

**COMMUNITY UNIT SCHOOL DISTRICT 200
ESSENTIAL LEARNINGS- MATH/GIFTED PROGRAM
GRADE 5**

FIFTH GRADE

Subject expectation 1 (State Goal 6) **Students will be able to demonstrate and apply an understanding of numbers and their operations, including meaning and relationships.**

Essential Learning 1 (Learning Standard A) (Learning Standard D)	Understand numbers, ways of representing numbers, relationships among numbers, and number systems
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- Critical Content**
- 6.A.2** a. represent concretely or symbolically, compare and order
 - whole numbers to one trillion
 - decimals to the thousandths place
 - simple fractions to the lowest terms
 - mixed numbers
 - integers *
 - percents*
 - 6.A.3*** b. use the place-value structure of the base-ten number system
 - identify the repeating place-value pattern (ones, tens, hundreds) within the periods
 - interpret expanded notation using powers of ten
 - 6.A.3*** c. find the approximate location on a number line of integers, fractions and decimals
 - 6.B.3b*d.** determine the prime factorization of a number
 - 6.A.3*** e. develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines and as divisions of whole numbers
 - 6.D.3*** f. apply ratio and proportions to solve practical problems
 - 6.A.3*** g. generate equivalent decimals
 - 6.A.3*** h. recognize and generate equivalent forms of commonly used fractions, decimals and percents *such as* $1/8 = .125 = 12.5\%$

Essential Learning 2 (Learning Standard B)	Understand meanings of operations and how they relate to one another
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- Critical Content**
- 6.B.2 & 6.B.3a***
 - a. create representations that show the various meanings of multiplication and division of whole numbers, fractions and decimals
 - equal groups
 - arrays
 - area of rectangles with whole numbers and fractions including the use of partial products *such as* $1/2$ of $2/3$
 - 6.B.2 & 6.B.3b***
 - b. identify and demonstrate relationships between operations
 - division as the inverse of multiplication with decimals
 - the model of multiplication as repeated addition with decimals
 - compare two models of division including fair share division and repeated subtraction with decimals
 - 6.B.3c***
 - c. apply operations and number properties including commutative, associative, distributive, equality, transitive and order of operations and use them to compute with whole numbers, fractions and decimals
 - 6.B.2**
 - d. recognize and use zero property in multiplication and division
 - 6.C.2a**
 - e. apply the appropriate operations to a real situation
 - 6.C.2b**
 - f. describe a real situation in which multiplication and division are used and explain its solution

Essential Learning 3	Compute fluently and make reasonable estimates
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- Critical Content**
- 6.B.2**
 - a. demonstrate automatic recall of basic facts through twelve:
 - addition
 - subtraction
 - multiplication
 - division
 - 6.C.2b**
 - b. develop and use strategies to estimate the results of whole number computations and to judge the reasonableness of such results
 - rounding
 - front end
 - compatible numbers
 - clustering
 - 6.B.2**
 - c. demonstrate fluency with basic number operations:
 - division with two digit divisors with or without remainders
 - addition and subtraction of fractions with unlike denominators
 - multiply fractions with like and unlike denominators
 - addition and subtraction of decimals *such as* $.3 + .052$
 - divide a decimal by a whole number noted as money
 - 6.B.3b***
 - d. use least common multiple and greatest common factor to generate equivalent fractions

Essential Learning 4 *	Choose appropriate technology/tools
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- Critical Content** *
- a. select appropriate methods and tools, according to the context, for computing
 - mental computation
 - estimation
 - calculators
 - and paper and pencil

Essential Learning 5 *	Recognize the connections between number sense and other math strands
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Critical Content

Essential Learning 6 *	Construct and communicate convincing arguments
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- Critical Content** *
- a. demonstrate correct usage of the language related to number sense, integers, exponents, least common multiple, greatest common factor
 - b. make and test conjectures and form generalizations about number sense
 - the larger the divisor, the smaller the quotient and vice versa
 - once you multiply a whole number by a fraction, the product is smaller
 - understand the reasonableness that when you divide a whole number from a fraction, the quotient is smaller
 - c. show evidence that computational results using whole numbers, fractions and decimals are correct and/or that estimates are reasonable
- 6.C.2b**

FIFTH GRADE:

**Subject Expectation 2
(State Goal 7)**

**The student will be able to estimate, make and use
measurements of objects, quantities and relationships and determine
acceptable levels of accuracy**

