

**COMMUNITY UNIT SCHOOL DISTRICT 200  
ESSENTIAL LEARNINGS- MATH/GIFTED PROGRAM  
GRADE 4**

**FOURTH GRADE**

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

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 billion
    - decimals to the hundredths place as related to money
    - simple fractions to the lowest terms
    - mixed numbers
    - integers
  - \*  
**6.A.2**
  - 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
  - 6.A.3\***
  - c. find integers and simple fractions on a number line
  - 6.B.3b\***
  - d. determine all the factors of both prime and composite numbers
    - recognize that square numbers have an odd number of factors
  - \*  
**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.2**
  - f. develop an understanding of ratios
    - describe the part-to-part relationship between two sets of data using ratios
    - represent the ratio with appropriate notation including  $a/b$ ,  $a$  to  $b$  and  $a:b$
  - 6.A.3\***
  - g. generate equivalent fractions
  - 6.A.3\***
  - h. recognize and generate equivalent forms of commonly used fractions, decimals, and percents

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 and simple fractions
      - equal groups
      - arrays
      - area of rectangles with whole numbers including partial products *such as* 1/3 of 18
  - 6.B.2
  - 6.B.3b\*
    - b. identify and demonstrate relationships between operations
      - division as the inverse of multiplication
      - the model of multiplication as repeated addition with fractions
      - compare two models of division including fair share division and repeated subtraction with fractions
  - 6.C.2a
  - 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 and fractions
  - 6.B.2
  - 6.C.2a
  - 6.C.2b
    - d. recognize and use zero property in multiplication and division
    - e. apply the appropriate operations to a real situation
    - 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:
              - addition and subtraction of numbers with *three*\* or more digits
              - multiplication with double digit multipliers
              - division with one digit divisors with and without remainders
              - addition and subtraction of fractions with like denominators
              - addition and subtraction of decimals noted as money
              - multiply a whole number and a decimal noted as money

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, divisor, quotient, dividend, front end and compatible numbers, ratio, percent, fractions
  - \* 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
  - 6.C.2b** c. show evidence that computational results using whole numbers are correct and/or that estimates are reasonable

**FOURTH 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.3a\***
    - a. recognize the measurable attribute
      - geometric attributes: length, area and volume
        - estimate, compare and measure length, width, perimeter and area of shapes (more complex shapes than 3<sup>rd</sup> grade)
        - estimate, compare and measure the center, radius, diameter, arc and chord of circles
      - \*
        - estimate, compare and measure angles
        - estimate, compare and measure the volume of rectangular prisms
  - 7.A.3a\***
    - capacity
      - compare two or more containers in terms of their capacities including ounce, cups, pints, quarts, gallons, milliliters and liters
  - 7.A.3a\***
    - weight/mass
      - compare two or more objects according to weight (mass) including milligram, gram, kilogram
  - 7.A.3b\***
    - temperature
      - understand degrees Fahrenheit and Celsius as a unit of measure
  - 7.A.2b**
    - money
      - estimate and find sums and differences, products and quotients with money
      - use decimals and symbols to appropriately represent money
  - 7.A.3b\***
    - time
      - estimate and calculate elapsed time
  - 7.A.2a**
    - b. compare and order objects
  - 7.A.2a &**
    - c. use *non-standard* \* and standard measurements
  - 7.A.3b\***
    - d. recognize and apply appropriate benchmarks for an attribute *such as* the boiling point or freezing point, right angle and half past the hour
  - 7.B.3\***
    - e. select appropriate unit or tools for the attribute being measured
  - 7.A.3b\***
    - f. explore the value of measuring with standard units: customary and metric
  - 7.A.2a**
    - g. compare the relationships among the various units within a system
  - 7.A.2a**
    - h. compute simple unit conversions within a system of measurement, *such as* centimeter to meter

