

COMMUNITY UNIT SCHOOL DISTRICT 200

Elementary Gifted Math Grade 3

Subject Expectation 1 (State Goal 6)

The student will be able to demonstrate and apply an understanding of numbers and their operations including meaning and relationships.

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| 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, order, and compare numbers to demonstrate an understanding of the base-ten number system <ul style="list-style-type: none">• whole numbers to the millions place• decimals to the hundredths place, expressed using monetary units (reworded)• simple mixed numbers• represent, order, label, and compare familiar fractions through the tenths including $\frac{1}{3}$, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{6}$, and $\frac{1}{8}$ |
| | 6.A.2 | b. read, write, order, translate and compare whole numbers, fractions and decimals in different notation systems, including standard, expanded, word, and number-and-word |
| | 6.A.2 | c. use the place-value structure of the base-ten number system <ul style="list-style-type: none">• identify the repeating place-value pattern (ones, tens, and hundreds) within the periods• interpret expanded notation |
| | 6.A.2 | d. recognize equivalent representations of whole numbers and generate them by composing and decomposing numbers <i>such as</i> $123 = 100 + 20 + 3$ |
| | 6.A.2 | e. represent fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers <ul style="list-style-type: none">• recognize a fraction represented with a pictorial model and manipulatives• recognize the relationship between the whole and its fractional parts• use models to generate equivalent fractions• judge the size of fractions using models, benchmarks, and equivalent fractions• explore the relationship between fractions and decimals• explore the relationship of percents to fractions and decimals*• read and write decimals that are greater than or less than 1 |

NOTE: *such as* = an example used for clarification, but not a mandatory concept
including = a mandatory concept
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- 6.A.2* f. explore integers less than zero by extending a number line and through familiar applications *such as* the thermometer and symmetry to understand relationship to opposite positive integer
- 6.B.2* g.. describe classes of numbers according to characteristics *such as* multiples and factors

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| Essential Learning 2 (Learning Standard B) | Investigate, represent and solve problems using number facts, operations (addition, subtraction, multiplication, and division) and their properties, algorithms and relationships |
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- Critical Content 6.B.2 a. explain meanings and relationships between addition and subtraction
- explain the reason for regrouping when adding or subtracting larger numbers
 - apply the commutative, associative, and zero properties for addition
- 6.B.2 b. explain meanings of and the relationships between multiplication and division
- use manipulatives to explore concepts of multiplication and division
 - use sets/groups/arrays/repeated addition to represent multiplication
 - use partial products or other strategies to understand multi-digit multiplication
 - solve multiplication and division number sentences up to 2 digit by 2 digit and word problems
 - demonstrate the concept of simple remainders in division *such as* 25 divided by 4 = 6 R 1 and how they are reported in problem solving
 - apply the one, zero, associative, commutative, distributive, and equality properties
- 6.B.2 c. use relationships between operations to solve problems, *such as* addition and subtraction are opposite operations, as are multiplication and division
- * d. apply knowledge of basic multiplication facts to related division facts and learn related facts as part of fact family, like addition and subtraction
- 6.B.2 e. recognize the effects of multiplying and dividing whole numbers
- 6.B.2. f. explore and use the order of operations
- when grouping symbols are used, work from inside the brackets out
 - when no grouping symbols are used, working left to right, do all multiplication and division and then again from left to right do all addition and subtraction

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- 6.B.2 g. solve one-step addition, subtraction, multiplication, and division number sentences and word problems by identifying the appropriate problem type including the four basic types of addition and subtraction story problems including join, separate, part-part-whole, and compare problems
 - join problems that take place over time and include a starting quantity, a change quantity (add or remove), and the result
 - separate problems that take place over time and include a starting quantity, a change quantity (add or remove), and the result
 - part-part-whole involves asking the solver to figure out one of the parts
 - compare problems involve relationships between two different sets
- 6.B.2 h. explore strategies to solve multi-digit multiplication problems *such as* arrays, partial products, area and repeated addition
- 6.B.2 i. explore how to interpret a remainder including
 - rounding up or down
 - ignoring
 - convert to a commonly used decimal in currency only or a fraction, *such as* $\$10/4 = \2.50 and $13/2 = 6 \frac{1}{2}$
- 6.B.2 j. explore adding and subtracting fractions with unlike denominators by using visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals
- 6.B.2 k. apply the appropriate operation to a real situation