Essential Learning 1 (Learning Standard A)	Understand measurable attributes of objects and the units, systems, and process of measurement
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- Critical Content 7.A.3***
- a. recognize the measurable attribute
 - geometric attributes: length, area and volume
 - estimate, compare and measure the circumference of a circle
 - develop strategies for estimating perimeters, areas and volume of irregular shapes
 - capacity
 - compare two or more containers in terms of their capacities including ounce, cups, pints, quarts, gallons, milliliters and liters
 - weight/mass
 - compare two or more objects according to weight (mass) including ounce, pound and ton
 - temperature
 - read temperatures using a variety of thermometers
 - money
 - money manipulatives
 - use decimals and symbols to appropriately represent money
 - time
 - distinguish B.C. and A.D. time
 - estimate and calculate elapsed time
 - b. compare and order objects
 - c. use *non-standard* *and standard measurements
 - d. recognize and apply appropriate benchmarks for an attribute *such as* the boiling point or freezing point, right angle and half past the hour
 - e. select appropriate unit or tools for the attribute being measured
 - f. explore the value of measuring with standard units: customary and metric
 - g. compare the relationships among the various units within a system
 - h. compute simple unit conversions within a system of measurement, *such as* centimeter to meter
- 7.A.3a*
- 7.A.3a*
- 7.A.3b*
- 7.A.2b
- 7.A.3b*
- 7.A.2a
- 7.A.2a & *
- 7.A.3b*
- 7.B.3
- 7.A.3b*
- 7.A.2a
- 7.A.2a

Essential Learning 2
(Learning Standard B)
(Learning Standard C)

Apply appropriate techniques, tools and formulas to determine measurements

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|-------------------------|----------------|----|--|
| Critical Content | 7.B.3 | a. | select appropriate units and tools for the attribute to be measured |
| | 7.B.3 | b. | demonstrate an accurate use of tools to determine measurement <ul style="list-style-type: none">• geometric attributes<ul style="list-style-type: none">– ruler, yardstick, meter stick, trundle wheel, tape measure, protractor and angle ruler• capacity<ul style="list-style-type: none">– graduated cylinders, various containers• weight/mass<ul style="list-style-type: none">– balance, customary scale, metric scale• temperature<ul style="list-style-type: none">– variety of thermometers• money<ul style="list-style-type: none">– money manipulatives• time<ul style="list-style-type: none">– calendar, digital clock, analog clock, stop watch |
| | 9.C.3b* | c. | develop, understand and use formulas to find the area of rectangles and related triangles and parallelograms |
| | 9.C.3b* | d. | develop strategies to determine the surface areas and volumes of rectangular solids |

Essential Learning 3 *

Recognize the connections between measurement and other math strands

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| Critical Content | * | a. | describe relationships in a simple scale drawing |
| | * | b. | construct or draw figures with given perimeters and area |
| | * | c. | connect the etymology of prefixes with computer terminology <i>such as</i> megahertz, gigabyte, kilobyte |
| | * | d. | compare money values among countries <i>such as</i> the value of a dollar compared to the value of a peso or lire |
| | * | e. | add/subtract/multiply/divide with mixed units of measure <i>such as</i> minutes/hours, inches/feet/yards, ounces/pounds, months/years |
| | * | f. | show the relationship between shapes <i>such as</i> parallelograms and rectangles, triangles and parallelograms and their areas |
| | * | g. | compute the change in temperature between positive and negative degrees |
| | * | h. | compute the average temperature over time |

Essential Learning 4 * Construct and communicate convincing arguments and proofs to solve problems

- Critical Content**
- * a. demonstrate correct usage of the language related to measurement
 - * b. make and test conjectures about measurement properties and relationships *such as*
 - every measurement is an approximation with its precision related to the size of the unit
 - the sum of the measure of any two sides must be greater than the third side
 - 9.C.2** c. develop logical arguments to justify conclusions about topics *such as* formulas for perimeter, area and volume

FIFTH GRADE

Subject Expectation 3 (State Goal 8)

The student will be able to use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.

Essential Learning 1 (Learning Standard A) (Learning Standard B)	Understand patterns, relations, and functions
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- Critical Content**
- 8.A.2a & *** a. describe, extend, create and *make generalizations** about geometric and numeric patterns
 - 8.A.3b*** b. represent and analyze patterns and functions using words, tables, graphs and, when possible, symbolic rules
 - *** c. relate and compare different forms of representation for a relationship
 - 8.B.2** d. analyze a geometric pattern and express the results numerically

Essential Learning 2 (Learning Center C)	Represent and analyze mathematical situations and structures using algebraic symbols
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- Critical Content**
- 8.A.3a** a. explain operations and number properties including commutative, associative, distributive, equality, transitive and order of operations and use them to compute with whole numbers
 - 8.A.3b*** b. construct and solve number sentences using two or more variables to represent an unknown quantity
 - *** c. express mathematical relationships using equations
 - *** d. develop initial conceptual understanding of different uses of variables
 - unknown, *such as* $10x - 4 = 5x + 6$
 - properties, *such as* $a - b = b - a$
 - formulas, *such as* $a = L - W$
 - co-variation, *such as* $5x + 2y = 37$
 - 8.B.4a*** e. using manipulatives, *such as* Algebra Lab Gear, find the common factors when dividing polynomials