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

Apply appropriate techniques, tools and formulas to determine measurements

- 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
- geometric attributes
    - ruler, yardstick, meter stick, trundle wheel, tape measure, protractor and angle ruler
  - capacity
    - graduated cylinders, various containers
  - weight/mass
    - balance, customary scale
  - temperature
    - variety of thermometers
  - money
    - money manipulatives
  - time
    - calendar, digital clock, analog clock
- 9.C.3b\* c. develop and use strategies for finding area of parallelograms and triangles culminating in the determination of appropriate formulas
- 9.C.3b\* d. develop strategies to determine the surface area of rectangular solids culminating in the determination of appropriate formulas
- 9.C.3b\* e. develop strategies to determine the volume of rectangular solids culminating in the determination of appropriate formulas

Essential Learning 3 \*

Recognize the connections between measurement and other math strands

- Critical Content** \* a. show the relationship between shapes *such as* parallelograms and rectangles, triangles and parallelograms and their areas  
\* b. compute the change in temperature between positive and negative degrees  
\* c. 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*
- 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

**FOURTH 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.2a b. represent and analyze patterns and functions using words, tables and graphs
  - 8.A.2a 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 Standard C)	Represent and analyze mathematical situations and structures using algebraic symbols
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- Critical Content** 8.C.2
- 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.2b b. construct and solve number sentences using a variable to represent an unknown quantity
  - \* c. express mathematical relationships *using equations\**

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
  - \* b. examine a real life situation
    - 10.B.2b • collect data related to the situation
    - 10.B.2b • arrange data in a table
    - 8.A.2a • look for patterns in a table
    - 10.B.2b • create a graph from the data
    - 8.A.2a • look for patterns in the graph
    - \* • create an equation using the patterns in the data and graph

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 compare them
  - c. solve linear equations involving whole numbers in real life situations
- 8.D.2

Essential Learning 5 *	Choose appropriate technology/tools for algebraic representation
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- Critical Content** \*
- a. use manipulatives, *such as* Algebra Tiles, Hands On Equations, etc., to solve linear equations

Essential Learning 6 *	Recognize the connections between algebra and other math strands
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- Critical Content** \*
- a. apply the commutative and associative properties for addition and multiplication
  - b. explore ratio and proportion to solve problems
  - c. use opposite operations to find missing numbers in equations
  - d. observe patterns in our environment
  - e. find, describe, extend and create patterns using manipulatives/numbers/letters/hundreds charts/arrays with an emphasis on number sense)
  - f. find, describe, extend and create geometric patterns using tessellations
  - g. construct a data table looking for patterns
  - h. identify and describe prime and composite numbers

Essential Learning 7 *	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 algebra, including constants, variables, commutative, associative, distributive, equality, transitive and function
  - b. demonstrate correct usage of the language related to patterns including skip counting, least common multiple, greatest and common factor
  - c. develop logical arguments to justify conclusions about topics *such as* unknown quantities and transitives
  - d. identify the rule used to generate a pattern
  - e. make and test conjectures about algebra properties as seen in the patterns developed

**FOURTH 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.2 & 9.B.3\*  
9.B.3\*  
9.B.2  
9.B.3\*  
9.B.2
- identify, describe, measure and classify angles/obtuse/right/acute
  - identify, describe and classify triangles/scalene/right/equilateral/isosceles
  - identify and describe point/segment/ray/line
  - identify and describe center/diameter/radius/chord of a circle
  - identify parallel/perpendicular/intersecting lines

Essential Learning 2 *	Specify locations and describe spatial relationships using coordinate geometry and (or) other representational systems
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- Critical Content** \*
- identify and use vocabulary associated with coordinate graphing including horizontal and vertical axis, origin, quadrant, x, y and ordered pairs
  - recognize and defend the need for uniform interval units
  - recognize and use mechanics of coordinate graphs
  - find ordered pairs on a coordinate graph in the first quadrant
  - use ordered pairs to create non-convex and convex polygons
  - 7.A.2a find area and perimeter of representations of polygons using tools *such as* geoboards, dot paper, power blocks, pattern blocks, grid paper
  - \* identify ordered pairs based on designated points on a graph

Essential Learning 3 (Learning Standard C)	Use visualization, spatial reasoning and geometric modeling to solve problems
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- Critical Content** 9.B.3\*  
9.A.2c  
9.A.2c
- draw geometric objects with specific properties including side lengths and angle measurements
  - identify and build a 3-dimensional object from a 2-dimensional representation
  - identify and build a 2-dimensional representation of a 3-dimensional object