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| Essential Learning 3 (Learning Standard C) | Compute using a variety of methods and make reasonable estimates |
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| Critical Content | <ul style="list-style-type: none"> * a. develop fluency with basic addition and subtraction facts using fact families up to 10 and use these combination to mentally compute related facts, <i>such as</i> $3 + 4 = 7$, so $30 + 40 = 70$ * b. develop fluency with basic multiplication facts from factors 0-10 and use these combinations to mentally compute related extended facts, <i>such as</i> $3 \times 4 = 12$, $30 \times 4 = 120$, $300 \times 4 = 1200$ 6.C.2a c. add <i>three</i> * or more addends with and without regrouping 6.C.2a d. add and subtract multi-digit numbers, including decimals with and without regrouping including zero in the ones and tens 6.C.2a e. multiply up to one digit by two digit factors 6.C.2a f. explore dividing two-digit dividends with one digit divisors, resulting in quotients with and without remainders 6.C.2a g. solve problems involving addition and subtraction, including making change for the value of a collection of bills and coins, whose total value is \$1000 or less 6.C.2b h. develop and use strategies to estimate the results of whole number computations and to judge the reasonableness of such results <ul style="list-style-type: none"> • round to the nearest tens and hundreds places |
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- 6.C.2b i. determine whether exact answers or estimates are appropriate for solutions
- 6.C.2a j. add and subtract fractions with like denominators
- 6.B.2* k. demonstrate the accurate use of mathematical symbols and vocabulary*
 - symbols, including multiplication: \times , $*$.
 - mathematical terms, including sum, difference, product, quotient, fraction

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| Essential Learning 4 * Choose appropriate technology and tools |
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| Critical Content | * | <ul style="list-style-type: none"> a. select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, manipulatives, and paper and pencil according to the context and nature of the computation and use the selected method or tool <i>such as</i> <ul style="list-style-type: none"> • pattern blocks • base ten blocks • geoboards • paper and pencil • calculators |
| | * | <ul style="list-style-type: none"> b. use language tools <i>such as</i> a math dictionary to determine meaning of terms |
| 6.A.2 | | <ul style="list-style-type: none"> c. use visual models, benchmarks, and equivalent forms to perform operations |

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| Essential Learning 5 * Recognize the connections between number sense, other math strands, and other curricular areas |
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| Critical Content | * | <ul style="list-style-type: none"> a. connect sixths to ten minute increments on the clock and eighths to measurement on a ruler |
| | * | <ul style="list-style-type: none"> b. find area of rectangles with whole numbers using partial products |
| | * | <ul style="list-style-type: none"> c. compare how reading a math story problem differs from reading expository and narrative text <i>such as</i> four basic types of addition and subtraction story problems including join, separate, part-part-whole, and compare problems <ul style="list-style-type: none"> • join problems that take place over time and include a starting quantity • separate problems that take place over time and include a starting quantity • part-part-whole involves asking the solver to figure out one of the parts • compare problems involve relationships between two different sets |

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- * d. use the reading comprehension strategies of inferring, questioning, determining important information, connecting, and visualizing to solve math problems

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| Essential Learning 6 | * | Construct and communicate convincing arguments and proofs to solve problems |
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| Critical Content | * | a. use the language of numbers and their operations to express mathematical ideas precisely, both verbally and in writing |
| | * | b. make and test conjectures and form generalizations about mathematical properties and relationships and develop logical arguments to justify conclusions <ul style="list-style-type: none"> • in our base-10 system each place value is related to the others, but does have an independent meaning • multiplying by powers of ten involves adding the same number of zeros • the larger the divisor, the smaller the quotient, and vice versa |
| 6.C.2b | c. | show evidence that computational results using whole numbers are correct and/or that estimates are reasonable |
| | * | d. write a symbolic equation to solve a one step word problem |
| | * | e. write a word problem from a symbolic equation |
| | * | f. write an extended response for a one or two step problem including <ul style="list-style-type: none"> • the answer • the process • the strategy(ies) • the explanation including how and why |
| | * | g. translate among and within representations <i>such as</i> concrete materials, spoken language, written language, pictures, diagrams and graphs, lists and tables, kinesthetic ways |
| | * | h. demonstrate the accurate use of mathematical symbols |