Essential Learning 3 (Learning Standard D)	Use mathematical models to represent and understand quantitative relationships and solve problems
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- Critical Content**
- 8.D.3a*** a. model and solve real life problems using various representations including (but not limited to) objects, graphs, tables and equations

Essential Learning 4*	Use problem solving to analyze change in real life situations
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- Critical Content**
- *** a. investigate how a change in one variable relates to a change in a second variable using objects, tables, graphs and equations
 - *** b. identify and describe situations with constant rates of change and/or varying rates of change and compare them
 - 8.D.2 & *** c. solve linear equations involving whole numbers *in real life situations**

Essential Learning 5 *	Choose appropriate technology/tools for algebraic representation
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- Critical Content** *
- 8.B.3***
- use manipulatives, *such as* Algebra Lab Gear, etc., to solve linear equations
 - use technology, *such as* graphing calculators, to look at the relationships among tables, graphs and equations

Essential Learning 6 *	Recognize the connections between algebra and other math strands
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- Critical Content** *
- apply the commutative and associative properties for addition and multiplication
 - use ratio and proportion to solve problems
 - apply the order of operations
 - observe patterns in our environment
 - find, describe, extend and create patterns using manipulatives/numbers/letters/hundreds charts/arrays with an emphasis on number sense)
 - find, describe, extend and create geometric patterns using tessellations
 - describe and use prime/composite/square numbers

Essential Learning 7 *	Construct and communicate convincing arguments and proofs to solve problems
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- Critical Content** *
- demonstrate correct usage of the language related to algebra, including constants, variables, commutative, associative, distributive, equality, transitive and function
 - demonstrate correct usage of the language related to patterns including skip counting, least common multiple, greatest common factor, linear and non-linear
 - develop logical arguments to justify conclusions about topics *such as* unknown quantities, transitives and varying rates of change
 - identify the rule used to generate a pattern
 - make and test conjectures about algebra properties as seen in the patterns developed

FIFTH GRADE:

**Subject Expectation 4
(State Goal 9)**

The student will use geometric methods to analyze, categorize and draw conclusions about points, lines, planes and space.

Essential Learning 1 (Learning Standard A) (Learning Standard B)	Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
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- Critical Content**
- 9.B.3*** a. apply knowledge of obtuse, acute, right angles to investigate straight, complementary and supplementary angles
 - 9.B.3*** b. describe and apply knowledge of center/diameter/radius/chord to investigate the circumference of a circle
 - 9.B.2** c. identify parallel/perpendicular/intersecting/skew lines
 - 7.A.3a*** d. measure the angles within polygons
 - 6.B.3c* & 6.D.2** e. investigate the ratio of circumference to diameter (π)

Essential Learning 2*	Specify locations and describe spatial relationships using coordinate geometry and (or) other representational systems
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- Critical Content**
- * a. find ordered pairs on a four quadrant coordinate graph
 - * b. use ordered pairs to create non-convex/convex polygons using all four quadrants
 - * c. explore the use of coordinate representations in 3-dimensions *such as* an archeological dig and 3D Tic Tac Toe

Essential Learning 3 (Learning Standard C)	Use visualization, spatial reasoning, and geometric modeling to solve problems
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- Critical Content**
- 9.A.3c*** a. recognize geometric ideas and apply them to other disciplines *such as* architecture
 - 9.B.3*** b. create original 3-dimensional isometric drawings
 - 9.B.3*** c. create original 2-dimensional drawings from 3-dimensional models and vice versa
 - 9.B.3*** d. use a 2-dimensional drawing to build a 3-dimensional figure and represent it isometrically
 - 9.B.4*** e. discover differences and similarities between the two ways of representing buildings using coordinate grids and isometric paper

Essential Learning 4 *	Apply transformations and use symmetry to analyze mathematical situations
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- Critical Content**
- 9.A.3c*** a. identify and describe line and rotational symmetry with 3-dimensional shapes and designs
 - 9.A.4b*** b. create an original reflection tessellation

Essential Learning 5*	Recognize the connections between geometry and other math strands
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Critical Content 7.A.3a*
* a. measure volume of solid figures
b. explore surface area of rectangular prisms

Essential Learning 6*	Construct convincing arguments and proofs to solve problems
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Critical Content 9.C.3b* & 9.C.3a* & 9.C.3a*
a. make and test conjectures about geometric properties and relationships
b. develop logical arguments to justify conclusions about topics *such as* the minimum and maximum number of blocks used to construct a building from a 2-dimensional or 3-dimensional plan

FIFTH GRADE

Subject Expectation 5
(State Goal 10)

The student will select, organize and analyze data using statistical methods; predict results; and interpret uncertainty using concepts of probability.

