.g., density, acceleration.

Main Idea/Essential Questions:

How can we organize data so that it shows trends?

How do we pick which measure of center displays our data best?

How does standard deviation help us determine data spread?

How do we combine rational expressions to solve equations?

Skills & Objectives:

- Explain differences among accuracy, precision and error, and describe how each of those can affect solutions in measurement situations.
- Estimate and compute areas and volume in increasingly complex problem situations.
- Solve problem situations involving derived measurements; e.g., density, acceleration.