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| Essential Learning 7 | * | Build mathematical knowledge by using a variety of appropriate strategies to solve a problem |
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| Critical Content | * | a. know the four phases in the process of problem solving including <ul style="list-style-type: none"> • understanding the problem • determine the conditions of the situation • comprehend the language and terms used • identify the desired goal and understand the constraints • form a representation • examine the assumptions • devising a plan of attack and selecting the appropriate problem solving strategy <ul style="list-style-type: none"> • organized list • make a table |
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- guess and check
 - act out/use problem and show reasoning
 - justify an answer by using manipulatives
 - draw a picture
 - use/find a pattern
 - work backwards
 - use logical reasoning
 - carrying out the plan
 - work through the problem
 - monitor use of the strategy
 - change strategies as necessary
 - reviewing
 - reconsider the initial conditions, constraints, and goals to make sure the solution fits
 - judge the reasonableness of the answer
- * b. rely on metacognitive processes to solve a problem
- activate prior knowledge about the information in the problem
 - develop various ways to represent information
 - question as he/she progresses to determine effectiveness and reasonableness

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**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.

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| 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.1a | a. recognize measurable attributes, including length, area, capacity, volume, weight, time, temperature, and money for each measurable attribute |
| | 7.A.1b, 7.A.1c | |
| | * | b. explore the concept of multiple time zones in the world |
| | 7.A.2a | c. compare and order objects according to measurable attributes |
| | 7.A.2a | d. compare angles to a right angle to determine if acute or obtuse |
| | 7.A.2a | e. use non-standard and standard units, as well as transition from non-standard to standard units in measurement |
| | 7.A.2a | f. explore the importance of measuring with standard units: customary and metric |

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| 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.2a | a. select and use benchmarks to estimate measurements, <i>such as</i> the boiling point or freezing point, right angle and half past the hour |
| | 7.B.2b | b. estimate, compare, and measure the length of objects using non-standard and standard units in the customary and metric systems including ½” and ¼”* |
| | 7.B.2b | c. perform simple unit conversions within a system of measurement, <i>such as</i> 12 inches = 1 foot |
| | 7.B.2b | d. compare the relationships among the various units within a system |
| | 7.C.2a | e. explore finding actual distance using a given scale, <i>such as</i> 1 inch represents 5 miles, so 2 inches represents 10 miles |
| | 7.C.2a | f. explore representing an actual distance using a given scale, <i>such as</i> redesigning a room |
| | 7.C.1 | g. develop strategies for estimating and finding perimeters and areas of regular and irregular shapes, including using arrays for understanding the rectangular area formula |
| | 7.C.2a | h. solve problems involving estimating and finding the perimeter and area of a square, rectangle and irregular shape composed of rectangles |
| | 7.C.2b | i. sketch figures with given perimeters and areas |
| | 7.C.2a | j. explore measuring acute, obtuse, and right angles within two degrees |
| | 7.B.2a | k. determine the number of cubes needed to fill a variety of rectangular solids |
| | 7.C.2a | l. develop strategies for finding the volume of regular and irregular 3-dimensional shapes, constructed from cubes |
| | 7.A.1b | m. tell time using an analog clock to minute intervals |

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| 7.A.2a | n. | estimate and compare two or more objects according to weight and choose appropriate unit of measurement including ounces, pounds, grams, kilograms, and tons |
| 7.A.2a | o. | estimate, compare, and measure the capacity of an object using ounces, cups, pints, quarts, gallons, milliliters and liters |
| 7.B.2b | p. | estimate and calculate elapsed time in compound unit, <i>such as</i> hours, minutes, days |
| 7.C.2a | q. | measure time in days, weeks, months, years, decades and centuries |
| * | r. | identify and describe the relative values and relationships among coins |
| 7.A.1c | s. | develop the use of decimals and symbols to represent money |
| 7.A.1d | t. | measure temperature using the Fahrenheit and Celsius scale |
| 7.B.3* | u. | select appropriate units and tools for the item to be measured |
| * | v. | use appropriate technology and tools to determine measurements <i>such as</i> <ul style="list-style-type: none"> • geometry: ruler, tape measure, yard stick, meter stick, and trundle wheel, half circle, and full circle protractors • capacity: graduated cylinders, measuring cups • weight: balance scale, customary scale • temperature: Fahrenheit and Celsius thermometers • money: coins • time: digital clock, analog clock, calendar • math dictionary • calculator |
| 7.B.1b | w. | compare estimated measures to actual measures taken |