Essential Learning 1 (Learning Standard A) (Learning Standard B)	Develop concepts of data collection and analysis
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Critical Content

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| <p>10.B 2a</p> <p>10.B.2b</p> <p>10.B.2b</p> <p>10.B.2c</p> <p>10.B.2d</p> <p>10.B.2d</p> <p>10.A.2b</p>
<p>10.B.2d & 10.A.2a & *</p>
<p>*</p>
<p>10.A.2c</p> | <p>a. use the steps to solve for problems</p> <ul style="list-style-type: none"> • identify the problem (question) • collect/gather data • organize and display the data • analyze the data • make and test conjectures about data • draw conclusions <p>b. calculate the mean, median, mode and range using a data set (given or <i>collected*</i>)</p> <p>c. read and interpret data represented on bar graphs, circle graphs, line plots, line graphs and stem and leaf plots</p> <ul style="list-style-type: none"> • display and analyze given data using a line graph and stem and leaf plot • choose different representations of the same data and evaluate how well each representation shows important aspects of the data <p>d. choose the sample set that will appropriately represent the given population</p> <ul style="list-style-type: none"> • move from noticing individual features of the data to describing the overall shape of the data distribution <p>e. make predictions and decisions based on data and communicate their reasoning</p> |
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Essential Learning 2 (Learning Standard C)	Develop the concept of probability
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| <p>Critical Content 10.C.2a</p>
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<p>*</p> <p>*</p> <p>8.A.2a</p> <p>8.A.4b*</p> <p>*</p>
<p>*</p>
<p>10.C.2b</p> | <p>a. explore experimental probability through a series of data collection experiments that are recorded and analyzed, <i>such as</i> dice and computer games</p> <p>b. make a connection between theoretical probability and experimental probability through repetition of each of the experiments</p> <p>c. create a tree diagram to solve for a problem</p> <p>d. generate a logical order to determine if all possible outcomes have been identified</p> <p>e. search for patterns within the list, <i>such as</i>: triangular numbers</p> <p>f. represent the pattern(s) in a numerical sentence</p> <p>g. distinguish between situations where order (permutations) matters or doesn't matter</p> <p>h. determine the probability of an event involving "and", "or" or "not" (using two attributes)</p> <p>i. understand that the measure of the likelihood of an event can be represented by a number on a scale from 0 to 1</p> |
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Essential Learning 3*	Choose appropriate tools for data collection and representation
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- Critical Content** *
- a. use technology, including a spreadsheet *such as* MS Excel, to represent and/or analyze data
 - b. use technology, *such as* graphing calculators, to represent and/or analyze data

Essential Learning 4*	Recognize the connections between data collection and probability and other math strands
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- Critical Content** 8.A.4b*
- a. represent the pattern in a numerical sentence
 - b. analyze and extrapolate conclusions from a coordinate graph
 - c. connect number scale 0-1 to fractions and decimals

Essential Learning 5*	Construct and communicate convincing arguments and proofs to solve problems
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- Critical Content** *
- a. demonstrate correct usage of the language related to data collection and probability including mean, median, mode, range, cluster, gap, interval, outliers and extrapolate
 - b. discuss possible outcomes of experiments
 - c. make and test conjectures about data/probability properties and relationships *such as* different measures of central tendency reveal different aspects of data distribution
 - d. develop logical arguments to justify conclusions about topics including the shape of data and sample
 - e. develop logical arguments to justify the reason for a prediction
 - f. design studies to further investigate the conclusions or predictions
- 10.A.2c
- 10.A.3c*
- 10.A.3c*
- 10.A.2c
- 10.B.4*

Math Curriculum for the Replacement Program Grades 3,4, and 5

Developed by:

Renee Klopfenstein, Grade 3

Patti Woods, Grade 4

Sara Garner, Grade 5

Kim Rumrey, Monroe

Lorraine Gawlik, Edison

Judy Vandermeulen, WWSHS

Barb Dyche, Gifted Specialist

Trish Fagen, Gifted Specialist

Josie Heins, Gifted Specialist

Marianne Russell, Gifted Specialist

Janet Spence, Gifted Specialist

Dr. Art Hyde, National Louis University

Kathie Bossier, Director of Elementary Education

Margo Sorrick, Assistant Superintendent for Instruction

Dr. Gary T. Catalani, Superintendent

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