Essential Learning 4 *	Apply transformations and use symmetry to analyze mathematical situations
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- Critical Content** \*
- create an original tessellation that rotates
  - 9.B.2 investigate whether two shapes are congruent

Essential Learning 5 *	Recognize the connections between geometry and other math strands
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- Critical Content** 7.A.3b
- a. using units and square units, find perimeter and area of 2-dimensional polygons
  - \* b. recognize and apply the relationship among a data table, ordered pairs and a coordinate graph
  - \* c. use data tables to create the ordered pairs and plot on a coordinate graph

Essential Learning 6 (Learning Standard C)	Construct convincing arguments and proofs to solve problems
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- Critical Content** 9.C.3a\*
- 9.C.2
- a. make and test conjectures about geometric properties
  - 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

## FOURTH GRADE

**Subject Expectation 5**      **The student will select, organize and analyze data using statistical methods; predict results; and interpret uncertainty using concepts of probability.**  
 (State Goal 10)

Essential Learning 1	Develop concepts of data collection and analysis
<b>Critical Content</b>	
10.B.2a	a. use the steps to solve for problems
10.B.2b	<ul style="list-style-type: none"> <li>• identify the problem (question)</li> <li>• collect/gather data</li> </ul>
10.B.2b	<ul style="list-style-type: none"> <li>• organize and display the data</li> </ul>
10.B.2c	<ul style="list-style-type: none"> <li>• analyze the data</li> </ul>
10.B.2d	<ul style="list-style-type: none"> <li>• make and test conjectures about data</li> </ul>
10.B.2d	<ul style="list-style-type: none"> <li>• draw conclusions</li> </ul>
10.A.2b	b. calculate the mean, median, mode and range using a data set (given <i>or collected</i> *)
10.B.2d & 10.A.2a	c. read and interpret data represented on bar graph, circle graph, line plot, pictograph, line graph and stem and leaf plot
	<ul style="list-style-type: none"> <li>• display and analyze given data using a line graph and stem and leaf plot</li> </ul>
*	<ul style="list-style-type: none"> <li>• compare different representations of the same data and evaluate how well each representation shows important aspects of the data</li> </ul>
10.B.3 *	d. formulate questions of interest and select methods to systematically collect data
*	e. collect sample data and make conjectures about the total population
*	<ul style="list-style-type: none"> <li>• distinguish between categorical and numerical data</li> </ul>
*	<ul style="list-style-type: none"> <li>• compare different sample sets that represent the given population including biased, random and convenient</li> </ul>
10.A.2c	f. make predictions and decisions based on data and communicate their reasoning
*	g. move from noticing individual features of the data to describing the overall shape of the data distribution
Essential Learning 2 (Learning Standard C)	Develop the concept of probability
<b>Critical Content</b>	
10.C.2a	a. explore experimental probability through a series of data collection experiments that are recorded and analyzed, <i>such as</i> dice and computer games
*	b. make a connection between theoretical probability and experimental probability through repetition of each of the experiments
10.C.2b	c. understand that the measure of the likelihood of an event can be represented by a number on a scale from 0 to 1
*	d. map combinations of possible outcomes with the use of tree diagrams
10.C.2a*	e. organize a list from the tree diagrams
*	f. recognize there are situations where order matters and find all possible outcomes
10.C.2c	

- g. determine the probability involving “and”, “or”, or “not” with one attribute

Essential Learning 3*	Choose appropriate tools for data collection and representation
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- Critical Content 10.B.2c** \*
- a. use technology, *such as* Math Keys, to show and analyze data
  - b. use technology, including a spreadsheet *such as* MS Excel, 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** \*
- a. connect the concept of the scale of probability to percent
  - b. 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
  - 10.A.2c** b. discuss possible outcomes of experiments
  - 10.A.3c\*** c. make and test conjectures about data/probability properties and relationships *such as* different measures of central tendency reveal different aspects of data distribution
  - 10.A.3c\*** d. develop logical arguments to justify conclusions about topics including the shape of data and sample
  - 10.A.2c** e. develop logical arguments to justify the reason for a prediction
  - 10.A.3c\*** f. propose and justify conclusions and predictions that are based on data