Essential Learning 3 * Recognize the connections between measurement, other math strands, and other curricular areas

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| Critical Content | * | a. compare how reading a math story problem differs from reading expository and narrative text |
| | * | b. use reading strategies of visualizing, determining important ideas, and making connections to analyze information in a measurement situation |
| | * | c. construct a timeline to show relationships between events in social studies |
| | * | d. explore what happens to measurements of a two-dimensional shape, <i>such as</i> its perimeter and area when the shape is changed in some way |

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

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| Critical Content | * | a. use the language of measurement to express mathematical ideas precisely, both verbally and in writing |
| | * | b. make and test conjectures about mathematical properties and relationships and develop logical arguments to justify conclusions |

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- defend the value of measuring with standard units in customary and metric systems
 - form generalization that the smaller the unit, the more you need and vice versa
 - recognize the transitive relationship in ordering objects according to some attribute such as $a > b$ and $b > c$ leads to $a > c$
 - the concept of division as the inverse operation of multiplication
- * c. write an extended response for a one or two step problem including
- the answer
 - the process
 - the strategy(ies)
 - the explanation including how and why
- * d. translate among and within representations *such as* concrete materials, spoken language, written language, pictures, diagrams and graphs, lists and tables, kinesthetic ways

Essential Learning 5 * **Build mathematical knowledge by using a variety of appropriate strategies to solve a problem**

- Critical Content
- * a. explore the four phases in the process of problem solving including
- understanding the problem
 - determine the conditions of the situation
 - comprehend the language and terms used
 - identify the desired goal and understand the constraints
 - form a representation
 - examine the assumptions
 - devising a plan of attack and selecting the appropriate problem solving strategy
 - organized list
 - make a table
 - guess and check
 - act out/use problem and show reasoning
 - justify an answer by using manipulatives
 - draw a picture
 - use/find a pattern
 - work backwards
 - use logical reasoning
 - carrying out the plan
 - work through the problem
 - monitor use of the strategy
 - change strategies as necessary
 - reviewing
 - reconsider the initial conditions, constraints, and goals to make sure the solution fits
 - judge the reasonableness of the answer

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 - b. rely on metacognitive processes to solve a problem
 - activate prior knowledge about the information in the problem
 - develop various ways to represent information
 - question as he/she progresses to determine effectiveness and reasonableness

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**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.

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| Essential Learning 1 (Learning Standard A) (Learning Standard B) | Understand patterns, relations, and functions |
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| Critical Content | 8.A.2a 8.B.2 8.A.2a 8.A.2a 8.A.2a 8.A.2a 8.A.2b 8.A.2b 8.A.2a 8.A.2b 8.D.2 8.D.2 | <ul style="list-style-type: none"> a. analyze, describe, extend, and make generalizations about geometric and numeric patterns <i>such as</i> ABC, ABBA including recognizing missing elements or errors in a pattern b. create simple geometric and numeric patterns with repeating or growing patterns c. represent and analyze patterns and functions, using words, pictures, tables, and graphs d. determine a missing term in a pattern (sequence) e. explore identifying the “nth” term in a pattern with visual representation f. construct and solve simple number sentences using a letter or symbol for a variable <i>such as</i> $2 + a = 3$ g. represent simple mathematical relationships with number sentences, equations, and inequalities, such as $3+4 < 10$ h. express mathematical relationships of whole numbers using equations, <i>such as</i> $4 + 6 = 10$, $10 - 4 = \underline{\quad}$, $7 + 6 = 6 + \underline{\quad}$ i. represent and solve for a variable <i>such as</i> an unknown j. identify a rule to generate a pattern |
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| Essential Learning 2 (Learning Standard C) | Represent and analyze mathematical situations and structures using algebraic symbols |
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| Critical Content | 8.C.1 8.C.1 8.C.2 8.C.2 8.C.2 | <ul style="list-style-type: none"> a. demonstrate multiplication as repeated addition b. describe the basic arithmetic operations orally, in writing and using concrete materials and drawings c. apply the relationship of addition/subtraction and multiplication/division fact families to solve for an unknown quantity d. discuss operations and number properties including commutative, associative, distributive, transitive, zero, equality and order of operations e. demonstrate how to select and use an appropriate operation to solve problems involving patterns |
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| Essential Learning 3 * | Use mathematical models to represent and understand quantitative relationships and solve problems |
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| Critical Content | * | <ul style="list-style-type: none"> a. model and solve real life problem situations, representing them with pictures, graphs, symbols, or tables to draw conclusions <i>such as</i> pictures, graphs, tables, and equations to draw conclusions <i>such as</i> there are 8 pigs and 4 chickens, if there are 12 animals and 40 legs on the farm yard |
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| Essential Learning 4 * (Learning Standard D) | Use problem solving to analyze change in real life situations |
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| Critical Content | 8.D.2 | a. select and use an appropriate operation to solve problems involving patterns <i>such as</i> save one penny on day 1, double that amount each day for 10 days, ask how much total money will you have on the 10 th day? |
| | 8.D.2 | b. solve one-step linear equations using concrete materials <i>such as</i> I have ten students and twenty cookies, how many cookies can each child have? |
| | * | c. investigate how a change in one variable relates to a change in a second variable using objects, tables and graphs |

