

INDIAN HILL EXEMPTED VILLAGE SCHOOL DISTRICT  
Mathematics Curriculum - May 2009  
OGT Class

**Main Idea: Number and Number Systems**

**Skills & Objectives:**

- Use factorial notation and computations to represent and solve problem situations involving arrangements.
- Connect physical, verbal and symbolic representations of irrational numbers; e.g., construct [square root of 2] as a hypotenuse or on a number line.
- Explain the meaning of the  $n$ th root.
- Approximate the  $n$ th root of a given number greater than zero between consecutive integers when  $n$  is an integer; e.g., the 4<sup>th</sup> root of 50 is between 2 and 3.
- Compare, order, and determine equivalent forms for rational and irrational numbers.
- Explain the effects of operations such as multiplication or division, and of computing powers and roots on the magnitude of quantities.
- Calculate relative error.
- Explain the difference between absolute error and relative error in measurement.
- Explain how a small error in measurement may lead to a large error in calculated results.
- Give examples of how the same absolute error can be problematic in one situation but not in another; e.g., compare 'accurate to the nearest foot' when measuring the height of a person versus when measuring the height of a mountain.
- Determine the measures of central and inscribed angles and their associated major and minor arcs.
- Formally define and explain key aspects of geometric figures, including:

**Main Idea: Measurement**

**Skills & Objectives:**

- Estimate the solutions for problem situations involving square and cube roots.
- Demonstrate the relationship among zeros of a function, roots of equations, and solutions of equations graphically and in words.
- Construct congruent or similar figures using tools, such as compass, straightedge, and protractor or dynamic geometry software.
- Solve simple linear and nonlinear equations and inequalities having square roots as coefficients and solutions.

**Main Idea: Geometry and Spatial Sense**

**Skills & Objectives:**

- Analyze two-dimensional figures in a coordinate plane; e.g., use slope and distance formulas to show that a quadrilateral is a parallelogram.
- Define the basic trigonometric ratios in right triangles: sine, cosine and tangent.
- Apply proportions and right triangle trigonometric ratios to solve problems involving missing lengths and angle measures in similar figures.
- Derive coordinate rules for translations, reflections and rotations of geometric figures in the coordinate plane.
- Make, test and establish the validity of conjectures about geometric properties and relationships using counterexample, inductive and deductive reasoning, and paragraph or two-column proof, including:
- Solve problems involving chords, radii, and arcs within the same circle.
- Solve equations and inequalities having rational expressions as coefficients and solutions.
- Solve real-world problems that can be modeled using linear, quadratic, exponential, or square root functions.
- Graph the quadratic relationship that defines circles.

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**Main Idea: Patterns, Functions, and Algebra**

**Skills & Objectives:**

- Generalize patterns using functions or relationships (linear, quadratic and exponential), and freely translate among tabular, graphical and symbolic representations.
- Define function with ordered pairs in which each domain element is assigned exactly one range element.
- Describe problem situations (linear, quadratic and exponential) by using tabular, graphical and symbolic representations.
- Use formulas to solve problems involving exponential growth and decay.
- Add, subtract, multiply and divide monomials and polynomials (division of polynomials by monomials only).
- Write and use equivalent forms of equations and inequalities in problem situations; e.g., changing a linear equation to the slope-intercept form.
- Find linear equations that represent lines that pass through a given set of ordered pairs, and find linear equations that represent lines parallel or perpendicular to a given line through a specific point.
- Solve and interpret the meaning of 2 by 2 systems of linear equations graphically, by substitution and by elimination, with and without technology.
- Model and solve problems involving direct and inverse variation using proportional reasoning.
- Describe the relationship between slope and the graph of a direct variation and inverse variation.
- Describe how a change in the value of a constant in a linear or quadratic equation affects the related graphs.
- Simplify rational expressions by eliminating common factors and applying properties of integer exponents.
- Make inferences about relationships in bivariate data, and recognize the difference between evidence of relationship (correlation) and causation. • Indicator 3.F.9 Show and describe the results of combinations of translations, reflections and rotations (compositions); e.g., perform compositions and specify the result of a composition as the outcome of a single motion, when applicable.

**Main Idea: Data Analysis and Probability**

**Skills & Objectives:**

- Describe, create and analyze a sample space and use it to calculate probability.
- Classify data as univariate (single variable) or bivariate (two variables) and as quantitative (measurement) or qualitative (categorical) data.
- Create a scatterplot for a set of bivariate data, sketch the line of best fit, and interpret the slope of the line of best fit.
- Analyze and interpret frequency distributions based on spread, symmetry, skewness, clusters and outliers.
- Describe and compare various types of studies (survey, observation, experiment), and identify possible misuses of statistical data.
- Describe characteristics and limitations of sampling methods, and analyze the effects of random versus biased sampling; e.g., determine and justify whether the sample is likely to be representative of the population.
- Identify situations involving independent and dependent events, and explain differences between, and common misconceptions about probabilities associated with those events.
- Use theoretical and experimental probability, including simulations or random numbers, to estimate probabilities and to solve problems dealing with uncertainty; e.g., compound events, independent events, and simple dependent events.
- Use counting techniques and the Fundamental Counting principle to determine the total number of possible outcomes for mathematical situations