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| Essential Learning 5 * | Choose appropriate technology/tools for algebraic representations |
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| Critical Content | * | a. use appropriate technology and tools to solve equations <i>such as</i> <ul style="list-style-type: none"> • manipulatives, including Hands On Equations • calculators • computer programs • paper and pencil |
| | * | b. use language tools <i>such as</i> a math dictionary to determine meaning of terms |

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| Essential Learning 6 * | Recognize the connections between algebra, other math strands, and other curricular areas |
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| Critical Content | * | a. compare how reading a math story problem differs from reading expository and narrative text <ul style="list-style-type: none"> • know that in math a letter can represent a variable |
| | * | b. use reading strategies of inferring and making connections to analyze information in a given situation |
| | 8.C.2 | c. apply the commutative and associative property for addition |
| | 8.A.2b | d. represent and solve an equation of an unknown quantity using a letter or symbol in a number sentence <i>such as</i> $3 + n = 9$, $n = 6$ |
| | 8.C.2 | e. apply the commutative and distributive property for multiplication |
| | 8.C.2 | f. explore the associative property for multiplication |
| | 8.C.2 | g. use opposite operations to find missing numbers in equations |
| | * | h. observe patterns in our environment, <i>such as</i> Fibonacci numbers |
| | 8.A.2a | i. find, describe, extend and create patterns using manipulatives/numbers/letters/hundreds charts/arrays with an emphasis on number sense |
| | * | j. find, describe, extend and create geometric patterns using tessellations |
| | 6.A.2 | k. recognize patterns of odd/even numbers |

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| Essential Learning 7 * | Construct and communicate convincing arguments and proofs to solve problems algebraic problems |
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| Critical Content | * | a. use the language of algebra to express mathematical ideas precisely, both verbally and in writing |
| | * | b. make and test conjectures about mathematical properties and relationships and develop logical arguments to justify conclusions <ul style="list-style-type: none"> • explore the concept that in the commutative property order does not matter to achieve sameness • explore the concept that an equal sign does not mean “answer,” instead it means a balanced equation |
| | * | c. translate among and within representations <i>such as</i> concrete materials, spoken language, written language, pictures, diagrams and graphs, lists and tables, kinesthetic ways |
| | * | d. identify the rule used to generate a pattern |
| | 8.C.2 | e. explain how and why you solved an algebraic problem |
| | * | f. write an extended response for a one or two step problem including <ul style="list-style-type: none"> • the answer • the process • the strategy(ies) • the explanation including how and why |

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| Essential Learning 8 * | Build mathematical knowledge by using a variety of appropriate strategies to solve a problem |
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| Critical Content | * | a. explore the four phases in the process of problem solving including <ul style="list-style-type: none"> • understanding the problem <ul style="list-style-type: none"> • determine the conditions of the situation • comprehend the language and terms used • identify the desired goal and understand the constraints • form a representation • examine the assumptions • devising a plan of attack and selecting the appropriate problem solving strategy <ul style="list-style-type: none"> • organized list • make a table • guess and check • act out/use problem and show reasoning • justify an answer by using manipulatives • draw a picture • use/find a pattern • work backwards • use logical reasoning • carrying out the plan <ul style="list-style-type: none"> • work through the problem |
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- monitor use of the strategy
 - change strategies as necessary
 - reviewing
 - reconsider the initial conditions, constraints, and goals to make sure the solution fits
 - judge the reasonableness of the answer
- * b. rely on metacognitive processes to solve a problem
- activate prior knowledge about the information in the problem
 - develop various ways to represent information
 - question as he/she progresses to determine effectiveness and reasonableness

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

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

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| 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.A.2b | a. identify, draw, and name* points, lines, line segments, rays, parallel lines, intersecting lines and angles |
| | 9.B.2* | |
| | 9.A.2c | b. identify, describe, build and sketch two-dimensional shapes (triangles, squares, rectangles, pentagons, hexagons, and octagons) according to the number of sides, length of sides, and number of vertices |
| | 9.A.2c | c. identify, describe, build, and sketch three-dimensional shapes (cubes, spheres, cones, cylinders, prisms, and pyramids) according to their characteristics (faces, edges, vertices) |
| | 9.B.2 | d. compare, analyze, and classify attributes of two and three dimensional shapes <ul style="list-style-type: none"> • regular and irregular • convex and non-convex (concave) • identify faces, vertices, edges • identify congruent and similar figures |
| | 9.C.2 | e. develop definitions for classes of shapes, <i>such as</i> triangles and pyramids |
| | 9.B.2 | f. explore, define and classify shapes by attributes such as triangles include scalene, equilateral, right, isosceles and squares and equilateral triangles are regular polygons |
| | 9.B.2 | g. identify the concept of parallel lines |
| | 9.A.2c | h. identify, compare and sketch angles (acute, obtuse and right) |
| | 9.B.2 | i. explore right angles and perpendicular lines |
| | 9.A.2b | j. find and discuss geometric figures in real life settings |
| | 9.B.2 | k. identify congruent and similar figures by visual inspection |
| | 9.A.2c | l. explore and identify polygons and non-polygons |
| | 9.C.2 | m. predict the results of putting shapes together (composing) and taking them apart (decomposing), <i>such as</i> placing 2 congruent triangles together makes a rectangle |
| | * | n. recognize shapes that do and do not tessellate |

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| Essential Learning 2 * | Specify locations and describe spatial relationships using coordinate geometry and (or) other representational systems |
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| Critical Content | * | a. identify and use vocabulary associated with coordinate graphing using horizontal, vertical, axis, origin, quadrant, x, y, and ordered pairs |
| | * | b. make and use square and point coordinate systems to specify locations and to describe paths, <i>such as</i> mystery pictures and Battleship |
| | * | c. read, plot, name, locate and write ordered pairs |

NOTE: *such as* = an example used for clarification, but not a mandatory concept
including = a mandatory concept
* = exceeds state standards

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- * d. describe how points relate to one another, such as Point A is 3 points to the right of Point B
- * e. explore the need for uniform interval units along an axis plot and determine the interval
- * f. make representations of polygons using tools *such as* geoboards, dot paper, power blocks, grid paper and pattern blocks

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| Essential Learning 3 * | Apply transformations and use symmetry to analyze mathematical situations |
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| Critical Content | 9.B.1c | a. identify and draw lines of symmetry in two-dimensional figures |
| | 9.B.2 | |
| | 9.B.1c | b. identify symmetrical figures |
| | * | c. apply, identify, and complete rotations, reflections, and translations with two dimensional shapes |
| | * | d. predict and describe results of translating (sliding), reflecting (flipping), and rotating (turning) 2-dimensional shapes |
| | * | e. apply the appropriate transformations to identify which shapes tessellate |
| | * | f. determine congruence and similarity of a given shape |

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| Essential Learning 4 * (Learning Standard A) (Learning Standard C) | Use visualization, spatial reasoning, and geometric modeling to solve problems |
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| Critical Content | 9.A.2a | a. identify and build a three dimensional object from a two dimensional representation including nets |
| | 9.C.1 | b. determine the perimeter of a polygon with given side lengths or a given non-standard side unit, <i>such as</i> paperclips |
| | 9.C.2 | c. determine the area of a figure, when whole and half square units are shown |
| | 9.C.1 | d. determine the volume of a three-dimensional figure that shows cubic units |
| | 9.C.2 | e. from a two-dimensional drawing of an object <i>such as</i> a partially completed rectangular prism made from cubes, explore concepts <i>such as</i> <ul style="list-style-type: none"> • number of cubes to complete it • number of exposed faces |
| | 9.C.2 | f. develop the concept of rectangular arrays |

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| Essential Learning 5 * (Learning Standard C) | Choose appropriate technology/tools for geometric representations |
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| Critical Content | * | a. use appropriate technology/tools <i>such as</i> <ul style="list-style-type: none"> • computer software • mental visualization • manipulatives <i>such as</i> rulers, pattern blocks, solid shapes, nets |
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- paper and pencil
- * b. use language tools *such as* a math dictionary to determine meaning of terms

Essential Learning 6 * Recognize the connections between geometry, other math strands, and other curricular areas

- Critical Content
- * a. use reading strategies of visualizing and determining important ideas to analyze information in a given geometrical situation
 - * b. compare how reading a math story problem differs from reading expository and narrative text
 - * c. describe and find area and perimeter in a two dimensional polygon, as well as use given measurements to draw a figure
 - * d. explore finding locations on a coordinate grid *such as* latitude and longitude
 - * e. explore the relationship between number and shape including square numbers arrays
 - * f. describe and find the volume of three dimensional figure *such as* rectangular prisms showing cubes
 - * g. explore use of geometric concepts and figures and patterns in art *such as* congruency and transformations within patterns in tessellations and frieze patterns
 - * h. apply coordinate grid and point plotting skills to graphing

Essential Learning 7 (Learning Standard C) Construct and communicate convincing arguments and proofs to solve problems involving geometry

- Critical Content
- * a. use the language of geometry to express mathematical ideas precisely, both verbally and in writing
 - 9.C.2 b. make and test conjectures about mathematical properties and relationships and develop logical arguments to justify conclusions such as
 - explore the relationships between the different polygon terms, such as squares are a subset of rectangles, which are a subset of parallelograms
 - explore predicting and verifying the results of subdividing and combining shapes through manipulations
 - describe a motion or a series of motions that will show that two shapes are congruent
 - identify the two-dimensional components of a three-dimensional object
 - explore patterns to help determine the number of faces, edges, and vertices of solids through manipulations
 - apply geometric ideas and relationships to real life situations

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- * c. write an extended response for a two or three step problem including
 - the answer
 - the process
 - the strategy(ies)
 - the explanation including how and why
- * d. translate among and within representations *such as* concrete materials, spoken language, written language, pictures, diagrams and graphs, lists and tables, kinesthetic ways

Essential Learning 8 * Build mathematical knowledge by using a variety of appropriate strategies to solve a problem

- Critical Content
- * a. explore the four phases in the process of problem solving including
 - understanding the problem
 - determine the conditions of the situation
 - comprehend the language and terms used
 - identify the desired goal and understand the constraints
 - form a representation
 - examine the assumptions
 - devising a plan of attack and selecting the appropriate problem solving strategy
 - organized list
 - make a table
 - guess and check
 - act out/use problem and show reasoning
 - justify an answer by using manipulatives
 - draw a picture
 - use/find a pattern
 - work backwards
 - use logical reasoning
 - carrying out the plan
 - work through the problem
 - monitor use of the strategy
 - change strategies as necessary
 - reviewing
 - reconsider the initial conditions, constraints, and goals to make sure the solution fits
 - judge the reasonableness of the answer
 - * b. rely on metacognitive processes to solve a problem
 - activate prior knowledge about the information in the problem
 - develop various ways to represent information
 - question as he/she progresses to determine effectiveness and reasonableness

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**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.

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| Essential Learning 1 (Learning Standard A) (Learning Standard B) | Develop concepts of data collection and analysis |
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| Critical Content | 10.B.3* 10.B.2a 10.B.2b 10.B.2c 10.B.2d | a. investigate to address a question <ul style="list-style-type: none"> • identify the problem (question) • consider how data-collection methods affect the nature of the data set • collect/gather data using observations, questionnaires, surveys, and experiments • organize data using tally charts, tables, and line plots • display data using circle/pie graphs, line graphs, pictographs, and bar graphs • analyze the data, including <ul style="list-style-type: none"> • develop strategies to determine median and mode • find maximum, minimum, range, median, and mode for a data set • draw conclusions |
| | 10.B.2c 10.B.2d | b. read and interpret data represented on circle/pie graphs, line graphs, pictographs, bar graphs, tables, line plots, Venn Diagrams, and tally charts |
| | 10.B.2a * * | c. choose appropriate representations of data d. describe the shape and important features of a set of data e. compare different representations of the same data |
| | 10.A.2c 10.B.2d | f. propose and justify conclusions and predictions that are based on data and communicate his/her reasoning |

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| Essential Learning 2 (Learning Standard C) | Develop the concept of probability |
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| Critical Content | 10.C.2a | a. calculate and predict the theoretical probability (chance) of a simple event based on the results from a series of experiments that are recorded and analyzed (experimental probability), <i>such as</i> coin tosses, spinners, dice, and bags of manipulatives |
| | 10.C.2b | b. make a connection between theoretical probability and experimental probability through repetition of each of the experiments |
| | 10.C.2b | c. interpret probability events using words, including least likely, most likely, equally likely, -impossible, possible, certain, and 50/50 |
| | 10.C.2b * | d. understand that the measure of the likelihood of an event can be represented by a number on a scale from 0 to 1 e. represent probability as a fractional part of a whole group to <i>such as</i> a tossed coin can land on heads or tails; therefore, it should land on heads ½ of the time |
| | * | f. list all possible outcomes of simple problems |

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- 10.C.2b* g. explore the meaning of percent as it relates to probability *such as* 100% probability equals certainty and 0% equals impossible

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| Essential Learning 3 | * | Choose appropriate technology/tools for data collection and representation |
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| Critical Content | * | a. use appropriate technology and tools <i>such as</i> <ul style="list-style-type: none"> • computer • graph paper • manipulatives <i>such as</i> coins, dice, spinners |
| | * | b. use language tools <i>such as</i> a math dictionary to determine meaning of terms |

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| Essential Learning 4 | * | Recognize the connections between data collection and probability, other math strands, and other curricular areas |
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| Critical Content | * | a. compare how reading a math story problem differs from reading expository and narrative text |
| | * | b. use the reading comprehension strategies of inferring, questioning, and determining important ideas to analyze data in a given situation <ul style="list-style-type: none"> • recognize that drawing conclusions is implicit information |
| | * | c. connect the concept of mean to fair share division |
| | * | d. connect number scale 0-1 to fractions |
| | * | e. practice measurement skills to create data set |

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| Essential Learning 5 | * | Construct and communicate convincing arguments and proofs to solve problems involving probability |
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| Critical Content | * | a. use the language of data and probability to express mathematical ideas precisely, both verbally and in writing |
| | * | b. make and test conjectures about mathematical properties and relationships and develop logical arguments to justify conclusions |
| | * | c. discuss possible outcomes of experiments |
| | * | d. recognize that one, whole, and unit are interchangeable terms |
| | * | e. write an extended response for a one or two step problem including <ul style="list-style-type: none"> • the answer • the process • the strategy(ies) • the explanation including how and why |
| | * | f. translate among and within representations <i>such as</i> concrete materials, spoken language, written language, pictures, diagrams and graphs, lists and tables, kinesthetic ways |

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Essential Learning 6 ***Build mathematical knowledge by using a variety of appropriate strategies to solve a problem**

Critical Content

- * a. explore the four phases in the process of problem solving including
 - understanding the problem
 - determine the conditions of the situation
 - comprehend the language and terms used
 - identify the desired goal and understand the constraints
 - form a representation
 - examine the assumptions
 - devising a plan of attack and selecting the appropriate problem solving strategy
 - make a table
 - organized list
 - guess and check
 - act out a problem
 - use manipulatives
 - draw a picture
 - use/find a pattern
 - work backwards
 - use logical reasoning
 - carrying out the plan
 - work through the problem
 - monitor use of the strategy
 - change strategies as necessary
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 - reconsider the initial conditions, constraints, and goals to make sure the solution fits
 - judge the reasonableness of the answer
- * b. rely on metacognitive processes to solve a problem
 - activate prior knowledge about the information in the problem
 - develop various ways to represent information
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